

Initial Environmental Examination

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India: Rajasthan Urban Sector Development Investment Program—Karauli Sewerage and Sanitation Subproject (Tranche 3)

Prepared by Local Self Government Department for the Asian Development Bank.

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

CURRENCY EQUIVALENTS

(as of 6 June 2013)

Currency unit	=	Indian rupee/s (Re/Rs)
Re1.00	=	\$0.02
\$1.00	=	Rs 56.42

ABBREVIATION

ADB	-	Asian Development Bank
DSC	-	Design and Supervision Consultancy
EA	-	Executing Agency
EAC	-	Expert Appraisal Committee
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	-	Multitranchise Financing Facility
MoEF	-	Ministry of Environment and Forests
NAAQS	-	National Ambient Air Quality Standards
OHSR	-	Over Head Service Reservoir
OM	-	Operations Manual
PHED	-	Public Health Engineering Department
PM	-	Particulate Matter
PMU	-	Project Management Unit
RCC	-	Reinforced Cement Concrete
ROW	-	Right of Way
RPCB	-	Rajasthan State Pollution Control Board
RUIDP	-	Rajasthan Urban Infrastructure Development Project
RUSDIP	-	Rajasthan Urban Sector Development Investr Program
SPM	-	Suspended Particulate Matter
STP	-	Sewerage Treatment Plant
ToR	-	Terms of Reference
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
$\mu\text{g}/\text{m}^3$	–	micrograms per cubic meter
km	–	kilometer
lpd	–	liters per day
m	–	meter
mg/l	–	milligrams per liter
mm	–	millimeter
ppm	–	parts per million

NOTES

- (i) The fiscal year (FY) of the Government of India and its agencies begins on 1 April and ends on 31 March. “FY” before a calendar year denotes the year in which the fiscal year ends, e.g., FY2011 begins on 1 April 2011 and ends on 31 March 2012.
- (ii) In this report, “\$” refers to US dollars.

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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 Multitranches 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 Safeguard Policy Statement, SPS (2009) 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 the sewerage and sanitation sub-project which is the subject of this Environmental Examination. For construction of STP “consent to establish” and for operation “consent to operate” are required from State Pollution Control Board.

3. This is the Initial Environmental Examination (IEE) report for the Karauli sewerage and sanitation sector. It discusses the generic environmental impacts and mitigation measures relating to the location, design, construction and operation of physical works proposed under this subproject.

4. **Project Description:** The sub-project is located in Karauli, the headquarters town of Karauli district, in the South-Eastern Boader of Rajasthan. The main components of the sub-project are Construction of 5 MLD Sewage Treatment Plant (STP) based on UASB process near Charagah village, construction of Intermediate Pumping Station (IPS), laying of pumping main, laying of sub-mains & laterals sewers, and Laying of Outfall Sewer & Trunk Mains. STP site is about 800-1000 m away from the residential village. The 4 ha land proposed for STP is in government land.

5. **Description of Environment:** Karauli is located between 26° 30' N and 26° 49' N Latitude and 76° 30' E and 77° 26' E Longitudes with average elevation of town is approximately 275 metres above M.S.L. Karauli town is surrounded by River in three sides. In the north-east side River Bhadrabati and In South-west side River Barkhera surrounded the town. Karauli 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. Karauli is essentially a hilly area surrounded on three sides on plans and one side by the Chambal River. The Mountain Arabali's eastern series consists of quartz, Mica, gneiss and Migmatites etc., whereas, the rock of Great Vindhyan series, mainly in Kaimul, Riwa and Bhandar, consists largely of sand stone, lime stone and slate. Soil of the region falls within rainfall zone of 500- 700 mm. The soil is generally alluvial in nature which prone to water logging. The region has a generally arid climate. The average rain fall of the district is 68.92 cm. The district has only approximately of 35 rainy days on average in a year. The range of temperature is high with maximum reaching up to 49°C and Minimum recorded as low as 20°C. The ambient air quality monitoring of Karauli town was carried out in the month of April 2012.

Traffic is the only significant pollutant in Karauli, so levels of oxides of sulphur and nitrogen are well within the National Ambient Air Quality Standards (NAAQS). On an average 60-70 50% of the district area (mostly south and eastern part of the district) covered with consolidated fissured formation with some patches of hilly area. Water quality from existing tube wells, especially around the city centre, has deteriorated significantly with a total dissolved solids having increased from 850 ppm to 2,535 ppm thereby rendering water unsuitable for human consumption. The results also indicate higher concentration of nitrate (10 percent samples) and iron (30 percent samples) than recommended levels prescribed by the Indian standards on drinking water. It is therefore recommended that as far as possible existing tube wells should be abandoned. There is no forest area nearby the sub-project site. No endangered flora and fauna is reported from the site.

6. Karauli, being the district headquarters for Karauli District, performs all administrative and revenue functions required of a district center. Traditionally, Karauli is a commercial town and the main occupation of the people is agriculture and commercial. However some developments can be seen now a day in the town in form of industries and commercial activities. Karauli is also a cultural town depicting original Rajasthan Heritage. According to the Census of 2001 the work force participation ratio in Karauli is 23.38 percent, which is marginally lower when compared with cities such as Kota (27.6%), Jaipur (27.0%), Udaipur (28.0) and the state of Rajasthan (26.6%). During the last century, Karauli remained industrially backward. It mainly depended on agriculture and few cottage industries. Quarrying of building stone was the only activity which provided employment to the comparatively large section of the population. The area of Karauli Municipality Board is 58,808 Acre. Out of this total area, 17,642 acres is developed and rest of the land is full of hills and ravines. Residential use of land is 30% of developed land. The major portion of municipal land is full of hills and ravine resulting in heterogonous nature of settlements. 36.12 percent of municipal land is wasteland and used for animal grazing. Proportion of commercial land is of 4.5 percent whereas recreation land is 21.8 percent.

7. Water supply to Karauli is from only groundwater sources comprising 32 nos. of tube well. Groundwater is tapped through the tube wells. From tube well 5.2 MLD water extract and supplied to the town. There is no underground sewage system in Karauli town at present. Only few households have covered with individual septic tank. The disposal of waste and effluent of septic tank is through the open drains. Presently the roads in Karauli town are equipped with kachha open drains, but most of the drains are silted resulting in overflow and resulting flooding in monsoon. Small industries exist in under RIICO, which is outside the city area and small amount of effluent disposed scattered in local nallahs. Karauli generates 35.73 tons (approx.) of solid waste daily in 2009 and Waste collected per day is only 11 tons (approx.). Karauli comprises a road network of 95 km, consisting of 35 km concrete roads, 15 km bituminous roads, and 25 km of earthen road control and maintained by Municipality and 20 km of BT road under PWD control which is mainly the part of SH-22 (Hindaun-Mandrayal road) and National state highway no. NH-11B (Masalpur-Gangapur road).

8. According to Census 2001, the population of Karauli Urban Agglomeration is 66,239 and spreads over Karauli Municipal area in 35 nos. of wards. Initially Karauli district was within the Sawai Madhopur district, but later on, Karauli was separated as a distinct district. Being a district headquarters, it is expected that the requisite number of educational and health facilities are available within the city area for the population as per norms. Karauli is a popular destination for domestic as well as foreign tourist. Some famous temple like Madan Mahan Temple, Ma Sahib Temple, Sri Kaila Devi Temple, Kaila Devi Sanctuary and Sri Karanpur Mata Temple. Timagarh

fort, Mandaroyal fort, Sahi Kund, Raj Palace, Sukh Vilas and Rangawa Talav are other points of attraction for tourist inflow.

9. 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 localized and not greatly significant during design phase.

10. The proposed STP is situated on non cultivated land and devoid of any environmental sensitive feature inside or in the vicinity of the proposed site. Though there is no restricted area is located nearby the project sites but during construction special attention particularly application of some mitigation measures are recommended in IEE report. No historical site, cultural monument is there within a distance of about 10 Km so there will be no chance of damages to these sites. Kaila Devi National Park is about 20 Km away from the site, and there will be no chance of any interference due to proposed location of STP.

11. During project implementation the impacts are consider on physical environment like water, air, soil, noise; on biological environment, like flora and fauna 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 IEE. During pipe laying traffic management plan will be applied. In and around the STP buffer zone plantation will be considered. During operation phases there are few positive socio-economic impacts will be anticipated.

12. 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.

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

Environmental management and monitoring cost for the sub-project has been estimated as 1.5 million Rupees.

14. 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 meetings were conducted 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 program.

15. 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.

16. 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.

17. 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 and national law. Only consent from pollution control board will be required for establishment and operation of STP.

I. INTRODUCTION

A. Purpose of the Report

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

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

3. RUSDIP will improve infrastructure through the design and implementation of a series of subprojects, each providing improvements in a particular sector (water supply, sewerage, solid waste etc) in one town. RUSDIP has been classified by ADB as environmental assessment category B (some negative impacts but less significant than category A). The impacts of subprojects prepared according to Safeguard Policy Statement (SPS) of ADB (2009) and Environmental Assessment Guidelines (2003).

B. Extent of the IEE study

4. Indian law and ADB's policy (2009) 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 SPS (2009) 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:

- (i) Category A: Projects that could have significant environmental impacts. An Environmental Impact Assessment (EIA) is required.
- (ii) 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.
- (iii) Category C: Projects those are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.
- (iv) Category FI: Projects that involve a credit line through a financial intermediary (FI) or an equity investment in a FI. The FI must apply an environmental management system, unless all subprojects will result in insignificant impacts.

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

2. National Law

8. The GoI EIA Notification of 2006 as amended in 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 only type of infrastructure provided by the RUSDIP that is specified in the EIA Notification is solid waste management, where EC is required for all Common Municipal Solid Waste Management Facilities (CMSWMF).¹ EC is thus not required for the sewerage sanitation

¹ For the purpose of EIA Notification, common municipal solid waste management facilities may be referred as

sub-project that is the subject of this Environmental Examination. For construction of STP “consent to establish” and for operation “consent to operate” are required from State Pollution Control Board.

3. Review and Approval Procedure

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

4. Scope of Study

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

II. DESCRIPTION OF THE PROJECT

A. Type, Category and Need

14. This is a sewerage and sanitation sub-project, and as explained above it has been classified by ADB as Category B, because it is not expected to have major negative environmental impacts. Under ADB procedures such projects require an IEE to identify and mitigate the impacts, and to determine whether further study or a more detailed EIA may be required. The sub-project is needed because there is no underground sewage system in Karauli town at present. Only few households have covered with individual septic tank. The disposal of waste and effluent of septic tank is through the open drains. Presently the open drains, which have been constructed by Municipal Board, convey the sludge and sewage which is leading to unhygienic and unsanitary conditions.

15. From the demand gap analysis it is to be concluding that there is comprehensive need of UGD scheme for proper collection and treatment and disposal of sewage in the town. It is also to be seen from demand gap assessment that significant area of land will be required for installation of sewage treatment facilities.

B. Location, Size and Implementation Schedule

16. The sub-project is located in Karauli, the headquarters town of Karauli District, in the north eastern part of Rajasthan. The infrastructure will extend throughout many parts of the town, where pipes for new secondary and tertiary sewer networks will be buried within or alongside roadways. Proposed sewerage layout plan of Karauli town is shown in **Figure 2.1** A new outfall sewer will be buried alongside the Road. There will be a new Sewage Treatment Plant (STP) of 5 MLD to be built near Village Charagah (**Figure 2.2**).

centralized MSW facility for an given town, city, region. It is further to mention a common facility need not have surrounding ULBs included.(Technical EIA Guidance Manual for CMSWMF)

17. Detailed design began in the last quarter of 2009 and completed with revised scope by mid of 2010. Construction of all elements will be begin in early 2013 and expected to complete within 2 years, i.e by the end of 2014.

18. Photographs of the project area are attached as **Annexure 1**.

1. Existing Sewerage and Sanitation status of Karauli

19. There is no underground sewage system in Karauli City at present. Only few households have individual septic tanks. The disposal of Waste and effluent of septic tank is through open drains. Presently the open drains, which have been constructed by Municipal Board, convey the sewage which is leading to unhygienic and unsanitary conditions. As reported by the Karauli MB, there are 5250 nos. individual disposal system with septic tanks covering 33015 population & 1325 nos. of low cost sanitation units. Besides individual disposal system, 25200 populations directly dispose the sewage to the open drains.

20. The Karauli town lacks drainage facilities where waste water gets accumulated over streets, creating unhygienic conditions. There is no effective waste water collection, disposal and treatment plant in Karauli city. Untreated waste water is allowed to flow though existing *Nallas* at depression. Waste water is ultimately absorbed by soil. Absence of underground sewerage system is highlighted as major problem and major health hazard. More than 50 percent of the city's population depends on septic tanks or pit latrines or discharges sewer to the surrounding *nallahs*, through the existing open drains the remaining resort to 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.

2. Objective of the subproject:

- (i) General Improvement in the existing environmental condition.
- (ii) Collecting the sewage from houses through respective house connections.
- (iii) Collecting and conveying the sewage through laterals, sub mains, mains and also by interception of side drains.
- (iv) Transporting sewage from all localities through trunk mains to STP.
- (v) Achieving the treatment through appropriate sewage treatment process to the standards suitable for use of effluent.

C. Sub- project Description including detailed scope

21. **Subproject Component:** Subproject components covered under Phase-1 are as under:
- (i) Construction of 3 Nos. of Pumping stations - Near Ambedkar circle, Near Nadi Gate and Near Sainath Khidikiya.
 - (ii) Construction of 5 MLD Sewage Treatment Plant based on UASB process behind Government College including all Civil, Electrical, Mechanical, Pumping and other allied works.
 - (iii) Laying of Trunk Mains of RCC of 700 mm to 900 mm dia. for a length of 2419 m of RCC (NP-3/NP-4).
 - (iv) Laying of Sub-Mains & laterals sizes 200 mm to 500 mm dia. for a length of 28772 m of RCC (NP-3/NP-4).
 - (v) Laying of 400 mm dia. HDPE PE-100/PN-6 pipe for a length of 250 m by trenchless technology.

- (vi) PVC-U pipes of 110 & 160 mm Dia. for a length of 24618 m. for property connections.

22. **Table 2.1** shows the nature and size of the various components of the subproject. As indicated above there are three main elements: provision of a network to collect sewage from different city part; a trunk sewer to transport waste to the STP; and a new STP to treat sewage to Indian legal standards. The descriptions shown in **Table 2.1** are based on the present proposals, which are expected to be substantially correct, although certain details may change as development of the subproject progresses.

23. Under Tranche-III, works of the STP (which will be of approx.5.0 MLD capacity in 1st phase and can be increased in phase manner) will be constructed comprising of secondary treatment by UASB process and Sewerage Network of pipe line in the main old town including out fall and Trunk sewer, Laterals and house connection. Under Tranche-III, the work for sewerage network for the city including laying of Laterals and sewer lines in surrounding developed areas of the town and house connections to be considered. Land identified for STP to an extent of 4ha and under possession of project Executing Agency. Layout plan of STP is shown in **Figure 2.2**.

Table 2.1: Improvements in sewerage infrastructure proposed in Karauli

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Infrastructure	Function	Description	Location	Remarks
Sewage Treatment Plant (STP)	For treatment of Raw Sewage.	Capacity: 5 Million Liters per Day (MLD) Technology: Upflow Anaerobic Sludge Blanket (UASB) Components: 1. Initial pumping – There are three Sewage Pumping Station two intermediate PS i.e SPS-1, between Ambedkar Circle and Mela Gate, SPS-4 near Sainath Khedkiya and one SPS at STP & pumping main up to Govt. College. ➤ SPS-1 has to tackle 23. 23 MLD Peak flow with submersible pumps of 242 Cum/hr. -2 Nos, 484 Cum/hr. -3 Nos. ➤ SPS-4 will tackle 1.21 MLD Peak flow with 12.62 Cum/hr. -2 Nos, 25.25 Cum/hr. -3 Nos, submersible pumps. ➤ Another SPS is proposed at STP to handle the present combined peak flow 11.25 MLD (10.04+1.21) with 117.50 cum/hr. -2 Nos, 235 Cum/hr. -3 Nos, submersible pumps. 2. Screening and degritting ➤ Coarse Screen Chamber There shall be two coarse screen chambers of RCC, one working and one stand by shall be provided both screen shall be mechanically operated with following specifications: Capacity: Each to handle Design Peak flow 11.25 MLD Arrangement: Parallel to each other and provided with a common conveyor system to collect and convey screenings to disposal bin. Clear spacing: (max) 50 mm Flats size: 10 mm x 50 mm Velocity : 1 m/s (maximum) MOC: SS AISI 316 ➤ Fine Screen Chamber Two fine screen channels shall be	4 ha land behind Government college near village Charagah	Sludge will be stabilized in the sludge bed. Dried sludge will be collected every 4 to 5 years and will be utilized as soil conditioners or any other identified reuse in accordance with the nitrogen and phosphorus contents of the dried sludge. The consent to establish for the STP has been obtained from Rajasthan Pollution control Board on 07.08.2012 (ANNEXURE-6)

Infrastructure	Function	Description	Location	Remarks
		provided to install mechanical operated fine screens. These screens will be with clear spacing between bars of 6 mm and comprise of SS-316 flats, 50 mm x 10mm. and min. horizontal velocity of 0.3 m/sec. ➤ Grit Separator (Degritting): These shall be built in R.C.C. Grit chamber is provided to arrest all the inorganic grit of size 0.15 mm and above with specific gravity of 2.4 to 2.65. The detention time shall be 1 min and surface overflow rate shall be around 920 m³/m²/day. There shall be 2 grit chambers, each shall be designed for Peak flow i.e. 11.25 MLD flow. 3. Main UASB reactor: These reactors shall be constructed in R.C.C. They will either be circular or rectangular in shape depending upon the design with min. land requirement of 800 Sq.m. with following specification: a) Reactor tank: M-40 grade concrete vibrated, or concrete made with sulphate resistant cement. <i>Portion below liquid level :</i> Epoxy paint to resist CO₂ attack <i>Portion above liquid level:</i> FRP lining on R.C.C b) Distribution boxes: M-40 R.C.C c) Over flow weirs of the distribution boxes: FRP d) Bolts and nuts for adjustment :SS-316 (keep all weirs adjustable and use FRP only for weirs) e) Down take pipes :FRP, HDPE, MDPE f) Sludge with draw Pipes: C.I Pipes (Class LA) as per IS g) Gas Hoods: R.C.C with 5 mm FRP lining internally to the gas collecting channels h) For slopes of hoods: PVC plates on FRP frames		

Infrastructure	Function	Description	Location	Remarks
		4. Gas collection and handling Gas flaring system is to be provided for the gas generated in UASB reactor. A distance of minimum 30 m shall be kept waste gas burner and the reactor tank or future gas holder to avoid the possibility of igniting the gas mixture. The capacity of the waste gas burner shall be adequate to burn the gas generated at optimum conditions. A pilot flame device should also be provided with the waste gas burner. Condensate traps, pressure release valves and flame traps should be provided ahead of the waste gas burner. Manometer indicating the gas pressure in cm of water should be used in the gas pipeline from the reactor. At present no gas holder is to be provided. However, planning and designing of plant has to be done considering that the gas holder will be installed in future. 5. Sludge drying bed The stabilized sludge withdrawn from the UASB reactors shall be dried on sludge drying beds. Sludge drying beds with an indicative area of about 1000 m² will be required for this sludge. Sludge drying beds shall be constructed in gravel and sand. Depth of sludge blanket shall be around 0.3m. Drying cycle shall be assumed to be around 7 days. 6. Post treatment facility A natural nalla is located on the south west direction of the STP site. This is sloping in the west direction towards river Barkheda. This nalla will be useful in discharging treated sewage as this is leading to another nalla that is used for irrigation purpose.		

Infrastructure	Function	Description	Location	Remarks
Intermediate pumping station	For intermediate sewage pumping	Construction of Pumping stations for pumping of raw sewage - Near Ambedkar circle, Near Nadi Gate and Near Sainath Khidikiya.	Near Ambedkar circle,	No fencing /compound wall required. Access to the pump house during operation and maintenance phase will be limited to authorized personnel only.
			Near Sainath Khidikiya	No fencing /compound wall required. Access to the pump house during operation and maintenance phase will be limited to authorized personnel only.
Trunk and lateral (Secondary) Sewers and tertiary network and house connection	Different dia. of sewer network and to connect with outfall sewer.	Laying of Trunk Mains of RCC of 700 mm to 900 mm dia. for a length of 2,419 m of RCC (NP-3/NP-4).	To be buried along existing right of way	Maximum excavation will be 1.85 m wide and 6.47 m deep. One stretch of trench with 30 to 50 m length will be kept open for maximum of 2 days. Road will be reinstated to original or better condition
		Laying of Sub-Mains & laterals sizes 200 mm to 500 mm dia. for a length of 28,772 m of RCC (NP-3/NP-4).	To be buried along existing right of way	Maximum excavation will be 1.85 m wide and 6.47 m deep. One stretch of trench with 30 to 50 m length will be kept open for maximum of 2 days. Road will be reinstated to original or better condition
		Laying of 400 mm dia. HDPE PE-100/PN-6 pipe for a length of 250 m by trenchless technology.	Minimal excavation of for the equipment at the both ends	No anticipated impact
		PVC-U pipes of 110 & 160 mm Dia. for a length of 24618 m. for property connections.	To be buried along existing right of way	Maximum excavation will be 0.35 m wide and depth will vary as per site conditions. One stretch of trench will be kept open for maximum of 1 day. Road will be reinstated to original or better condition

Figure 2.1: Proposed Sewerage system map of Karauli

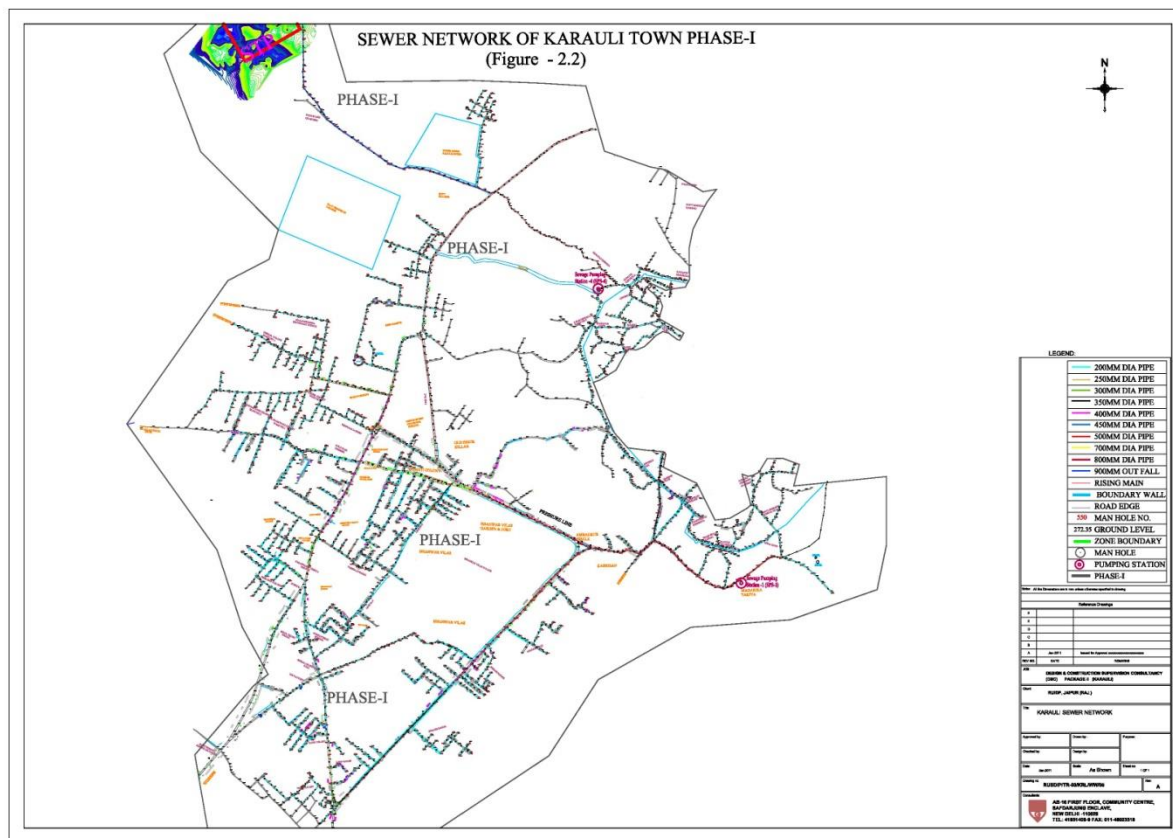
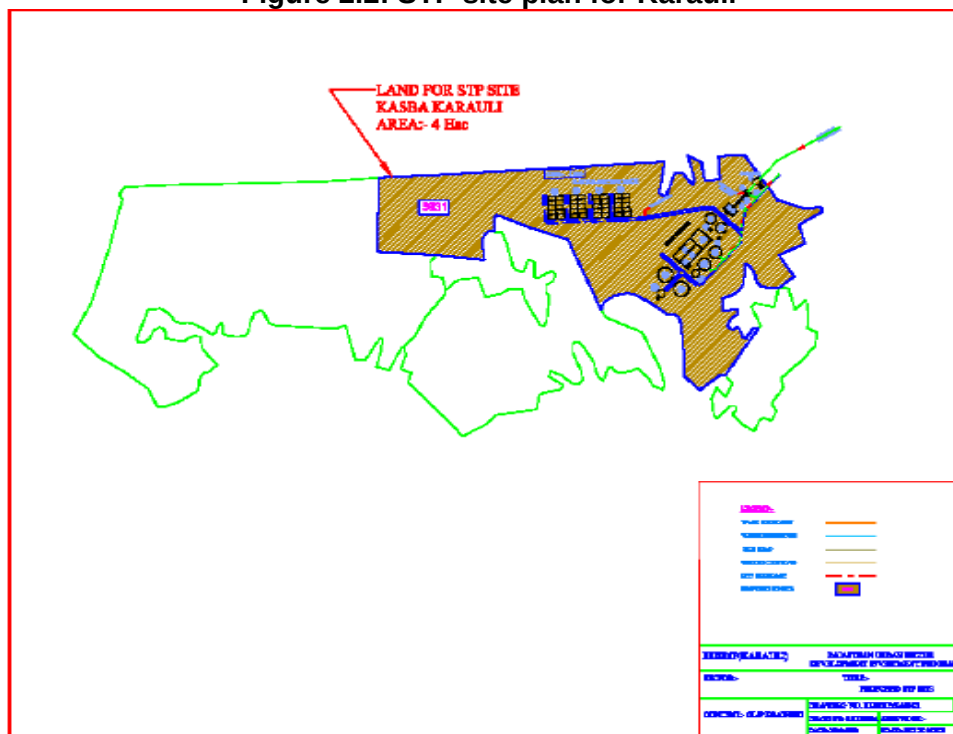


Figure 2.2: STP site plan for Karauli



III. DESCRIPTION OF THE ENVIRONMENT

A. Physical Resources

1. Location

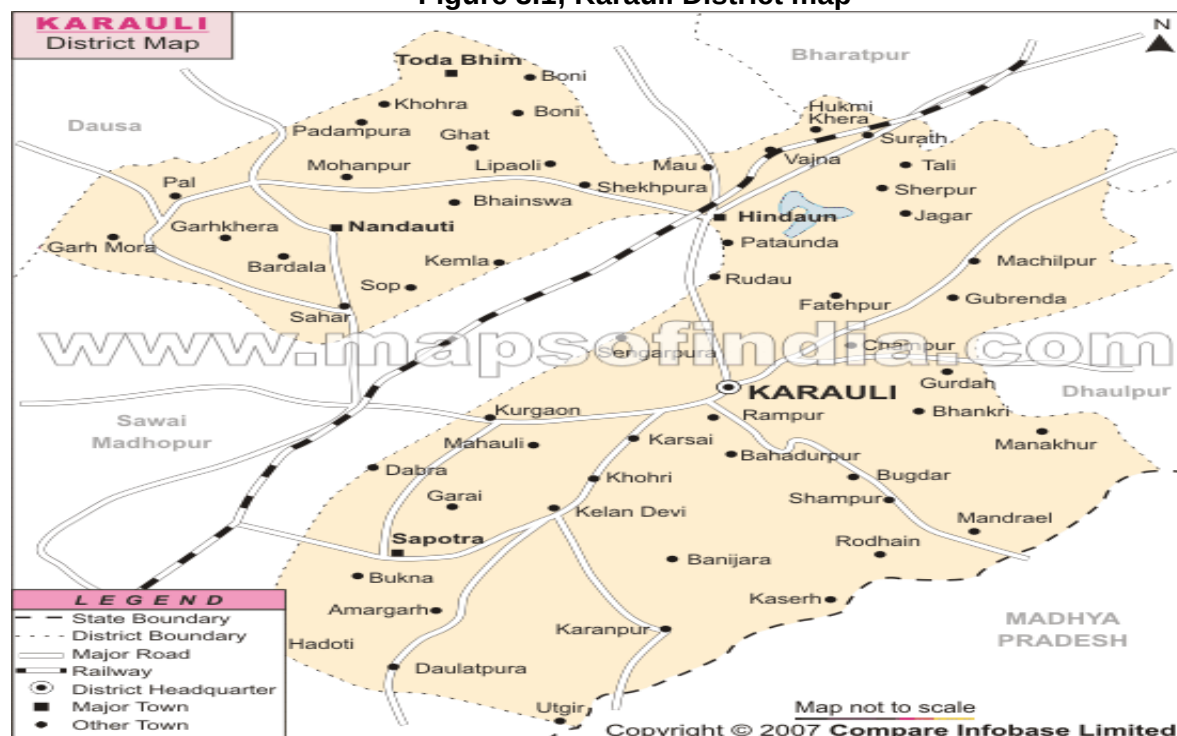
24. Karauli is the historical place and was found by King Arjun Pal of the Yadav Empire in 1348. Its original name was Kalyanpura because of the famous Temple of Kalyan of the town. Earlier it was called Bhadrawati due to its location on the bank of River Bhadrabati. The circumference of Karauli under walled city is 3.7 km. and it's made of red sand stone. It has six large gateway (Darwaze) and twelve small gate way (Khitkiyan). The town has grown considerably from its original area of 1.05 sq.km to 33.00 sq. km. on 19th July, 1997 Karauli was declared a new district and become the 32nd district of Rajasthan. Now Karauli is the district as well as administrative head quarter of the district. The district is divided into five subdivisions- Karauli, Sapotara, Mandrayal, Todabheem and Hindann. The details of the district are depicted in the **Table 3.1**. **Figure 3.1** shows Karauli district map.

25. Karauli town is surrounded by River in three sides. In the north-east side River Bhadrabati and In South-west side River Barkhera surrounded the town.

Table 3.1: Salient features of the district

Name of Tehsil	Nos. of Kanungo Circle under Tehsil with name	Total population	Tehsil
Hindaun	Bargaban, Hindaun, Khera, Mahoo Ibrahimpur, Sherpur, Shri Mahaveerji, Suroth (7 nos.)	347264	
Karauli	Chainpur, Gunesra, Kailadevi, Karauli, Kheria, Maholi, Masalpur (7 nos.)	288860	
Mandrail	Langra, Mandrail (2 nos.)	61182	
Nadoti	Garh khera, Harh Mora, Gurha Chandraji, Kemla, Nadoti, Shahar (6 nos.)	126089	
Sapotra	Amargarh, Inayati, Jeerota, Karanpur, Kurgaon, sapotra (6 nos.)	171331	
Todabhim	Balghat, Kamalpura, Kariri, Mahamadpur, Nangal Sherpur, Padampura, Todabhim (7 nos.)	214939	

Figure 3.1; Karauli District map



2. Topography, Drainage, Natural hazard and Drought

26. **Topography** The Karauli town is located between $26^{\circ}30'$ N and $26^{\circ}49'$ N Latitude and $76^{\circ}35'$ E and $77^{\circ}26'$ E longitudes. The average elevation of the town is approximately of 275 m above the mean sea level. Karauli subdivision is full of hills and streams while the rest of the district is mostly fertile plain with light sandy soil. The hilly and forested Karauli subdivision is known locally as Dang. It situated in the south eastern border of Rajasthan, East of Dausa and southwest of Sawai Madhopur district. It is bordered in the northeast by Dholpur and in the northwest by Bharatpur

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

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

Figure 3.2: Earthquake zones of Rajasthan

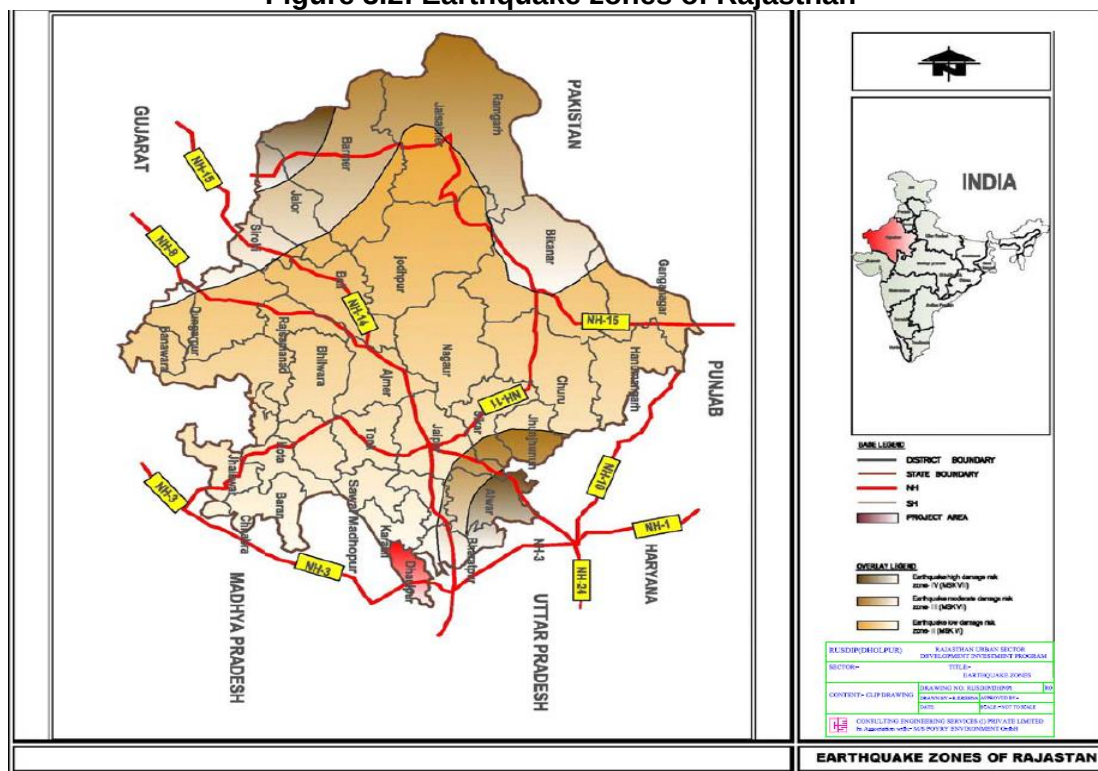
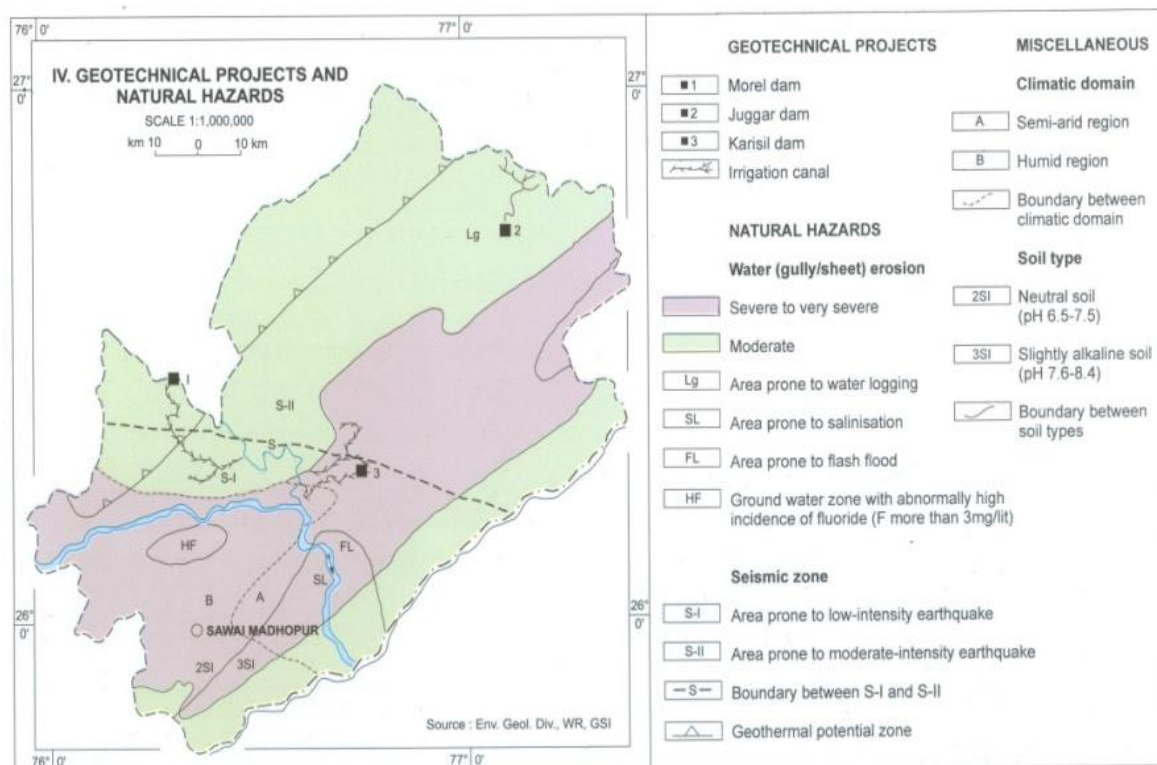


Figure 3.3: Natural Hazard zone within Sawai Madhopur and Karauli District (GSI Resource map)



3. Geology, geomorphology, mineral resources and soil

29. Karauli is essentially a hilly area surrounded on three sides on plans and one side by the Chambal River. The Mountain Arabali's eastern series consists of quartz, Mica, gneiss and Migmatites etc., whereas, the rock of Great Vindhyan series, mainly in Kaimul, Riwa and Bhandar, consists largely of sand stone, lime stone and slate. The district is well endowed with both metallic and non-metallic minerals. Lead, copper and iron ore are the major minerals available there. Besides, the region also has ample reserves of spotted red sand stone and pink stone of Bhandar series. Geology and mineral map of Sawai Madhopur and Karauli district is depicted in **Figure 3.4** and geomorphological map is shown in **Figure 3.5**.

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

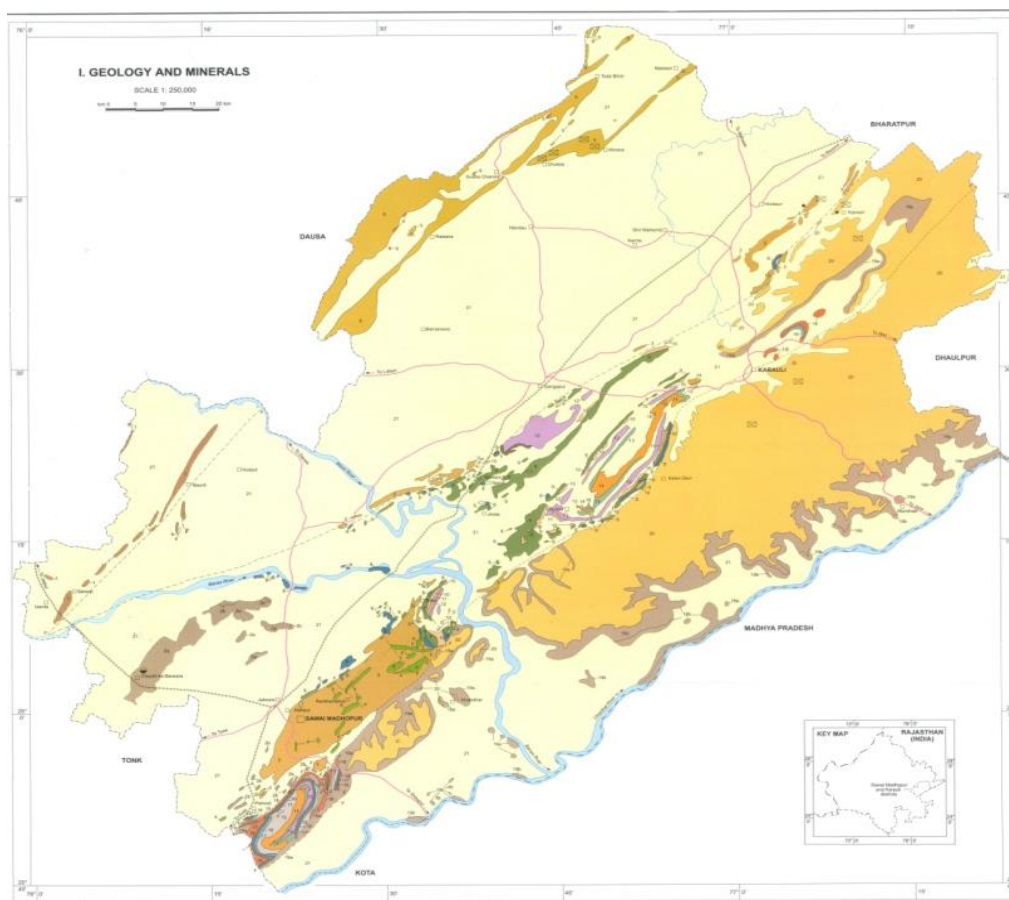
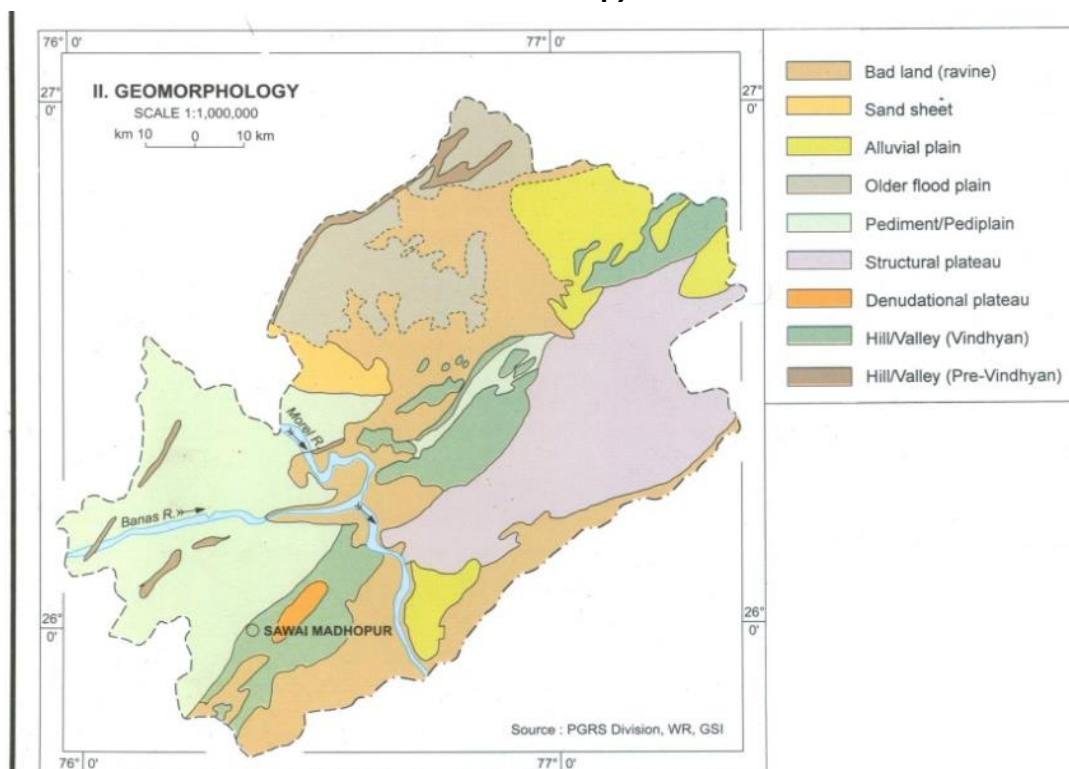


Figure 3.5: Geomorphology of Karauli and Sawai Madhopur district (Source: GSI Resource map)



30. **Soil characteristics:** Soil of the region falls within rainfall zone of 500- 700 mm. The soil is generally alluvial in nature which prone to water logging. Also nature of recently alluvial calcareous has been observed. **Table 3.2** shows nutrient level in the Karauli soil including area coverage of saline and sodic soil. The nutrient status of the Karauli soil is graded as low to medium level.

Table 3.2: Fertility status – major nutrients and problematic soils of Karauli district

	Nutrient			Saline Soil(Ha)	Sodic or Alkali(Ha)
	N	P	K		
Status	L	M	M	7002	7200

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

4. Climate

31. The region has a generally arid climate. The average rain fall of the district is 68.92 cm. The district has only approximately of 35 rainy days on average in a year. The range of temperature is high with maximum reaching up to 49°C and Minimum recorded as low as 2°C. Dust storm and thunder storm occur all through the summer and are particularly active in pre-monsoon period. In summer mean humidity as 60%. The predominant wind direction is from west and south-west.

32. The rainfall over Karauli 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

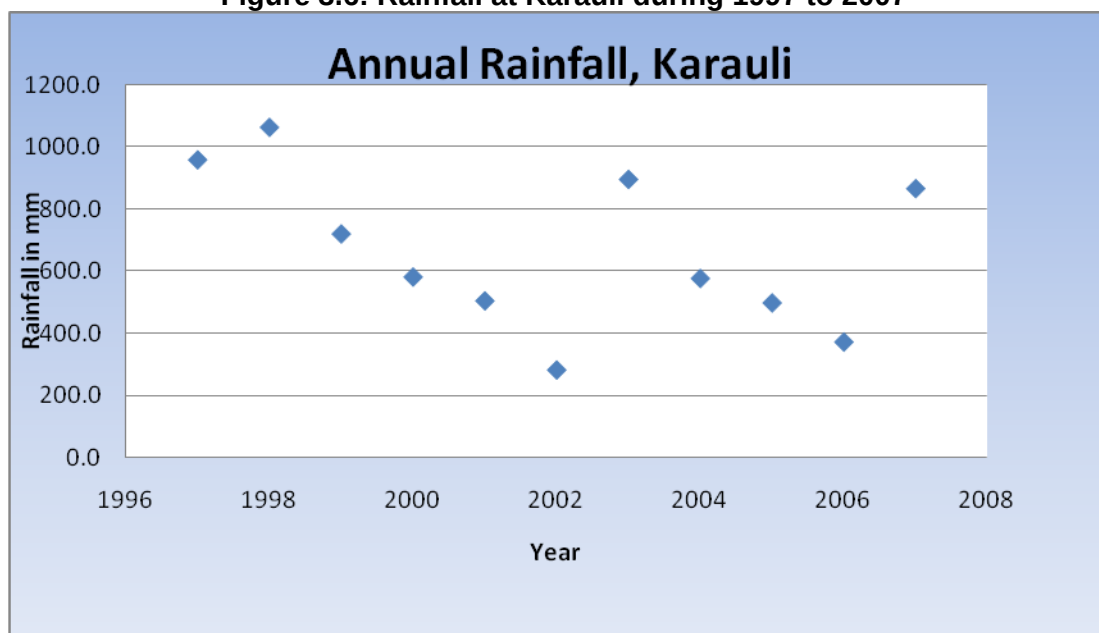
recent year (2011) shown in **Table 3.3**. **Figure 3.6** shows yearly variation (1997-2007) of rainfall at Karauli.

Table 3.3: Rainfall at Karauli in recent years (2011)

	Months	Rainfall (mm)
1	January	0.0
2	February	47.0
3	March	0.0
4	April	0.0
5	May	19.5
6	June	153.8
7	July	71.5
8	August	99.2
9	September	109.0
10	October	0.0
11	November	0.0
12	December	0.0
13	Monsoon Rainfall	433.5
14	Non monsoon rainfall	66.5
15	Annual Rainfall	500.0

(Official Website Govt. of Rajasthan, 2012)

Figure 3.6: Rainfall at Karauli during 1997 to 2007



(Source: Deputy Director Hydrology water resources ID and R, Jaipur).

5. Air & Noise Quality

33. In the month of April & May 2012 air quality monitoring was done in various project locations of Karauli. Traffic is the only significant pollutant in Karauli, so levels of oxides of sulphur and nitrogen are likely to be well within the National Ambient Air Quality Standards (NAAQS). The ambient air quality data is depicted in **Table 3.4**. Noise monitoring was also carried out in the month of April & May 2012 for the sub-project. The noise monitoring data are presented in **Table 3.5**.

Table 3.4: Ambient Air Quality in Karauli (Annual Average, units in $\mu\text{g}/\text{m}^3$)

Monitoring Station	PM _{2.5} (mg/m ³)	PM ₁₀ (mg/m ³)	Oxides of Nitrogen as NO ₂ (mg/m ³)	Sulphur Dioxide as SO ₂ (mg/m ³)	Carbon monoxide as CO (mg/m ³)
Sainath Khidkiya	40.8	85.18	20.45	9.36	0.5
DITE	45.2	99.4	19.0	10.1	0.5
Behind RTO Office	56.1	126.1	25.3	13.5	0.5
Karauli Bus Stand	49.6	105.3	20.9	11.1	0.5
NAAQ Standard	60	100	80	80	2000* 4000 [#]

Where: *= Maximum limits for 8 hourly monitoring, #= Maximum limits for 1 hourly monitoring

Note: Onsite monitoring done by RUIDP

Table 3.5: Ambient Noise Level Data of Karauli

Sl. No.	Sampling Location	Sampling date	Land Use	Observation Value [in dB(A)] L Daytime			Observation Value [in dB(A)] L Night Time		
				Lmax	Lmin	Leq	Lmax	Lmin	Leq
1	Sainath Khidkiya	02/05/2012	Commercial	75.10	41.10	59.27	57.30	41.00	49.15
2	Behind RTO Office	28/04/2012	Residential	72.10	55.70	64.20	60.00	39.40	52.12
3	Near Bus Stand	27/04/2012	Commercial	78.20	55.70	70.00	71.40	42.10	62.10
4	DITE	26/04/2012	Residential	72.30	52.30	64.20	58.20	38.40	46.25
Standard Limits in dB(A) Leq, [THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000]			Residential	-	-	55	-	-	45
			Commercial	-	-	65	-	-	55

6. Surface Water

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

7. Geohydrology and Groundwater

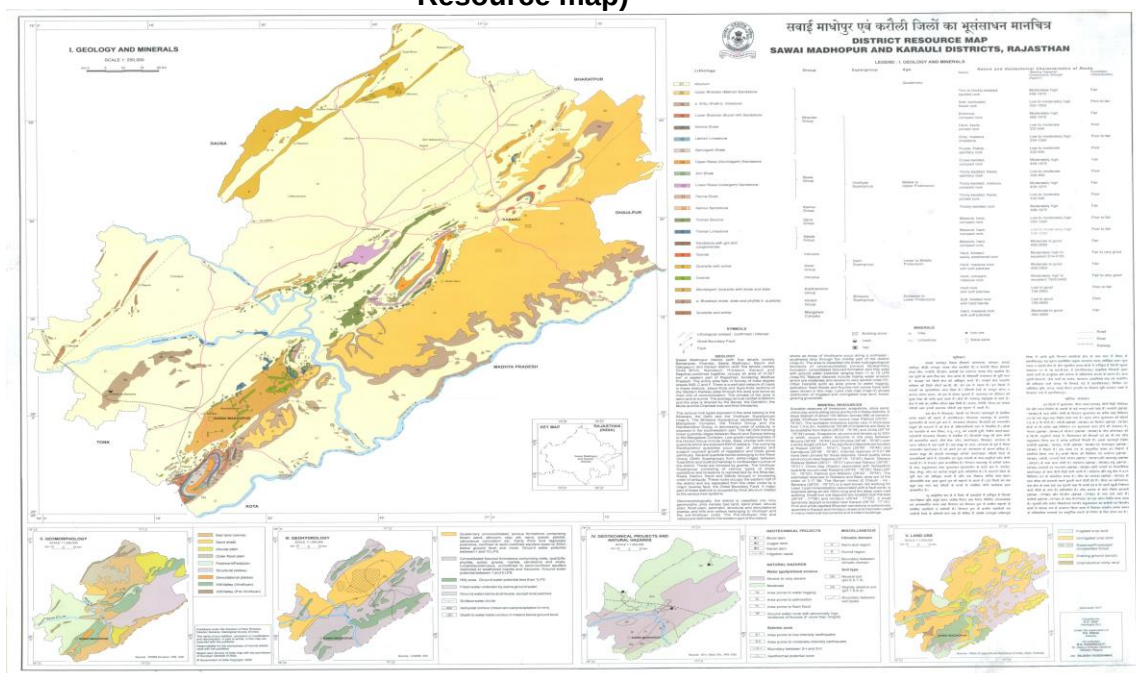
35. Geohydrological map of the Sawai Madhopur and Karauli district is shown in **Figure 3.7**. For broadly grouping geological formations from ground water occurrence and movement considerations, the various lithological units have been classified into major two groups on the basis of their degree of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

- (i) Porous Formations- Quaternary unconsolidated formations
- (ii) Fissured formations – consolidated sedimentary rocks.

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

37. Ground water table in Karauli is ranged between 10-20 m bgl.

Figure 3.7: Geohydrological map of Sawai Madhopur and Karauli district (Source: GSI Resource map)



38. 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 Karauli

Parameters	Maximum Level	Minimum Level	Standard of Drinking water (IS: 10500: 1991)	
			Desirable limit (mg/l)	Maximum Permissible limit (mg/l)
pH	8.8	6.9		
EC(micro mhos /cm at 25°C	10600	530		
Cl (mg/l)	2734	21	250	1000
SO ₄ (mg/l)	1824	10	200	400 (if Mg does not exceeds 30 ppm)
NO ₃ (mg/l)	575	3	-	100
PO ₄ (mg/l)	1.8	0.11		
Total Hardness(mg/l)	2100	200	300	600
Ca(mg/l)	668	20	75	200
Mg(mg/l)	117	17	30	100
Na(mg/l)	1794	20	-	-
K(mg/l)	185	1	-	-
F(mg/l)	10	0.15	1.0	1.5
Fe(mg/l)	7.5	0.05	0.3	1.0
SiO ₂ (mg/l)	42	4		
TDS (mg/l)	6890	345	500	2000

Note: Total – 13 nos. samples

Source: Ground water year book Rajasthan, Central Ground Water Board, Jaipur (2009-10)

39. Water quality (tested by PHED) from existing tube wells, especially around the city centre, has deteriorated significantly with a total dissolved solids having increased from 850 ppm to 2,535 ppm thereby rendering water unsuitable for human consumption. The results also indicate higher concentration of nitrate (10 percent samples) and iron (30 percent samples) than recommended levels prescribed by the Indian standards on drinking water. It is therefore recommended that as far as possible existing tube wells should be abandoned.

40. Supply water quality as measured by Public Health Department is shown below. It is noted that ground water contains high level of TDS and nitrate levels.

Table 3.6: Present supply water quality at Karauli

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
39.5	Ground	100	0	4	4	0.5	1.4	851	2535	36	600

CWR: Clear Water Reservoir , SR: Storage Reservoir, F- Fluoride, TDS: Total Dissolved Solids, NO₃: Nitrate.

B. Ecological Resources

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

42. **FAUNA:** Karauli district is rich in wild life. It has a large variety of animals, birds and fish. In addition, leopard or panther and wild dog (Dhole) are found in this area. Sloth bears are less uncommon here than in many other parts of India where they were once well known. The Chital in large numbers and Chinkara in small parties are the other main animals of the Reserve. Wild pigs are plentiful, though in small size. The avifauna of the Reserve is rich and varied .The lakes attract many water birds and water side birds. Among the forest birds are the peafowl, doves, parakeets, owls and other birds of prey. Other birds seen here are egrets, pond herons, grey and purple herons.

43. There is no forest area nearby the sub-project site. No endangered flora and fauna is reported from the site.

C. Economic Development

44. Karauli is located at 110 km distant from the divisional headquarter at Bharatpur. Although the town is well connected with Jaipur, Agra, Bharatpur, Alwar, Dholpur by State Highway no. 22 and National state highway no. 11B. Main transport of the town is through road by buses and nearest Railway station located at Hindaun and Gangapur city, which are on the Delhi-Mumbai main track and 30 to 40 km from the town.

45. Karauli, being the district headquarters for Karauli District, performs all administrative and revenue functions required of a district center. Traditionally, Karauli is a commercial town and the main occupation of the people is agriculture and commercial. However some

developments can be seen now a day in the town in form of industries and commercial activities. Karauli is also a cultural town depicting original Rajasthan Heritage.

46. According to the Census of 2001 the work force participation ratio in Karauli is 23.38 percent, which is marginally lower when compared with cities such as Kota (27.6%), Jaipur (27.0%), Udaipur (28.0) and the state of Rajasthan (26.6%). **Table 3.7** shows the details of work force participation of Karauli.

Table 3.7: Socio-Economy Characteristics of Karauli Town

Sector	1991			2001		
	No. of Worker	% to total Worker	% to total Population	No. of Worker	% to total Worker	% to total Population
Primary	2,058	16.18	4.20	676	4.36	1.02
Secondary	3,004	23.61	6.13	894	5.77	1.35
Tertiary	7,660	60.21	15.63	13,917	89.87	21.01
Total	12,722	100	25.96	15,487	100	23.38

Source: Census of India 2001.

47. During the last century, Karauli remained industrially backward. It mainly depended on agriculture and few cottage industries. Quarrying of building stone was the only activity which provided employment to the comparatively large section of the population.

Table 3.8A: Occupation Structure in Karauli UA

S.No.	Category of Business	Working Population as per 1991 census	
		Nos.	%
1.	Agriculture	3843	27.3
2.	Industries	2384	16.9
3.	Construction	769	5.4
4.	Business & Trading	2389	16.9
5.	Transport	762	5.4
6.	Others	3967	28.1
	Total	14114	100.00

Source: Municipal Board, Karauli

48. During the last century, Karauli remained industrially backward. It mainly depended on agriculture and few cottage industries. Quarrying of building stone was the only activity which provided employment to the comparatively large section of the population.

Table 3.8B: Occupation Structure in Karauli District

S. No.	Category	Occupation wise classification of population	
		Nos.	%
1	Main Workers	355450	29.4
2	Marginal Workers	127660	10.5
3	Non-workers	726555	60.1
	Total Population	1209665	100

Source: Statistical Abstract, Rajasthan 2009

49. As is evident from **Table 3.8A**, the major occupation of people in Karauli is agriculture & other allied works and trade business and industry. Majority of the population is engaged in agriculture, industries and trading. The profile of the working class is depicted above. From the table above, it is clear that the working population is engaged primarily in agriculture, industries and business.

1. Land use

50. The area of Karauli Municipality Board is 58,808 Acre. Out of this total area, 17,642 acres is developed and rest of the land is full of hills and ravines. Residential use of land is 30% of developed land. The major portion of municipal land is full of hills and ravine resulting in heterogenous nature of settlements. 36.12 percent of municipal land is wasteland and used for animal grazing. Proportion of commercial land is of 4.5 percent whereas recreation land is 21.8 percent. The detail break up of land use pattern Karauli developed area is given in **Table 3.9** and **Figure 3.8**. Land use of Sawai Madhopur and Karauli district is shown in **Figure 3.9**.

Table 3.9.: Karauli UA Land use pattern

Sl. No.	Land use	Area in acres	Percentage
1	Residential	5292.6	30.00
2	Commercial	793.9	4.50
3	Industrial	396.94	2.25
4	Recreation	3848	21.80
5	Institutional	132.31	0.75
6	Public/Semi Public	2852	16.20
7	Circulation/Transport	4322.3	24.50
	Total Developed Land	17642	100.00

Source: Municipal Board, Karauli

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

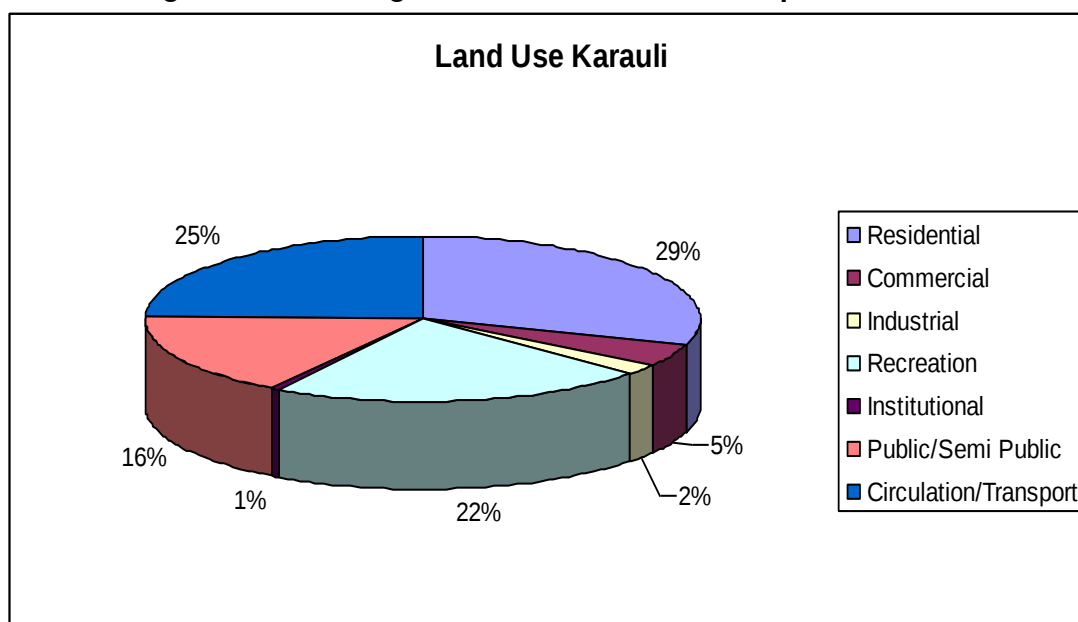
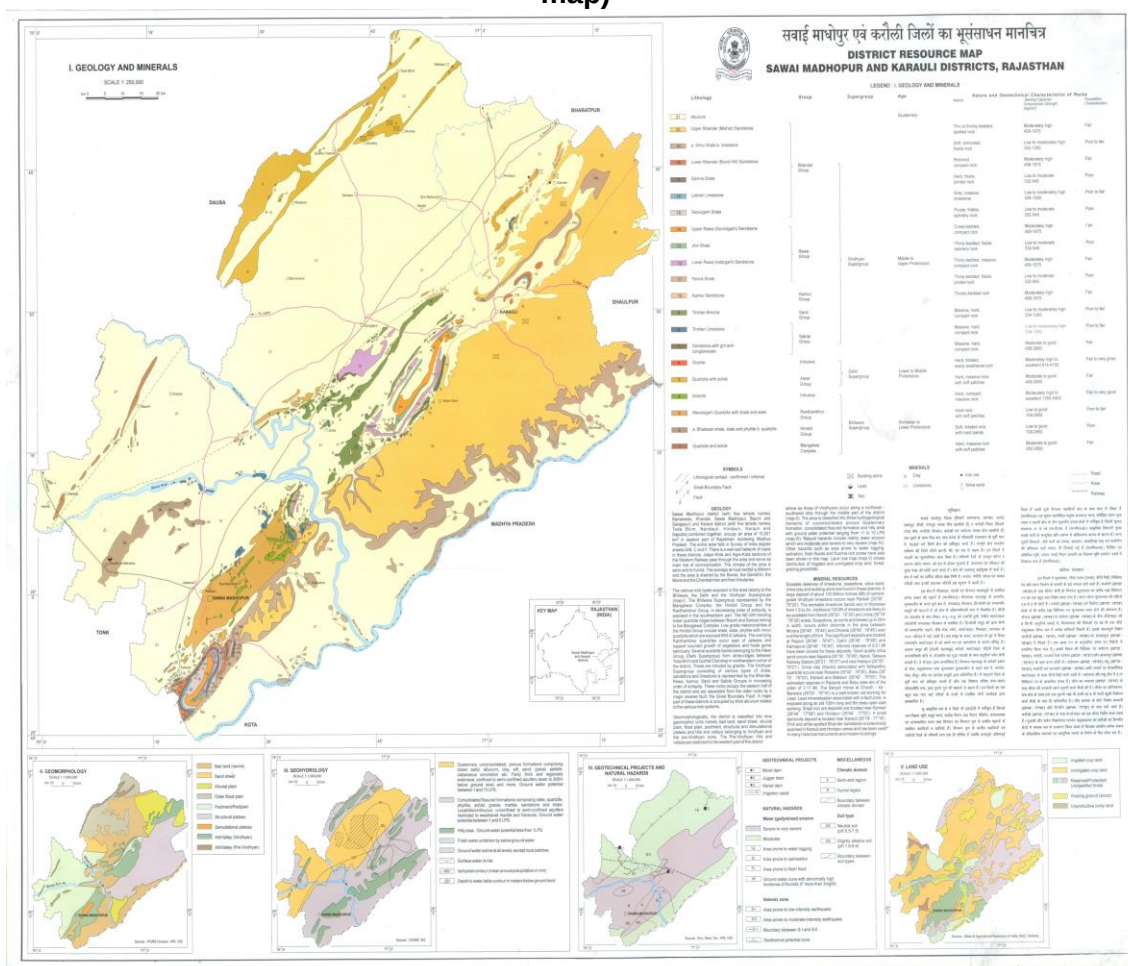


Figure 3.9: Current land use of Sawai Madhopur and Karauli District (GSI Resource map)



2. Commerce, Industry and Agriculture

51. Karauli is an important center for trade and commerce in the District. Art works occupies an important place in the city economy and basically the craft includes stone carving. The trade and commerce activities can be broadly classified into two categories namely the organized and unorganized markets. Other than the organized sector, there are a number of unorganized markets in the town. There has been a rapid growth in the commercial sector during the recent past. Hotel and transportation based units have shown appreciable growth. In addition, food & grocery items and clothes are the other organized commercial sectors showing an increase. Auto spare parts and repair centers are predominant along SH-22 and National state highway 11B. Several of the commercial activities such as wholesale markets are located close to the walled city. These activities are not related to tourism but attract a number of vehicles for transportation of goods/materials thereby adding to the congestion and traffic problems. Other than the organized sector, there are large numbers of unorganized vendors seen in the town. Accordingly the field visit and discussion with the various stakeholders, certain degree of concentration has been observed in the location of these unorganized markets and this may pave way for planned construction of market complexes, Kiosks in the developed parts of the town within the framework of the Development plan. Rajasthan's strong economic performance during the 80's and the early 90's reflected well in Karauli.

52. In and around the Karauli city area there are about 80% of lands used for agricultural purpose. Crop production statistics as depicted in **Table 3.10** indicates that total crop production during Rabi and Kharif season is more or less same.

Table 3.10: Crop production in around Karauli

Type of Crops	Under Rabi Crops 2008-09 (Prod in Tonnes)	Under Kharif Crops 2008-09 (Prod in Tonnes)
Cereals	287309	249060
Pulses	20124	349
Food Grains	307433	249409
Oilseeds	106717	18657
Others	170	8178
Total	414320	276244

(Source: Rajasthan Statistic at a Glance, 2009-10).

3. Infrastructure

53. Water supply: Water supply to Karauli is from only groundwater sources² comprising 32 nos. of tube well. Groundwater is tapped through the tube wells. From tube well 5.2 MLD water extract and supplied to the town. The present supply and distribution network comprising of transmission main of 9.4 km., trunk main of 4.7 km., feeder main of 11.80 km. and distribution mains of 19.0 km. including lateral with the diameter of pipelines ranging from 50 to 300 mm. There are 4 nos. of elevated reservoir of total capacity of 2.30 ML.

54. Sewerage System: There is no underground sewage system in Karauli City at present. Only few households have covered with individual septic tank. The disposal of waste and effluent of septic tank is through the open drains. Presently the open drains, which have been constructed by Municipal Board, convey the sewage which is leading to unhygienic and unsanitary conditions. As reported by the Karauli MB, there is 5,250 nos. individual Disposal system with septic tank covering 33015 population & 1,325 nos. of low cost sanitation covering 8,000 population. Besides individual disposal system, 25,200 populations directly dispose the sewage to the open drains.

55. Sanitation: Only 50% of the households reportedly have septic tanks and soak 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.

56. Drainage: Presently the roads in Karauli city are equipped with kachha open drains, but most of the drains are silted resulting in overflow and resulting flooding in monsoon. As reported by KMB, the total length of drains is approximately 150 Km. Out of which 125 km is kachha and 25 km of Pucca but open. An efficient network of storm water drains and outfall system is required to drain out storm water runoff.

² Groundwater is tapped for both drinking water supply and irrigation purposes by means of dug wells, tube-wells and dug-cum-bore (DCB) wells. As extraction of groundwater is still unregulated in the State, there is no record of groundwater distribution for private drinking water supply and irrigation. The Central Ground Water Board (CGWB), Western Region, indicates that agricultural water use of ground water accounts for more than 80% of the total water use in Karauli.

57. **Industrial Effluents.** Small industries exist in under RIICO, which is outside the city area and small amount of effluent is disposed scattered in local *nallahs*. As reported by the local MB, 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.

58. **Solid Waste:** Karauli generates 35.73 tons (approximately) of solid waste daily in 2009 and waste collected per day is only 11 tons (approximately). Major source of generation of waste in Karauli town is explicated in the **Table 3.11** where it is clearly shown that the waste generation by Residential/Domestic is predominant. In addition to household (domestic) solid waste, the main waste generation sources in the town are vegetable and fruit markets, commercial including hotels and eateries, construction activities, institutional and other tourism related activities.

Table 3.11: Waste generation of town

S.No.	Land Use	Waste Generation (Kg/Day)
1	Residential	32200
2	Commercial	730
3	Vegetable and fruit market	500
4	Slaughter House wastes	50
5	Hotels and Restaurants	400
6	Industrial (Bid Factory)	450
7	Institutional	1400
	Total	35730

Note: The population of Karauli in 2009 was around 79,393 and waste generation was 35,730 kg/day. Thus per capita waste generation in 2009 was 450gms/capita/day.

59. The street sweeper sweeps roads and dumps the waste at different points. The Karauli MB carries out the waste from the open collection point to dust bin by wheel borrows and the dustbin lifted to the dumper placer and transported to the existing Land fill site. Some time tractor directly carried out the waste from town to disposal point, the open dumping area along the Masalpur road and Mandrayal road.

4. Transportation

60. Karauli comprises a road network of 95 km, consisting of 35 km concrete roads, 15 km bituminous roads, and 25 km of earthen road control and maintained by Municipality and 20 km of BT road under PWD control which is mainly the part of SH-22 (Hindaun-Mandrayal road) and National state highway no. NH-11B (Masalpur-Gangapur road). Table 3.12 provides a breakdown of road surface composition in Karauli. 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: Road Surface Composition

Surface Type	PWD (km)	MC (km)	Total (km)	Dist.
Concrete	-	35	35	36.84%
Bituminous	20	15	35	36.84%
WBM	-	-	-	-
Earthen Road		25	25	26.32%
Total	20	75	75	100%

Source: Karauli MC.

61. The Transport corridors and their proximity to existing services are the guiding factors influencing the spatial growth of the town. Current growth trends indicate that the town is

growing rapidly along the NH-11B towards Gangapur city in the western direction. Similar growth trend are also observed towards Bari Mandrayal. The scope for extension towards Mandrayal along SH-22 and other direction growth is limited due to Bhadrabati Ravine.

62. Existing Road network of Karauli:

- (i) The road network within town is maintained by Karauli MB and the PWD
- (ii) PWD maintain approximately a total length of 20.0 Km comprising of SH-22, Hindaun to Mandrayal road and NH-11B, Masalpur to Gangapur city road,
- (iii) Karauli MB maintaining 75 Km of road including Kachha road also
- (iv) In case of availability of public surface transport system, regular buses ply between Dholpur, Gwalior, Gangapur city, Bharatpur, Hindaun and other major cities like Alwar, Jaipur etc. The Private and Government Bus stand are located separately in the town. Approximately 150 nos of buses ply in every day and 7500 nos. of passenger moves in every day.

D. Social and Cultural Resources

1. Demography

63. In 2011, Karauli had population of 1,458,459 of which male and female were 784,943 and 673,516 respectively. In 2001 census, Karauli had a population of 1,209,665 of which males were 651,998 and remaining 557,667 were females. Karauli District population constituted 2.13 percent of total Maharashtra population. In 2001 census, this figure for Karauli District was at 2.14 percent of Maharashtra population.

64. According to Census 2001, the population of Karauli Urban Agglomeration is 66,239 and spreads over Karauli Municipal area in 35 nos. of wards. However 17 wards inside the walled city together constitute as much as 70 percent of total population of the town. The total spread of the Urban Agglomeration is approximately 33.00 sq. km. The UA supports an average density of 2007 persons per sq. km. While the UA witnessed a high growth between 1981 and 2001 on account of induced agricultural, commercial and industrial development. Table 3.13 indicates the demographic characteristics for the UA.

Table 3.13: Population Growth in Karauli town

Year	Population	Growth Rate	Area	Density
	<i>Karauli Town</i>	<i>(%)</i>	<i>Sq. Km</i>	<i>Persons / sq. km</i>
1901	23482		-	
1911	19803	(-) 15.67	-	
1921	19579	(-) 1.13	-	
1931	19671	(-) 0.47	-	
1941	19177	(-) 2.51	-	
1951	19148	(-) 0.15	-	
1961	23696	(+) 23.75	-	
1971	27793	(+) 17.29	-	
1981	37954	(+) 36.56	-	
1991	49008	(+) 29.13	33.00	1485
2001	66239	(+) 35.16	33.00	2007

Source: Census of India, 2001.

2. Health and educational facilities

65. Initially Karauli district was within the Sawai Madhopur district, but later on, Karauli was separated as a distinct district. Being a district headquarters, it is expected that the requisite

number of educational and health facilities are available within the city area for the population as per norms.

3. History, culture and tourism

66. Karauli is a popular destination for domestic as well as foreign tourist. Some famous temple like Madan Mahan Temple, Ma Sahib Temple, Sri Kaila Devi Temple, Kaila Devi Sanctuary and Sri Karanpur Mata Temple. Timagarh fort, Mandaroyal fort, Sahi Kund, Raj Palace, Sukh Vilas and Rangawa Talav are other points of attraction for tourist inflow. The nos. of tourist inflow increase geometrically during festival like Amawasya, Janmastmi, Holi and Diwali. However numbers of tourist inflow is still to be counted.

IV. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Pre-construction

67. 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.

68. In many environmental assessments there are certain effects that, although they will occur during either the construction or operation stage, should be considered as impacts primarily of the location or design of the project, as they would not occur if an alternative location or design was chosen. For example, if a STP produces an effluent that does not meet established standards, then this is an impact of the design as it would not occur if a more rigorous treatment technology had been adopted.

69. In the case of this subproject there are few impacts that can clearly be said to result from either the design or location. This is mainly because:

- (i) The project is relatively small in scale and involves straightforward construction and low-maintenance operation, so it is unlikely that there will be major impacts;
- (ii) Most of the predicted impacts are associated with the construction process, and are produced because that process is invasive, involving trenching and other ground disturbance. However the routine nature of the impacts means that most can be easily mitigated;
- (iii) In the key field in which there could be significant impacts (archaeology), those impacts are clearly a result of the construction process rather than the project design or location, as they would not occur if this did not involve trenching or other ground disturbance.

70. One of the impacts that could be said to be related to the design and location of the subproject is the establishment and operation of the STP on the surface water and groundwater, if the treated effluent is discharged to the adjacent *nallah*. This would have not occurred if the STP was located elsewhere, or if a treatment technology to remove nitrate and phosphate was adopted.

71. There is a possibility of controlling greenhouse gas (GHG) and generation of power from sewage. Some attempts have already been made at Surat, in the state of Gujarat. The case

study is being documented in **Annexure 2**. Now Surat Municipal Corporation (SMC) is gearing to earn about 50,000 units of carbon credit per year for the successful generation of the green gas. In fact SMC is producing 3.5 MW power from sewage at four places in the city.

B. Construction

1. Screening of No Significant Impacts

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

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

- (i) Most of the network and the trunk sewer will be built on unused ground alongside existing roads and can be constructed without causing major disruption to road users and any adjacent houses, shops and other businesses;
- (ii) The STP will be located on government-owned land that is not occupied or used for any other purpose;
- (iii) Most network construction will be conducted by small teams working on short lengths at a time so most impacts will be localised and short in duration;
- (iv) The overall construction programme will be relatively short for a project of this nature, and is expected to be completed in 2-2.5 years.

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

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

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

Field	Rationale
Climate	Short-term production of dust is the only effect on atmosphere
Geology and seismology	Excavation will not be large enough to affect these features
Fisheries & aquatic biology	No rivers or lakes will be affected by the construction work
Wildlife and rare or endangered species	There is no endangered species in the town or on the government owned areas outside the town on which facilities will be built
Coastal resources	Karauli is not located in a coastal area
Population and communities	Construction will not affect population numbers, location or composition

76. Rapid Environmental Impact Assessment checklist along with mitigation measures is given in Annexure- 3.

2. Sewage Treatment Plant

a. Construction method

77. Work components of STP involve:

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

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

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

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

b. Physical Resources

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

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

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

83. Another physical impact associated with large-scale excavation is the effect on drainage and the local water table if groundwater and/or surface water collect in the voids. Given the difficulties of working in wet conditions the Contractor will almost certainly conduct all excavation in the dry season, so this should avoid any impacts on surface water drainage. If water collects in any quantity it will need to be pumped out, and it should then be donated to neighbouring

farmers to provide a beneficial use to the communities most affected by this aspect of the work, and improve public perceptions of the project.

c. Ecological Resources

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

d. Economic Development

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

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

- (i) Planning transportation routes so that heavy vehicles do not enter Karauli town and do not use narrow local roads, except in the immediate vicinity of delivery sites;
- (ii) Scheduling transportation activities to avoid peak traffic periods.

e. Social and Cultural Resources

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

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

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

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

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

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

3. Sewerage Network and Trunk Sewer

a. Construction method

91. Provision of a sewerage system in part of the town during the third phase of investment (Tranche 3) will involve construction of:

- (i) The secondary and tertiary network will collect sewage from individual houses have a sufficient water supply. These pipes will be of small diameter (200 to 500 mm) and will be located in shallow trenches (ca 1.5 m in depth).
- (ii) The trunk sewer will also be of RCC pipes and will convey sewage from the secondary network to the STP. These pipes will be 700 and 900 mm in diameter.

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

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

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

95. Pipes are normally covered by 1.2 m of soil, and a clearance of 100 mm is left between the pipe and each side of the trench to allow backfilling. Trenches will therefore be quite large, a

maximum of 2.3 m deep and 1.2 m wide for the trunk main, and a minimum of 1.5 m deep and 0.7 m wide for the tertiary network.

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

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

b. Physical Resources

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

- (i) Contact the town authorities to find beneficial uses for the waste material, in construction projects, to raise the level of land prior to construction of roads or buildings, or to fill previously excavated areas, such as brickworks;
- (ii) Remove waste material as soon as it is excavated (by loading directly into trucks), to reduce the amount stockpiled on site;
- (iii) Use tarpaulins to cover loose material when transported from the site by truck;
- (iv) Cover or water stockpiled soil to reduce dust during windy weather.

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

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

c. Ecological Resources

101. There are no significant ecological resources in and around the project locations, so construction of the network and trunk sewer should have no ecological impacts. But actual impact can be assessed after confirmatory survey of alignment. However, roadside trees should not be removed unnecessarily to build the trenches, and to mitigate any such losses the Contractor should be required to plant and maintain three new trees (of the same species) for each one that is removed.

d. Economic Development

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

103. There could be some economic impacts however, if the presence of trenches, excavated material, workers and machinery discourage customers from visiting shops and businesses adjacent to network construction sites, and the businesses lose income as a result. These losses will be short in duration as work at any one site should be completed in a week or less. However the loss of income could be significant for small traders and other businesses that exist on low profit margins. These impacts should therefore be mitigated by:

- (i) Leaving spaces for access between mounds of excavated soil, and providing footbridges so that pedestrians can cross open trenches;
- (ii) Increasing the workforce in these areas to ensure that work is completed quickly;
- (iii) Consulting affected businesspeople to inform them in advance when work will occur.

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

Excavation could also damage existing infrastructure, in particular storm drains and water supply pipes, both of which are located alongside roads in the town. It will be particularly important to avoid damaging existing water pipes as these are mainly manufactured from Asbestos Cement (AC), which can be carcinogenic if inhaled, so there are serious health risks for both workers and the public (see below). It will be important therefore to avoid these impacts by:

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

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

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

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

e. Social and Cultural Resources

107. As was the case with the STP site, there is a risk that sewer construction, which involves extensive disturbance of the ground surface, could damage undiscovered archaeological and/or historical remains, or even unknown sites. The risks are in fact considerably higher in this case, because such artefacts are more likely to occur in areas that have been inhabited for a long period. The preventative measures described in Section IV.B.5 will thus need to be employed and strictly enforced. These are:

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

108. Sewer construction will also disturb some modern-day social and cultural resources, such as schools, hospitals, temples, and sites that are of interest to tourists. Impacts will include noise, dust, and interrupted access for pedestrians and vehicles, and in cases where pneumatic drills are used to break the surface of concrete roads, there could be a risk of damage from vibration. Mitigation will therefore be needed to protect these resources and to enable usage by local people and visitors to continue throughout the construction work. This will be achieved through several of the measures recommended above, including:

- (i) Consulting the town authorities to identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity;
- (ii) Limiting dust by removing waste soil quickly, covering and watering stockpiles, and covering soil with tarpaulins when carried on trucks;
- (iii) Increasing the workforce in sensitive areas to complete the work quickly;
- (iv) Providing wooden bridges for pedestrians and metal sheets for vehicles to allow access across open trenches where required (including access to houses);

- (v) Using modern vehicles and machinery with standard adaptations to reduce noise and exhaust emissions, and ensuring they are maintained to manufacturers' specifications.

109. In addition, the Executing Agency and Contractor should:

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

110. 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:

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

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

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

112. 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),³ and amongst other things, should involve:

- (i) Training of all personnel (including manual labourers) to enable them to understand the dangers of AC pipes and to be able to recognise them in situ;
- (ii) Reporting procedures to inform management immediately if AC pipes are encountered;
- (iii) 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.

³ 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>.

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

C. Operation and Maintenance

1. Screening out areas of no significant impact

114. Although the sewerage system will need regular maintenance when it is operating, with a few simple precautions this can be conducted without major environmental impacts (see below). There are therefore several environmental sectors which should be unaffected once the system begins to function. These are identified in **Table 5.2** below, with an explanation of the reasoning in each case. These factors are thus screened out of the impact assessment and will not be mentioned further. Presently most of the sub-project components are in design stage.

Table 5.2: Fields in which operation and maintenance of the completed sewerage system is not expected to have significant impacts

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

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

2. Operation and maintenance of the improved sewerage system

116. The new sewerage system will collect and treat all surface water, domestic wastewater and sewage produced by 60% of the town, and the remainder of the inhabited area and future expansion will be served by additional sewers provided via subsequent tranches of funds. Although treatment will not be to the standards of more developed countries, the technology is approved by the Central Public Health and Environmental Engineering Organization (CPHEEO) and Pollution Control Board attached as **Annexure 4** and the discharge after treatment will comply with Indian wastewater standards (**Table 5.3**).

Table 5.3: Waste Water Quality Discharge Standards

SL.no	Parameter	Standards			
		Inland surface water	Public sewers	Land irrigation	Marine/coastal areas
		(a)	(b)	(c)	(d)
1.	Colour and odour	remove as far as practicable			
2.	Suspended solids mg/l. max.	100	600	200	(a) For process waste water 100 (b) For cooling water effluent 10% above total suspended matter of

SL.no	Parameter	Standards			
		Inland surface water	Public sewers	Land irrigation	Marine/coastal areas
					influent.
3.	Particle size of suspended solids	shall pass 850 micron IS Sieve			(a)Floatable solids, max. 3mm. (b)Settable solids (max 850 micron)
4.	pH value	5.5. to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
5.	Temperature	shall not exceed 5°C above the receiving water temperature			shall not exceed 5°C above the receiving water temperature
6.	Oil and grease, mg./l, max.	10	20	10	20
7.	Total residual chlorine, mg/l. max.	1.0			1.0
8.	Ammoniacal nitrogen (as N.) mg/l max	50	50		50
9.	Total Kjeldahl Nitrogen (as NH ₃) mg/l. max	100			100
10.	Free ammonia (as NH ₃), mg/l.max	5.0			5.0
11.	Biochemical oxygen demand (3 days at 27°C), mg/l. max.	30	350	100	100
12.	Chemical oxygen demand, mg/l, max.	250			250
13.	Arsenic (as As) mg/l, max.	0.2	0.2	0.2	0.2
14.	Mercury (As Hg), mg/l, max.	0.01	0.01		0.01
15.	Lead (as Pb) mg/l, max	0.1	1.0		2.0
16.	Cadmium (as Cd) mg/l. max	2.0	1.0		2.0
17.	Hexavalent chromium (as Cr. +6). mg/l, max	0.1	2.0		1.0
18.	Total Chromium (as Cr) mg/l, max	2.0	2.0		2.0
19.	Copper (as Cu) mg/l, max	3.0	3.0		3.0
20.	Zinc (as Zn) mg/l, max	5.0	15		15
21.	Selenium (as Se) mg/l, max	0.05	0.05		0.05
22.	Nickel (as Ni) mg/l, max	3.0	3.0		5.0
23.	Cyanide (as CN) mg/l, max	0.2	2.0	0.2	0.2
24.	Fluoride (as F) mg/l, max	2.0	15		15
25.	Dissolved phosphates (as P)	5.0			

SL.no	Parameter	Standards			
		Inland surface water	Public sewers	Land irrigation	Marine/coastal areas
	mg/l, max				
26.	Sulfide (as S) mg/l, max	2.0			5.0
27.	Phenolic compounds (as C ₆ H ₅ OH) mg/l, max	1.0	5.0		5.0

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

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

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

3. Environmental impacts and benefits of the operating system

a. Physical Resources

120. The provision of an effective sewerage system in 60% of the town should improve the physical appearance and condition of the city area that will no longer be discharged to the *nallahs*. This measure and the fact that there will be fewer septic tanks and less sewage discharged to drains, should also improve the appearance of the town and the quality of surface water drainage and groundwater. Clearly there will be further significant improvements once the whole town is connected to sewer via the future funding.

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

122. There are also certain environmental risks from the operating system, most notably from leaking sewer pipes as untreated faecal material can damage human health and contaminate both soil and groundwater. It will be imperative therefore that the Government Agency (GA)

responsible for operating the sewerage system establishes a procedure to routinely check the operation and integrity of the sewers, and to implement rapid and effective repairs where necessary. If trenches are dug to locate and repair leaks or remove and replace lengths of pipe, the work will follow the same procedure as occurred when the infrastructure was provided. However the impacts should be much less significant as the work will be infrequent, and will affect individual small locations for short periods only. Work will not be conducted during rainfall so there will be no effect on drainage, and the excavated soil will be replaced in the trench so there will be no waste. Physical impacts should thus be negligible.

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

b. Ecological Resources

124. Although the new sewerage system will improve the environment of the town, there are unlikely to be significant ecological benefits as there are no natural habitats or rare or important species. If effluent from the STP was discharged into the nearby *nallah* there could be some small ecological benefits as marsh plants and animals will colonise the small wetland that is likely to be formed. However the risks of contaminating groundwater are more significant, so it would be more appropriate to forego this ecological gain in favour of the better disposal method suggested above, whereby the effluent is supplied to farmers to irrigate and fertilize their fields.

c. Economic Development

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

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

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

d. Social and Cultural Resources

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

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

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

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

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

131. The citizens of the town will be the major beneficiaries of the new sewerage system, as human waste from those areas served by the new network will be removed rapidly and treated to an acceptable standard. This should improve the environment of these areas, and in conjunction with the development of other infrastructure (in particular water supply), should deliver major improvements in individual and community health and well-being. Diseases of poor sanitation, such as diarrhoea and dysentery, should be reduced, so people should spend less on healthcare and lose fewer working days due to illness, so their economic status should also improve, as well as their overall health.

V. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Project stakeholders

132. 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:

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

133. Secondary stakeholders are:

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

B. Consultation and disclosure to date

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

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

135. 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 5**.

136. The public Consultation and group discussion meeting were conduct by RUIDP on Date 27 July, 2009 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 Karauli, the environmental and social impacts of the proposed subprojects under Tranche 3 in Karauli were discussed.

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

138. Major Issues discussed during Public consultation are:

- (i) Proposed waste water management project should ensure proper hygienic disposal of sewerage water in all wards of city.
- (ii) Executive agency should give preference to engage internationally reputed contractor for timely completion of work;
- (iii) Livelihood affected households should be given assistance in the mode of cash compensation;
- (iv) Local people should be employed by the contractor during construction work;
- (v) Adequate safety measures should be taken during construction work;
- (vi) Mobile kiosks/vendors/hawkers have shown willingness to shift in nearby places without taking any compensation and assistance from the Executing Agency;
- (vii) Local people have appreciated the waste water management proposal of the government and they have ensured that they will cooperate with the Executing Agency during project implementation.

C. Future consultation and disclosure

139. 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:

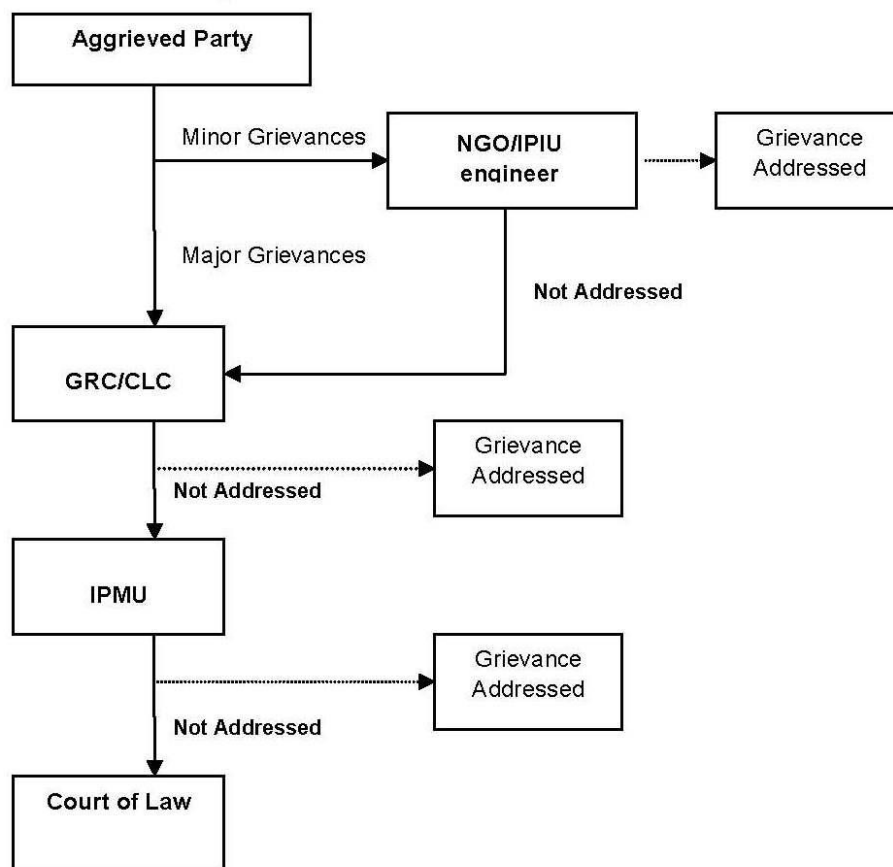
- (i) Consultation during detailed design:
 - Focus-group discussions with affected persons and other stakeholders (including women's groups, NGOs and CBOs) to hear their views and concerns, so that these can be addressed in subproject design where necessary;

- Structured consultation meetings with the institutional stakeholders (government bodies and NGOs) to discuss and approve key aspects of the project.
- (ii) Consultation during construction:
 - Public meetings with affected communities to discuss and plan work programmes and allow issues to be raised and addressed once construction has started;
 - 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;
- (iii) 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.

VI. GRIEVANCE REDRESS MECHANISM

140. 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. All costs involved in resolving the complaints will be borne by the IPMU. The GRCs will continue to function throughout the project duration.

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

Figure 6.1: Grievance Redress Mechanism – RUSDIP

CLC = City Level Committee, GRC = Grievance Redress Committee, IPIU=Investment Program Implementation Unit, IPMU = Investment Program Management Unit, NGO = nongovernmental organization,

VII. ENVIRONMENTAL MANAGEMENT PLAN

A. Institutional Arrangements

142. The main agencies involved in managing and implementing the subproject are:
- (i) LS GD 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 (for approach roads only) and supervise the construction process (both RUB portion as well as approach roads);
 - (v) Western Railway will design, float tender execute the works of RUB portion under the railway line. RUB portion by Box Pushing Technology will be executed by Railways directly which also has full-fledged and stringent systems and policies for safety, environment, and construction. IPIUs appoint and manage Construction Contractors to build elements of the infrastructure in a particular town.

- (vi) An inter-ministerial Empowered Committee⁴ (EC) assists LSGD in providing policy guidance and coordination across all towns and subprojects.; and
- (vii) City Level Committees⁵ (CLCs) have also been established in each town to monitor project implementation in the town and provide recommendations to the IPIU where necessary.

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

1. Responsible for carrying out mitigation measures

144. During construction stage, implementation of mitigation measures is the construction contractor's responsibility while during operation stage, Municipal Corporation and Railway will be responsible for the conduct of maintenance or repair works.

145. To ensure implementation of mitigation measures during the construction period, contract clauses (**Annexure 6**) 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 Investment Program Management Unit (IPIU).

2. Responsible for carrying out monitoring measures

146. During construction, DSC's Environmental Expert and the designated representative (Environment Safeguards Officer) of IPIU will monitor the construction contractor's environmental performance.

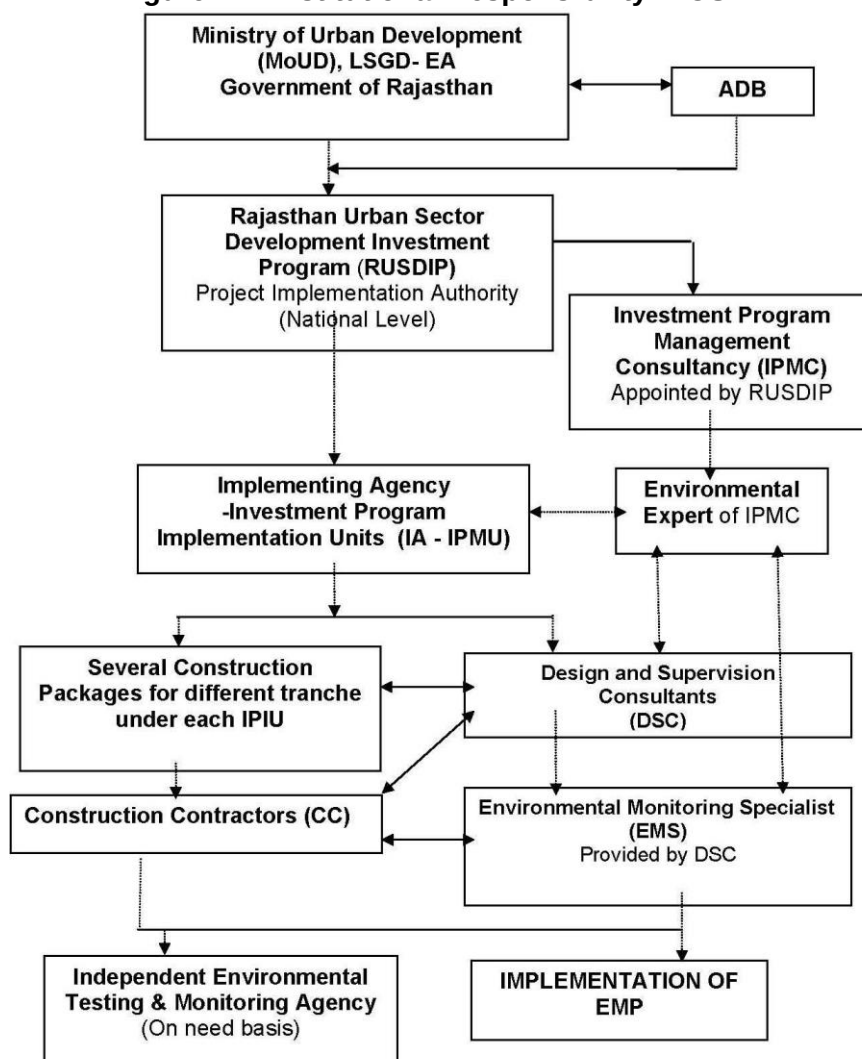
147. During the operation stage, monitoring will be the responsibility of Municipal Corporation.

3. Responsible for reporting

148. LGSD will submit to ADB quarterly reports on implementation of the EMP and will permit ADB to field annual environmental review missions which will review in detail the environmental aspects of the Project. Any major accidents having serious environmental consequences will be reported immediately.

⁴ 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.

⁵ 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.

Figure 7.1: Institutional Responsibility- RUSDIP

B. Environmental Mitigation Plan

149. **Table 7.1 to Table 7.3** shows that most mitigation activities are the responsibility of the Construction Contractors⁶ (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.

150. A program of monitoring will be conducted to ensure that all parties take the specified action to provide the required mitigation, to assess whether the action has adequately protected

⁶ During implementation the contractor will submit monthly progress reports, which includes a section on EMP implementation to the IPIU. The IPIU will submit reports to the IPMU for review. The IPMU will review progress reports to ensure that the all mitigation measures are properly implemented. The IPMU will consolidate monthly reports and submit quarterly reports to ADB for review

the environment, and to determine whether any additional measures may be necessary. This will be conducted by a qualified Environmental Monitoring Specialist (EMS) from the DSC. The EMS will be responsible for all monitoring activities and reporting the results and conclusions to the IPMU, and will recommend remedial action if measures are not being provided or are not protecting the environment effectively. The EMS may be assisted by environmental specialist in particular technical fields, and junior or medium-level engineers who can make many of the routine observations on site. Post-construction monitoring will be conducted by the relevant Government Agency (GA) to whom responsibility for the infrastructure will pass once it begins to operate.⁷

151. **Table 7.1 to Table 7.3** shows that most of the mitigation measures are fairly standard methods of minimising disturbance from building in urban areas (maintaining access, planning work to avoid sensitive times, finding uses for waste material, etc), and experienced Contractors should be familiar with most of the requirements. Monitoring of such measures normally involves making observations in the course of site visits, although some require more formal checking of records and other aspects. There will also be some surveys of residents, as most of the measures are aimed at preventing impacts on people and the human environment.

C. Environmental Monitoring Program

152. **Table 7.4 to Table 7.6** shows the proposed Environmental Monitoring Plan (EMP) for this subproject, which specifies the various monitoring activities to be conducted during all phases. Some of the measures shown in **Table 7.1** have been consolidated to avoid repetition, and there has been some re-ordering to present together those measures that relate to the same activity or site. The EMP describes: (i) mitigation measures, (ii) location, (iii) measurement method, (iv) frequency of monitoring and (v) responsibility (for both mitigation and monitoring). It does not show specific parameters to be measured because as indicated above, most measures will be checked by simple observation, by checking of records, or by interviews with residents or workers.

153. Given the scale of the investment in providing the infrastructure, LSGD will also wish to conduct monitoring during the operational period to ensure the correct functioning of the STP and confirm the long-term benefits of the scheme. There will also be bacteriological surveys when the STP is operating, to ensure the safety of dried sludge and treated effluent before sale to farmers to fertilize and irrigate fields. **Table 7.2 and 7.3** shows that these long-term surveys will monitor:

- (i) the chemical and bacteriological quality of treated STP effluent;
- (ii) the bacteriological content of dried sewage sludge;
- (iii) the health of the population and the prevalence of diseases of poor sanitation.

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

⁷ In the operational period some infrastructure will be the responsibility of the Municipal Boards/Councils, whilst others will be the responsibility of the appropriate branch of the State government (such as PWD, PHED, etc.).

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

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
Environmental clearances	CFE and CFO are required from the SPCB in order to implement the project. Land allotment letter required. If not pursued on timely basis, this can delay the project.	Pursue all clearances and follow up with relevant authorities	IPMU & IPIU	IPMU to follow up with SPCB on clearances
Utilities	Telephone lines, electric poles and wires, water and sewer lines within the existing bridge right-of-way (ROW) may be damaged.	(i) Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and (ii) Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.	DSC	(i) List of affected utilities and operators; (ii) bid document to include requirement for a contingency plan for service interruptions
Asbestos Cement Pipes	Risk of contact with carcinogenic materials	(i) Require DSC to develop AC Protocol; (ii) Develop reporting procedures to inform management immediately if AC pipes are encountered; and (ii) Require construction consultants to develop and apply an AC Management Plan, as part of the over-all health and safety (H&S) plan, to protect both workers and citizens in case accidental uncovering of AC pipes. This AC Management Plan should also contain national and international standards for safe removal and long-term disposal of all asbestos-containing material encountered.	IPIU and DSC	(i) Asbestos Cement Protocol; (ii) requirement for AC Management included in bid documents
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 recognised and measures are taken to ensure they are protected and conserved.	IPIU and DSC	Chance Finds Protocol
Construction work camps,	Disruption to traffic flow and sensitive receptors	(i) Prioritize areas within or nearest possible vacant space in the subproject sites;	IPIU and DSC to determine locations	List of selected sites for construction work camps,

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
hot mix plants, stockpile areas, storage areas, and disposal areas.		(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 water body or in areas which will inconvenience the community.	prior to award of construction contracts.	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 may cause ground instability	(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
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; (iii) Damp down exposed soil and any stockpiled on site by spraying with water when necessary during dry weather; (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), PM2.5, SOx, NOx and CO; (iv) vehicular emissions such as sulphur dioxide (SO2), 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; and (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; (iii) effectiveness of water management measures;

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
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; and (v) Use of ear plugs at noise producing area	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
Existing Infrastructure and Facilities	Disruption of service and damage to existing infrastructure located alongside roads, in particular water supply pipes	(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 AC Pipes Management Plan	Construction Contractor	(i) Existing Utilities Contingency Plan; (ii) Asbestos Cement Pipes Management Plan
Landscape and Aesthetics	Solid wastes as well as excess construction materials	(i) Prepare and implement Waste Management Plan; (ii) Avoid stockpiling of excess excavated soils; (iii) Coordinate with Municipal Board for beneficial uses of excess excavated soils or immediately dispose to designated areas; (iv) Recover used oil and lubricants and reuse or remove from the sites; (v) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; (vi) Remove all wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and (vii) 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.
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	Construction Contractor	(i) Traffic Management Plan; (ii) complaints from

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		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 affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints		sensitive receptors; (iii) number of signages placed at subproject sites.
Socio-Economic Income. –	Impede the access of residents and customers to nearby shops	(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. (vi) Execution of work in the night to complete it as early as possible, wherever necessary; (vii) Avoid peak tourist season for execution of work where shops exists	Construction Contractor	(i) Complaints from sensitive receptors; (ii) number of walkways, signages, and metal sheets placed at subproject sites.
Socio-Economic Employment -	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&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) Hands Training for all site	Construction Contractor	(i) Site-specific Health and Safety (Ha&) Plan; (ii) Equipped first-aid stations; (iii) Medical insurance

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		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&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.		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&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.
Asbestos Cement Pipes	Health risk	(i) Train all personnel (including manual laborers) 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;	Construction Contractor	(i) Records of trainings; (ii) AC Management Plan approved by IPIU/DSC

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		(iii) Develop and apply AC Management Plan.		
Community Health and Safety.	Traffic accidents and vehicle collision with pedestrians. Work site 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. (v) Provide fences to keep public out of work areas and ensure no trespassing for community safety	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	Risk of archaeological chance finds	(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 (iv) Inform IPIU/DSC if a find is suspected, and take	Construction Contractor	(i) Records of chance finds

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		any action they require ensuring its removal or protection in situ.		

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
Water Quality	deterioration of surface and groundwater quality	(i) Ensure treated water complies with GOI Standards for Discharges to Inland Waters and Land for Irrigation	Municipal Board/Council and O and M Contractors	Effluent quality testing before discharge (i) Inland parameters: colour and odour, suspended solids, particle size of suspended solids, pH value, temperature, oil and grease, total residual chlorine, ammonical nitrogen, total Kjeldahl nitrogen, free ammonia, biochemical oxygen demand, chemical oxygen demand, heavy metals, cyanide, fluoride, dissolved phosphates, sulfide and phenolic compounds. (ii) Land for Irrigation: colour and odour, suspended solids, pH value, oil and grease, biochemical oxygen demand, arsenic, and cyanide
Occupational Health and Safety	Adverse impacts on the appearance of surrounding environment and exposure of workers to hazardous debris and gases from sewage pipeline	(i) Ensure persons employed will be provided with suitable equipment (such as shovels and wheelbarrows); and (ii) Ensure all removed material will be deposited in the municipal waste storage bins. (iii) Arrangement of oxygen and PPE for laborer during repairing work (iv) Train all personnel (including manual laborers) to enable them to understand the dangers of AC pipes and to be able to recognise them in situ; (v) Report to management immediately if AC pipes are encountered; and (vi) Develop and apply AC Management Plan.	PHED, Municipal Board/Council and O and M Contractors	(i) Records of training; (ii) H and S Plan and AC Management Plan approved by PHED
General maintenance	May cause disturbance to sensitive receptors, dusts, increase in noise level	(i) Refill and re-compact trenches soil and backfilled sand will be removed to expose the leaking junction or pipe;	PHED, Municipal Board/Council and O and M Contractors	Complaints from sensitive receptors

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		(ii) Conduct work during non-monsoon period; and (iii) Cover or wet excavated material to prevent dusts.		
Economic Development	Impediments to residents and businesses	(i) Inform all residents and businesses about the nature and duration of any work well in advance so that they can make preparations if necessary; (ii) Conduct these works to provide wooden walkways across trenches for pedestrians and metal sheets where vehicle access is required; and (iii) Consult the local police regarding any such work so that it can be planned to avoid traffic disruption as far as possible, and road diversions can be organised if necessary. (iv) Supply of sewage sludge from STP to farmers for use in farming – economic development through utilization of waste material	PHED, Municipal Board/Council and O and M Contractors	Complaints from sensitive receptors
Social and Cultural Resources	Temporary disruption of activities	(i) Consult the town authorities to identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity; (ii) Complete work in these areas quickly; (iii) Provide wooden bridges for pedestrians and metal sheets for vehicles to allow access across open trenches where required; and (iv) Consult municipal	PHED, MB/MC and O and M Contractors	Complaints from sensitive receptors

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		authorities, custodians of important buildings, cultural and tourism authorities and local communities in advance of the work to identify and address key issues, and avoid working at sensitive times, such as religious and cultural festivals.		

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
Environmental Clearances	not applicable	IPIU/IPMC/IPMU	IPIU to follow up with SPCB on clearances	checking of records	Clearances issued	as needed	IPMU
Utilities	not applicable	DSC	(i) list of affected utilities and operators; (ii) bid document to include requirement for a contingency plan for service interruptions	checking of records	(i) list of affected utilities and operators prepared; (ii) requirement for a contingency plan for service interruptions included in bid documents	once	IPMU
Asbestos Cement Pipes	not applicable	IPIU and DSC	(i) Asbestos Cement Protocol; (ii) requirement for AC Management included in bid documents	checking of records	(i) AC Protocol prepared; (ii) bid documents include requirements for AC Management Plan	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
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) suspended particulate	Air sample collection and analyses by in-house laboratory or	GOI Ambient Air Quality Standards	Once prior to start of construction	IPMU

Field	Location	Responsible for Mitigation	Monitoring of	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
			matter (SPM)	accredited 3rd party laboratory			
Baseline Environmental Condition - Water Quality	Subproject sites	DSC	Establish baseline values of suspended solids (TSS), (iii) pH (iv) biological oxygen demand (BOD), (v) fecal coliform	Water sample collection and analyses by in-house laboratory or accredited 3rd party laboratory	GOI Water Quality Standards	Once prior to start of construction	IPMU

Table 7.5: Construction Environmental Monitoring Program

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of	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 for stockpiling of materials	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 particulate matter (PM2.5); oxides of sulphur and nitrogen, CO; (iv) vehicular emissions such as sulphur dioxide (SO ₂), nitrous oxides (NO _x), carbon monoxide (CO), and hydrocarbons (HC)	(i) checking of records; (ii) Records of generated monitoring data	(i) stockpiles on designated areas only; (ii) complaints from sensitive receptors satisfactorily 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 , NO _x , CO and HC.	monthly for checking records	DSC
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) effectiveness of water management measures;	visual inspection	(i) designated areas only; (ii) silt traps installed and functioning; (iii) no noticeable increase in suspended solids and silt from construction activities (iv) GOI Standards for Water Discharges to Inland Waters and Land for Irrigation	monthly	DSC
Noise Levels	(i) construction sites; (ii) areas for	Construction Contractor	(i) Complaints from sensitive receptors; (ii) use of silencers in	(i) checking of records; (ii) visual	(i) complaints from sensitive receptors satisfactorily addressed;	monthly	DSC

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
	stockpiles, storage of fuels and lubricants and waste materials; (iii) work camps		noise-producing equipment and sound barriers; (iii) equivalent day and night time levels	inspection	and (ii) silencers in noise-producing equipment functioning as design; and (iii) sound barriers installed where necessary		
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
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
Accessibility	(i) construction sites; (ii) traffic routes	Construction Contractor	(i) Traffic Management Plan; (ii) complaints from sensitive receptors; (iii) number of signages placed at subproject sites.	visual inspection	(i) implementation of Traffic Management Plan; (ii) complaints from sensitive receptors satisfactorily addressed; (iii) signages visible and located in designated areas	monthly	DSC
Socio-economic - Income	construction sites	Construction Contractor	(i) complaints from sensitive receptors; (ii) number of walkways, signages, and metal sheets placed at subproject sites.	visual inspection	(i) complaints from sensitive receptors satisfactorily addressed; (ii) walkways, ramps, and metal sheets provided (iii) signages visible and located in designated areas	quarterly	DSC
AC Pipes	construction	Construction	(i) records of trainings;	checking of	no exposure to AC pipes	as needed	PIU and DSC

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
	sites	Contractors	(ii) AC Management Plan approved by PIU/DSC	records			
Socio-Economic - Employment	construction sites	Construction Contractor	(i) employment records; (ii) records of sources of materials	checking of records	number of employees from project town equal or greater than 50% of total work force	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	visual inspection	(i) implementation of Traffic Management Plan;(ii) complaints from	quarterly	DSC

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
			sensitive receptors		sensitive receptors satisfactorily addressed (iii) fences set up to keep public out of construction site.		
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	records of chance finds	checking records of	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
Water Quality	(i) STP effluent; (ii) nearby water bodies	MB/MC in coordination with PHED and O and M Contractors	Effluent quality testing (i) Inland parameters: colour and odour, suspended solids, particle size of suspended solids, pH value, temperature, oil and grease, total residual chlorine, ammonical nitrogen, total Kjeldahl nitrogen, free ammonia, biochemical oxygen demand, chemical oxygen demand, heavy metals, cyanide, fluoride, dissolved phosphates, sulfide and phenolic compounds.(ii) Land for Irrigation: colour and odour, suspended solids, pH value, oil and grease, biochemical oxygen demand, arsenic, and cyanide	Sample collection and laboratory analyses	GOI Standards for Discharges to Inland Waters and Land for Irrigation	Quarterly or as prescribed by CPCB	IPMU
Occupational Health and Safety	subproject sites	PHED, MB/MC and O and M Contractors	complaints from sensitive receptors	(i) records of training; (ii) H and S Plan and AC Management Plan approved by PHED	(i) complaints from sensitive receptors satisfactorily addressed; (ii) no exposure to AC pipes	as needed	IPMU
General maintenance	subproject sites	PHED, MB/MC and O and M Contractors	complaints from sensitive receptors	checking of records	complaints from sensitive receptors satisfactorily addressed	as needed	IPMU
Economic Development	subproject sites	PHED, MB/MC and O and M Contractors	complaints from sensitive receptors	checking of records Use of sludge – observation in field	complaints from sensitive receptors satisfactorily addressed	as needed	IPMU
Social and Cultural Resources	subproject sites	PHED, MB/MC and O and M Contractors	complaints from sensitive receptors	checking of records	complaints from sensitive receptors satisfactorily addressed	as needed	IPMU

D. Environmental Management Costs

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

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

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

157. These have not been budgeted elsewhere, and their costs are shown in **Table 7.7**, with details of the calculations shown in footnotes beneath the table. The figures show that the total cost of environmental management and monitoring for the project as a whole (covering design, 2 years of construction and the first five years of operation) is **INR 1.5 million**.

Table 7.7: Environmental management and monitoring costs (INR)

Item	Quantity	Unit Cost	Total Cost	Sub-total
1. Implementation of EMP (2 years)				
Survey Expenses	Lump sum	100,000	100,000	100,000
2. Survey of STP sludge and effluent (5 years)				
Sample Analysis	5 x 10	10000 ^a	500,000	
Other Expenses	Lump sum	200,000	200,000	700,000
3. Survey of public health (6 years)				
Expenses	Lump sum	200,000	200,000	200,000
4. Environmental mitigation measures including buffer zone development near STP	Lump sum	500,000	500,000	500,000
TOTAL				1,500,000

^a Cost for a standard bacteriological analysis (total of faecal coliforms, e coli, enterococci, etc.,) is INR 3,500 per sample.

VIII. FINDINGS AND RECOMMENDATIONS

A. Findings

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

159. 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.

160. The process described in this document has assessed the environmental impacts of all elements of the infrastructure proposed under the Karauli Sewerage and Sanitation Subproject. Potential negative impacts were identified in relation to construction and operation of the improved infrastructure, and the design and location of the subproject. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. These were discussed with specialists responsible for the engineering aspects, and as a result some measures have already been included in the outline designs for the infrastructure. These include:

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

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

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

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

18. Regardless of these and various other actions taken during the IEE process and in developing the subproject, there will still be impacts on the environment when the infrastructure is built and when it is operating. This is mainly because of the invasive nature of trenching work and the excavation of ponds at the STP site; the sewer network is located in a town, some parts of which are densely populated; and because Rajasthan is an area with a rich history, in which there is a high risk that ground disturbance may uncover important archaeological remains. Because of these factors the most significant impacts are on the physical environment, the human environment, and the cultural heritage.

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

- (i) Finding beneficial uses for waste material;
- (ii) Covering soil and sand during transportation and when stored on site;
- (iii) Planning work to minimize disruption of traffic and communities;
- (iv) Providing temporary structures to maintain access across trenches where required.

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

165. 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:

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

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

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

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

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

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

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

- (i) The operation and integrity of sewers are checked regularly and any leaks are repaired rapidly and effectively to avoid public health risks and contamination of land and water;
- (ii) Treated effluent from the STP is sold to farmers to fertilize and irrigate fields instead of being discharged into a nearby *nallah*.

170. The repair of sewers will have fewer environmental impacts than the original sewer construction as the work will be infrequent and will affect small areas only. It will also be conducted in areas that have already been excavated, so there will be no need to protect archaeological material.

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

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

173. **Table 7.1** to **Table 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 scheme).

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

B. Recommendation

175. There are three 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:

- (i) All mitigation, compensation and enhancement measures proposed in this environmental status report (**Table 7.1** to **Table 7.3**) are implemented in full, as described in the text above;
- (ii) The Environmental Monitoring Plan proposed of this report is also implemented in full.
- (iii) The mitigation measures at the STP site are designed from the inception to take care of any sensitivity involved due to its location.

IX. CONCLUSIONS

176. The environmental status of the proposed improvements in sewerage and sanitation in Karauli Town has been assessed. Issues related to Involuntary Resettlement were assessed by a process of resettlement planning and will be compensated by measures set out in detail in the Resettlement Framework for the subproject.

177. The overall conclusion of process is that provided 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.

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

ANNEXURE 1: PHOTOGRAPHS

PHOTO ILLUSTRATION



Photo 1: Location of STP at Karauli



Photo 2: Approach Road to Karauli STP site



Photo 3: Public consultation at village Rajpur
in Karauli

Photographs of STP site



Photographs of sewer line alignment



Proposed alignment pipe laying (Teen bad to new collectory circle).jpg



Proposed alignment pipe laying (Teen bad to new collectory circle).jpg



Proposed alignment pipe laying (Towards hathi qhata) .jpg



Proposed alignment pipe laying towards sps-4.jpg



Proposed alignment pipe laying(Turn towards old collectory circle).jpg



Proposed pipe laying (Circuit house to old collectory circle) .jpg



Proposed pipe laying (Jindal marriage home to Teen bad).jpg



Proposed pipe laying (New collectory circle to PHED office).jpg



Proposed pipe laying (New collectory circle).jpg



Proposed pipe laying (New collectory to Truck union).jpg



Proposed pipe laying (Old collectory circle to govt. college).jpg



Proposed pipe laying (Old collectory circle).jpg



Proposed pipe laying (Opp. circuit house).jpg

Photographs of Sewage Pump House



View of SPS-1 site (1).jpg



View of SPS-1 site (2).jpg



View of SPS-1 site (3).jpg



View of SPS-1 site (4).jpg



View of SPS-1 site (5).jpg



View of SPS-1 site (6).jpg

ANNEXURE 2: RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST

Country/Project Title: **India/Rajasthan Urban Sector Development Investment Programme (Phase II).**

Sub-Project: **Design and Construction of Sewage Treatment Plant Including Supply, Laying, Jointing, Testing of Sewer – Karauli town**

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 the 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:

Rajasthan Urban Sector Development Investment Project (RUSDIP)

Sector Division:

Karauli Waste Water

Screening Questions	Yes	No	Remarks
B. Project Siting Is the project area...			
▪ Densely populated?		√	No, the project area is not densely populated. Only 4-5 houses at village Charagah is there, within a distance of about 1 km.
▪ Heavy with development activities?		√	A college building is under construction at a distance of around 1.2-1.5 km except that no other developmental activities is there within an area of around 3-4 Km.
▪ Adjacent to or within any environmentally sensitive areas?			
• Cultural heritage site		√	No cultural heritage site is there within a periphery of 10 Km. The site has been selected by considering all these factors
• Protected Area		√	Kaila Devi National Park is about 20 Km away from the site, and there will be no chance of any interference due to proposed location of STP.
• Wetland		√	There is no wetlands area present

Screening Questions	Yes	No	Remarks
			near to the project area.
• Mangrove		√	There is no mangrove area present near to the project area.
• Estuarine		√	There is no estuarine area present near to the project area.
• Buffer zone of protected area		√	Site is not within buffer zone of the protected area
• Special area for protecting biodiversity		√	The proposed project doesn't falls within any special area for protecting biodiversity.
• Bay		√	Not Applicable
A. Potential Environmental Impacts Will the Project cause...			
▪ impairment of historical/cultural monuments/areas and loss/damage to these sites?		√	No historical site, cultural monument is there within a distance of about 10 Km so there will be no chance of damages to these sites.
▪ interference with other utilities and blocking of access to buildings; nuisance to neighboring areas due to noise, smell, and influx of insects, rodents, etc.?		√	Since the project site is at a distance of 8-10 km from the main town the chances of such problems is negligible.
▪ dislocation or involuntary resettlement of people?		√	No chances of dislocation or involuntary settlement will be there as the site proposed is a Government Vacant Land. Also, no population is there within a periphery of around 800m from the project site.
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?			No such impact
▪ impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage?		√	Only treated water will be sent to the downstream area hence there will be no such problems.
▪ overflows and flooding of neighboring properties with raw sewage?		√	The raw sewage will be diverted to the STP and will be treated there. Proper drainage system would be ensured to minimize all such problems
▪ environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers?		√	The sludge will be collected and used as manure after digestion. Since the STP is designed for domestic purpose with underground pipelines so there would be no chance of industrial waste discharge disposal into it.
▪ noise and vibration due to blasting and other civil works?	√		Blasting is not required for this project so there will be no emissions of noise and vibrations which can affect natural life in nearby areas.for a short period. Proper mitigation measures will be applied
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, and biological hazards during project construction and operation?			
▪ discharge of hazardous materials into sewers, resulting		√	Discharge of hazardous materials will

Screening Questions	Yes	No	Remarks
in damage to sewer system and danger to workers?			not be allowed into sewer system. Proper measures have been proposed in order to prevent the workers from such kind of danger in order to prevent any mishap.
▪ inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances, and protect facilities?		√	The nearest settlement area is about 800 m to 1 km from the project site so all such probable nuisance are not expected. Moreover development of greenbelt in and around the STP has been considered in design
▪ road blocking and temporary flooding due to land excavation during the rainy season?		√	No road blocking will be there as most of the passage towards the site is vacant. Excavated soil will be used for filling of nearby low lying areas along with compaction.
▪ noise and dust from construction activities?	√		Noise will be produced slightly, but it will not affect the natural life because of the absence of any population within proximity of 800m- 1 km. Workers will be provided by ear plugs and other adequate measures in order to minimize the level of occupational noise impact Dust will be suppressed by sprinkling water
▪ traffic disturbances due to construction material transport and wastes?		√	No traffic disturbances will be there due to construction material transport because the proposed site is not a common route for transportation
▪ temporary silt runoff due to construction?		√	Soil will be removed and dumped/for other uses.
▪ hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?		√	Adequate measures have been taken so as to minimize any chances of over flooding. Also, there is less or no chances of failure of sewerage system as mentioned in DPR.
▪ deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?		√	Proper measures will be taken in order to prevent inadequate sludge disposal and direct discharge of untreated sewage water.
▪ contamination of surface and ground waters due to sludge disposal on land?		√	No chances of contamination of surface and ground water will be there as sludge will not be disposed on open land infact it will be utilized as manure after digestion.
▪ health and safety hazards to workers from toxic gases and hazardous materials which maybe contained in confined areas, sewage flow and exposure to pathogens in untreated sewage and unstabilized sludge?		√	Workers will be provided by all safety instruments in order to prevent any risk from release of toxic gases and hazardous materials if any.
▪ large population increase during project construction		√	No such impact is anticipated. A

Screening Questions	Yes	No	Remarks
and operation that causes increased burden on social infrastructure (such as sanitation system)?			moderate team of worker is required. Local workers will be engaged
▪ social conflicts between construction workers from other areas and community workers?		√	As the site is less populated workers will be engaged from nearby areas, if available preference will be given to the local workers in order to prevent such kind of conflicts.
▪ 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 such impact is anticipated. STP site is quite far from habitation. No explosive is required for the sub-project.
▪ community safety risks due to both accidental and natural hazards, 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 such impact is anticipated

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)?		√	Karauli town lies in low damage risk zone II
▪ Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost?		√	
▪ Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g. high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?		√	
▪ Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)?		√	

ANNEXURE 3: STP- UP FLOW ANAEROBIC SLUDGE BLANKET (UASB) TECHNOLOGY (APPROVED BY CPHEEO)

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

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

3. The effluent, if required, further may allowed to stay at Polishing Pond one day, after which, can be used for irrigation, horticulture or for washing purposes. The effluent BOD can be expected to be about 60mg/l assuming influent BOD of 300mg/l with 75-80% efficiency of BOD removal. The irrigation standard (BOD<100 mg/l) are generally conveniently met by UASB

A. Sludge Production and nutrient Requirement:

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

B. Gas Recovery:

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

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

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

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

9. At present no gas holder is to be provided. However, planning and designing of plant has to be done considering that the gas holder will be installed in future. Space shall be provided for gas holder while deciding the layout of the plant.

10. The treatment plant shall consist of the following units:

- (i) Initial Pumping
- (ii) Screening and Degritting
- (iii) Main UASB Reactor
- (iv) Gas Collection and Holding
- (v) Sludge Drying Bed
- (vi) Post treatment facility (Optional)

C. Units for STP

1. Inlet Chamber

11. It will be in R.C.C and will be raised above ground so that there is adequate hydraulic head available for flow to pass on from this unit towards the final treatment unit of STP. The detention time in inlet chamber will be min. ½ minute at flow of 11.25 MLD (ultimate peak flow) and will be fitted with CI gates of suitable size to each bar screen channel proceeding from it. Gravity main flow will enter in this chamber.

2. Coarse Screen Chamber

12. There shall be two coarse screen chambers of RCC, one working and one stand by shall be provided both screen shall be mechanically operated. The screens shall be ahead in the flow direction and the screen will be elevated above the side wall levels such that the RCC platform level matches the belt conveyor level to facilitate the least manual transfer of screenings on to the moving conveyor.

13. Necessary hand operated sluice gates shall be provided both in the upstream and downstream of the chamber to sluice either of the screens when it is taken out of service. A straight section, minimum of 3 times the width of the chamber, shall be ensured in the straight section upstream of the screens. A belt conveyor system of suitable width shall be provided which shall be common to both mechanical screens. This conveyor shall collect, transport and deliver the screenings through a FRP/SS chute at an elevation of 1.75 m above the level of adjacent service road such that the screenings drop automatically into a parked trailer / wheel barrow and hauled away for disposal without requiring manual handling. For inspection and maintenance of the screens & conveyor a RCC platform with handrails of 0.9 m height on both sides shall be constructed along the screen chamber with perpendicularly aligned access platform to reach to screens for closer inspection of both screens and conveyor system. For off-situ repairs to be carried out to the screen, lifting of the screen assembly by mobile crane is contemplated. Isolation of the screens from the flow during either repairs or due to low flow conditions or due to rotational duty shall be through manually operated sluice gates as described earlier. The sluice gates shall conform to IS: 13349. The raw sewage shall enter the Inlet chamber by gravity through Sewer. The operation of Screen & Belt Conveyer shall be through local panel/ push button. The limiting velocity through the openings will be 0.8 to 1.2m/sec. at Design peak flow (2041) and min. horizontal velocity at minimum flow will not be less than 0.3 m / sec. These screens shall be designed and constructed in a suitable size based on the Design peak flow (2041). Screen Channel will be discharging in to sump.

Parameters for screen

Numbers:

Two

Both mechanical operated

Capacity

Each to handle Design Peak flow 11.25 MLD

Arrangement	Parallel to each other and provided with a common conveyor system to collect and convey screenings to disposal bin.
Clear spacing (max)	50 mm
Flats size	10 mm x 50 mm
Velocity through screen	1 m/s (maximum)
Wetted parts and all fasteners	SS AISI 316
Isolating gates (Open channel gates)	CI

3. Raw sewage sump and pumps

14. Raw sewage sump of capacity equivalent to minimum 20 minutes for flow of 11.25 MLD of sewage shall be provided. The raw sewage sump shall be water tight. It shall be designed on "no-crack basic" to prevent seepage of the sewage out of the sump. The shape of this sump may be circular and integral with coarse screen channel. The pump type shall be submersible. The capacity and numbers of pumps installed shall be suitable for handling lean, average and peak flow and to lift the raw sewage to fine screen. There shall be RCC platform (with railings) at least 1.2 m wide or suitable for the biggest pump dimension along the axis of the pump row(s) to facilitate erection /de-erection of the pumps. Necessary monorail, travelling trolley and chain pulley block shall be provided in each platform for the purpose of erection/ de-erection of pump sets. The elevations of platform, operating wheels of gates etc shall be attended to in detailed engineering. The sump shall be provided with level switches. Control panel along with all electrical components for ON-OFF control and protection as well as required instrumentation shall be supplied along with the pumps. Manual entry into this raw sewage sump shall normally be prohibited. However, such entry shall still be made when required by recourse to adequate safety measures. The sewage from the raw sewage sump shall be pumped up through DI K-9 pipes to a manifold/elevated channel having discharge in the fine screen chamber.

Parameters for submersible pumps:

Type	: Wet submersible non-clog
Capacity of each pump	: 117.50 cum/hr. -2 Nos, 235 Cum/hr. -3 Nos,
Head	: To suit.
Materials of construction:	
Pump casing	: CI IS: 210 Gr FG 260
Discharge casing	: CI IS: 210 Gr FG 260
Impeller	: SS ASTM A 743 C, CF 8M
Shaft	: SS AISI 410
Mechanical Seal	: Silicon Carbide
Fasteners	: SS AISI 304.
Protective Coating	: The pumps shall be epoxy painted.

4. Pump Room

15. Pump Room will be built right on top of sump. Size of pump room shall be such as to facilitate all ancillaries. There will be a gantry crane of 2 ton capacity with chain and pulley block on the ceiling of pump house. Towards the side of pumps, the floor will have open space, adequate to handle pump removal, installation etc. The whole pump house, i.e. sump well will be well ventilated. The floor space of the sump will provide working space for pump repair, temporary storage etc. and permanent storage. At the outside but adjacent to pump house, D.G. set room, M.C.C Room, operators room and transformer shall be provided.

5. Fine Screen Chamber

16. Two fine screen channels shall be provided to install mechanical operated fine screens. These screens will be with clear spacing between bars of 6 mm and comprise of SS-316 flats, 50 mm x 10mm. The channel and screens will be sized for max. velocity of 0.8 to 1.2 m/sec. through openings at peak flow (11.25 MLD) and min. horizontal velocity of 0.3 m/sec. The each screens shall be designed for peak flow of 11.25 MLD (one working and one stand by). Contractor shall provide proper landing, steps and platform arrangement to facilitate manual cleaning. During operation also it shall be ensured that no worker gets in the channel without safety equipment and mask etc. The screenings shall be discharged through belt conveyor on to the portable containers (wheel barrows) placed on ground by the side of the screen channels.

6. Grit Separator

17. These shall be built in R.C.C. Grit chamber is provided to arrest all the inorganic grit of size 0.15 mm and above with specific gravity of 2.4 to 2.65. The detention time shall be 1 min and surface overflow rate shall be around 920 m³/m²/day. There shall be 2 grit chambers, each shall be designed for Peak flow i.e. 11.25 MLD flow. Both the units shall work simultaneously, when one of the units is under maintenance. Suitable landing arrangements, steps and platform will be provided by contractor to facilitate maintenance of grit chambers. The grit shall be collected in the portable bins (wheel barrows) placed on ground near the grit chamber.

7. Parshall Flume for Flow Measurement

18. Parshall flume in RCC shall be constructed capable of measuring flow up to 11.25 MLD. There will be an approach channel, a throat, and a downstream channel. At the throat, there will be a hydraulic jump and a corresponding head loss. There will be a meter mounted above the channel to measure the flow, record it and integrate it. Flow indicator, Flow Recorder and integrator shall be field mounted.

8. Distribution Chamber

19. The function of the distribution chamber is to collect the flow from the Parshall Flume and distribute it into two stream SS to be fed to the main treatment units of 2.5 MLD each. The distribution chamber shall be constructed in R.C.C with detention time of ½ min. at peak flow 11.25 MLD. There shall be Bypass arrangement from distribution chamber to the inlet of Facultative pond, which may be through RCC pipe / closed channel. The flow will be fed to two series of flow dividers and splitter boxes.

9. Flow Dividers and Splitter Boxes:

20. These are arranged right adjacent to distribution box. The nos and spacing and size of these splitter boxes will be determined by the supplier as per his / their proprietary design. Flow from splitter boxes will go through pipes to the inlet boxes placed in feeder channels of UASB reactors.

21. Average Flow is taken 5.0 MLD (2.5 MLD each stream) and peak flow shall be 11.25 MLD. All the preliminary units (Before reactor) shall invariably be designed for peak flow conditions.

22. C.I sluice gates of suitable size and numbers shall be installed as per the requirement. However, the contractor has to provide any additional gates, valves or any other item, which is necessary for the completeness of the work.

10. UASB (Up flow Anaerobic sludge Blanket) Reactors:

23. These reactors shall be constructed in R.C.C. They will either be circular or rectangular in shape depending upon the design. There will be two reactors, each capable to handle 2.5 MLD average flow. The indicative size of reactors will be 15.75 m dia x 6.75m ht. or 13m x 55m x 6.75 m ht. (Inner dimensions) each, however the contractor shall submit the design after award of work & submit it for approval from Project Manager. The solid retention time in the reactors shall be 8-10 hours. Liquid depth shall be 4.5- 6m. FB shall be kept as 0.75m. The additional height shall be provided for feed channels etc.. Gas domes shall be built and deflector beam shall be provided for "Gas Liquid Solid Separation" (GLSS). The gas dome shall be in R.C.C construction with 5 mm FRP lining. To prevent the UASB reactor from corrosion necessary precautions shall be taken during construction. The following may be adopted as guidelines:

a) Reactor tank:	:	M-40 grade concrete vibrated, or concrete made with sulphate resistant cement.
Portion below liquid level	:	Epoxy paint to resist CO ₂ attack
Portion above liquid level	:	FRP lining on R.C.C
b) Distribution boxes	:	M-40 R.C.C
c) Over flow weirs of the distribution boxes	:	FRP
d) Bolts and nuts for adjustment	:	SS-316 (keep all weirs adjustable and use FRP only for weirs)
e) Down take pipes	:	FRP, HDPE, MDPE
f) Sludge with draw Pipes	:	C.I Pipes (Class LA) as per IS
g) Gas Hoods	:	R.C.C with 5 mm FRP lining internally to the gas collecting channels
For slopes of hoods	:	PVC plates on FRP frames

11. Degasifying Aeration Tanks:

24. Two numbers R.C.C. aeration tanks shall be constructed near the UASB reactors. These tanks shall be designed for ½ hr. detention time. The indicative size for each tank is 4.75m x 4.75m x 2.5 m swd. These tanks shall be provided with 5 HP fixed type slow speed aerators. The effluent from the UASB reactor has gases mixed with it. To prevent the foul smell generated from the gases in the effluent, the effluent is desired to be aerated with the slow speed aerators.

12. Facultative Pond

25. There will be two facultative ponds, each pond will have a separate inlet chamber constructed in RCC (M30) with a detention time of 30 seconds. The inlet pipe from the distribution chamber will enter the facultative ponds and the outlet pipe from this inlet chamber will extend into the facultative ponds up to 30m, from the bottom edge of the embankment of pond. This inlet pipe shall be submerged and the crown of this inlet pipe shall be flushed with the top water level in 0.6m above the base of the pond and the invert of this inlet pipe shall be

0.6m above the base of the pond. A 90-degree bend with a bell mouth will be connected to the delivery end of the inlet pipes so that the flow shall be in downward direction. A Plain Cement Concrete (M20) splash pad of 150mm thick and dimensions 3m X 3m shall be constructed exactly below the delivery pipe such that the delivery end of pipe shall be at the center of the pad. The velocity of sewage through these pipes will be 0.6 m/sec to 1m/sec. The diameter of pipes and the relative water levels in both the facultative ponds shall be as per drawing. The liquid depth of ponds shall be 1.5m- 2.0m including required space for sludge accumulation for a minimum period of 5 years.

26. A baffle arrangement shall be provided upstream of the weir to prevent any floating matter and the algae entering the outlet chamber. The baffle wall shall Project minimum 0.6m into the sewage and minimum 0.6m above the sewage.

The outlet pipes from the outlet chambers shall be of DI K-9 and diameter shall be as per drawing. The velocity through these pipes shall be 0.6 m/sec to 1 m/sec. These pipes shall be connected to the final effluent chamber. The out let pipe from this final effluent chamber shall extend up to the open channel for final disposal works.

13. Sludge Drying Beds (SDB's)

27. Sludge from UASB reactors will be withdrawn from the bottom. The stabilized sludge withdrawn from the UASB reactors shall be dried on sludge drying beds. Sludge drying beds with an indicative area of about 1000 m² will be required for this sludge. Sludge drying beds shall be constructed as per CPHEEO Manual on sewerage & sewage Treatment Plant / IS code (amended upto date) in gravel and sand. Filtrate collection pipes etc. shall be provided with adequate size & number. Depth of sludge blanket shall be around 0.3m. Drying cycle shall be assumed to be around 7 days.

14. Filtrate Return Sump and Pump House:

28. The filtrate from the drying beds shall be led either into the inlet chamber or sump (after coarse screen) preferably by gravity. If pumping is needed then a small sump (RCC) with pump house (With RCC covered roof) of adequate size shall be constructed. Sludge pump of adequate discharge & head shall be installed in the sump to discharge the filtrate in to the inlet chamber or sump (after coarse screen).

15. Administrative Building:

29. This will be a single storey building of size 15mx10mx3.5m ht which will house, office of plant superintendent, operator, engineers visit room, laboratory with a cabin for chemist, records room, store room and Toilet with W.C. The building shall be designed as a framed structure. RCC work shall be in M-20. The walls shall be constructed in Brick Masonry with cement mortar 1:6. The inside & Outside plaster shall be 20mm thick in cement mortar 1:4. The doors & windows shall of Anodized Aluminum section as per standard specification of RUIDP. Flooring shall be of vitrified tiles of approved make & quality.

16. Gas flaring system

30. Gas flaring system is to be provided for the gas generated in UASB reactor. A distance of minimum 30 m shall be kept waste gas burner and the reactor tank or future gas holder to avoid the possibility of igniting the gas mixture. The capacity of the waste gas burner shall be adequate to burn the gas generated at optimum conditions. The waste gas burner shall be

located in the open yard for any observation. A pilot flame device should also be provided with the waste gas burner. Condensate traps, pressure release valves and flame traps should be provided ahead of the waste gas burner. Manometer indicating the gas pressure in cm of water should be used in the gas pipeline from the reactor. Necessary precautions shall be taken to avoid any mishap.

31. At present no gas holder is to be provided. However, planning and designing of plant has to be done considering that the gas holder will be installed in future. Space shall be provided for gas holder while deciding the layout of the plant.

ANNEXURE 4: PUBLIC CONSULTATION- ENVIRONMENT**PUBLIC CONSULTATION- ENVIRONMENT- Karauli Waste water project****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 nearby the city

Date & time of Consultation:

23.07.10 at 13.30 AM , Location :- Behind Police line near project site.

16.11.2012 at 10 AM, Location:- STP site and other alignment area

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 coverage area	The people of the town are well versed with the proposed STP. As per the local people, the DSC consultants have informed them by open houses and discussions regarding the proposed laying of the sewerage line and the STP. Since there is no settlement in the near periphery of the site so public consultation was done	The nearby residents should be associated at the most after proper discussions with them.
2.	In what way they may associate with the project	• The local people are of the view that they may be hired depending upon their efficiency and expertise. • People of repute in the local area have also assured that if they are well informed on time regarding the project, they will assist accordingly. • The local people wanted that they should be involved from the initial decision making phase onwards so that they can participate at every stage.	Preference will be given to the local labour during the implementation of the project as per the requirement. If required assistance should be taken from people of local repute.
3.	Presence of any forest, wild life or any sensitive/ unique environmental components nearby the project	During the consultation, it was found that there will be no such impact on the wildlife sanctuary as it is far away from the proposed project area.	Scientific application of mitigation measures will be required to avoid any impact on the sanctuary.
4	Presence of historical/cultural/ religious sites nearby	Sites of cultural/ historic/ religious importance were not found in the close proximity of the proposed project site.	--

Sr. No.	Key issues/Demands	Perception of community	Action to be Taken
5	Un favorable climatic condition	As per the local people's view, the summer season is not appropriate to commence the work as the temperature reaches about 47°C. During the heavy rains, there might arise some problems in the execution of the project.	Suitable climatic conditions will be considered for execution planning
6	Occurrence of flood	Due to poor drainage conditions people suffer from water stagnancy in the area especially in the market area and road side areas. There has been no report of Flood in the project area.	Proper actions should be taken during the execution of the project so that the condition does not worsen due to the project.
7	Drainage and sewerage problem facing	Due to poor drainage condition people suffer from water stagnancy in their area. No sewerage system in the project area.	The proposed sewerage system will improve the sewerage conditions.
8	Present drinking water problem- quantity and quality	The source of water in the project area is tube-wells.	Construction of CWRs and OHSRs should be made in order to reduce the drinking water problem.
9	Present solid waste collection and disposal problem	The Municipal Board takes care of the solid waste management of Karauli city. The waste collection facility in the project area is totally absent.	Proper solid waste management system should be implemented.
10	Availability of Labour during construction time	Sufficient labour is not available within 1 km area as there are only 3-4 houses. But beyond 1 km area sufficient labour is available.	Availability of labor is not a problem here, if required labor from nearby areas will be hired.
11	Access road to project site	The site is accessible via road from all sides	-
12	Perception of villagers on tree felling and afforestation	The local people were of the view that trees should not be cut; if necessary it should be minimum in number and number of trees cut should be replaced by planting trees in the nearby areas.	It has been explained that during implementation phase of the sewerage line, no tree is going to be affected.
13	Dust and noise pollution and disturbances during construction work	People are aware of the fact that during construction work some amount of dust and noise will arise. But they want that it should be minimized as much as possible. It has been explained that as per Safeguard policy of the project for abatement of pollution, control system will be considered. Vehicles movement will be controlled & appropriate measure will be taken to combat the same.	PUC certified vehicles should be used during material handling and transportation activities. Sprinkling of water should be done in order to minimize the fugitive dust emissions.
14	Setting up of worker's camp site within the village/ project locality	As per the people, local laborers should be hired which will minimize the requirement of setting of a temporary work shelter.	Preference will be given to the local labour during the implementation of the project as per the requirement.
15	Safety of residents during construction phase and applying of vehicle for construction activities	People were of the view that safety measures like cautionary boards, signals, barricades should be used at the project site in order to minimize any mishap.	Safeguard policy should be implemented in order to minimize the accidents.
16	Conflict among beneficiaries downstream users – water supply project using of river water	- Some of the people were worried for the fact that due to the sewer line construction, the ground water may get contaminated. - The treated waste water should be given equally for irrigation practices to the nearby villages. - Some people had a thought that odor can also be a problem for them.	Proper actions will be taken in response to that of the local people. Buffer zone plantation in and around STP should be taken into planning

Sr. No.	Key issues/Demands	Perception of community	Action to be Taken
17	Requirement of enhancement of other facilities	The people were of the thought that if city waste is brought and treated near to their shelter, the nearby villages should be given basic amenities for sustainability.	Actions should be taken in order to improve the standard of living.
18	Whether local people agreed to sacrifice their lands (cultivable or not) for beneficial project after getting proper compensation	The nature of the project does not involve any land acquisition from the local people. Government land has been acquired for the proposed project activity.	If it will be required, proper compensation will be provided to the land owners.

NAME AND POSITION OF PERSONS CONSULTED:

(Village- Rajpur village)

Mr Phoolchand, villager.

Mr Bholu Ram, villager.

Mr Shyamlal, Villager.

Mr Ratan Singh, Villager

Mr Anil Gujjar, Villager

Mr Khemraj Meena, Villager

Mr Shivram, Villager.

Mr Satyaprakash, Villager.

Mr Mahesh Kumawat, Villager

Mr Rajveer Meena, Villager

Participant of consultation dated 16.11.2012

Mr Ram Niwas Sharma, Local Resident

Mr Bhagwan Shalai, Local Resident

Mr Vipin, Local Resident

Ms. Sharda, Local Resident

Ms. Bina, Local Resident

Summary of outcome:

The various issues related to the proposed project of design, construction, supply erection, testing, commissioning & O&M of STP plant have been discussed at the nearby settlement area of the project site with the local people. The local people were of the view that they are aware about the work which RUIDP and other agencies are doing. The people are in favor of the commissioning of the STP plant. The problem faced by them is lack of hygienic conditions. They were afraid that bad odor would pose problem for them. They also wished that local people should be given opportunities during the project tenure. They are also concern of the quality of the treated sewage water to be given to them for irrigation purpose. People want their problems should be heard and solutions for them should be implemented during the implementation phase. People are ready to extend all types of support during execution of the project. They also want that sewerage, drainage and solid waste management projects should be taken up as early as possible.

ANNEXURE 5: RECOMMENDED CONTRACT CLAUSES FOR CONTRACTORS**A. Sources of Materials**

- (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.

B. Air Quality

- (i) Consult with IPIU/DSC on the designated areas for stockpiling of clay, soils, gravel, and other
- (ii) construction materials;
- (iii) Damp down exposed soil and any stockpiled on site by spraying with water when necessary
- (iv) during dry weather;
- (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
- (vii) correctly and have PUC of all the construction vehicles updated.

C. Surface Water Quality

- (i) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins
- (ii) or plastic sheets;
- (iii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be
- (iv) disposed, consult with IPIU/DSC on designated disposal areas;
- (v) Install temporary silt traps or sedimentation basins along the drainage leading to the water
- (vi) bodies;
- (vii) Place storage areas for fuels and lubricants away from any drainage leading to water bodies;
- (viii) Dispose any wastes generated by construction activities in designated sites; and
- (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
- (iii) vehicle's approach;
- (iv) 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
- (v) Maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at a distance of 10 m or more from the vehicle/s.

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

F. Accessibility

- (i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the
- (ii) immediate vicinity of delivery sites;
- (iii) Schedule transport and hauling activities during non-peak hours;
- (iv) Locate entry and exit points in areas where there is low potential for traffic congestion;
- (v) Keep the site free from all unnecessary obstructions;
- (vi) Drive vehicles in a considerate manner;
- (vii) Coordinate with Karauli Traffic Office for temporary road diversions and with for provision of traffic aids if transportation activities cannot be avoided during peak hours; and
- (viii) Notify affected sensitive receptors by providing sign boards informing nature and duration of
- (ix) 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;
- (iii) Remove all wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and
- (iv) Request IPIU/DSC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.

H. 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 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 affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.

I. 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.

J. Socio-Economic – Employment

- (i) Employ at least 50% of the labor 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.

K. Occupational Health and Safety

- (i) Develop and implement site-specific Health and Safety (H&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&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
- (iii) easily accessible throughout the site;
- (iv) Provide medical insurance coverage for workers;
- (v) Secure all installations from unauthorized intrusion and accident risks;
- (vi) Provide supplies of potable drinking water;
- (vii) Provide clean eating areas where workers are not exposed to hazardous or noxious substances;
- (viii) Provide H&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;
- (ix) 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;
- (x) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
- (xi) Ensure moving equipment is outfitted with audible back-up alarms;
- (xii) 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
- (xiii) 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.

L. Asbestos Cement Pipes

- (i) Train all personnel (including manual laborers) 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.

M. 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.

N. 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
- (vi) contamination;
- (vii) Recover used oil and lubricants and reuse or remove from the site;
- (viii) Manage solid waste according to the following preference hierarchy: reuse, recycling and
- (ix) disposal to designated areas;
- (x) Remove all wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and
- (xi) Request IPIU/DSC to report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.

O. 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
- (iv) Inform IPIU/DSC if a find is suspected, and take any action they require ensuring its removal or protection in site.

ANNEXURE 6: CONSENT TO ESTABLISH ISSUED BY RAJASTHAN POLLUTION CONTROL BOARD FOR STP



File No :
Order No :

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Rajasthan State Pollution Control Board
4, Institutional Area, Jhalana Doongari, Jaipur-302 004
Phone: 0141-5159600, 5159695 Fax: 0141-5159697
www.rpcb.nic.in
Registered

File No : F(MUID)/Bharatpur(Bharatpur)/2(1)/2012-2013/3759-3761
Order No : 2012-2013/MUID/883

Dispatch Date: 07/08/2012

Type of effluent	Max. effluent generation (KLD)	Quantity of effluent to be recycled (KLD)	Quantity of treated effluent to be disposed (KLD) and mode of disposal
Domestic Sewage	5000.000	NIL	5,000.000 On Land For Irrigation

6 That the domestic sewage shall be treated before disposal so as to conform to the standards prescribed by the Board as notified under the Environment (Protection) Act-1986 for disposal Into Inland Surface Water. The main parameters for regular monitoring shall be as under.

Parameters	Standards
Total Suspended Solids	Not to exceed 100 mg/l
pH Value	Between 5.5 to 9.0
Oil and Grease	Not to exceed 10 mg/l
Biochemical Oxygen Demand (3 days at 27°C)	Not to exceed 30 mg/l
Chemical Oxygen Demand	Not to exceed 250 mg/l

- 7 That the unit shall obtain all necessary permission from Nagari Palika & district administration, Karauli for establishment of STP of 5 MLD.
- 8 That the water flow meters shall be provided at all suitable points to measure quantity of daily waste water generation, waste water treated and treated waste water utilized for irrigation, plantation/gardening purposes. Daily record of the same shall be maintained and to be submitted to the Board.
- 9 That the unit shall install disinfection arrangement for treated sewage before utilization of the same for agriculture, irrigation, plantation/gardening etc.
- 10 That the entire treated sewage shall be utilized for irrigation, horticulture/plantation etc.
- 11 That the unit shall ensure proper utilization and reuse of domestic waste water after adequate treatment for gainful purposes.
- 12 That the unit shall not allow to discharge the treated domestic waste water into any stream/Nallah which is ultimately terminating into any water body used for drinking purposes.
- 13 That the total project cost shall not exceed 9.68 crores, if the project cost exceeds 9.68 Crores, the Project proponent shall take/obtain modification in consent after paying fee as applicable.

A
8/12



Rajasthan State Pollution Control Board
 4, Institutional Area, Jhalana Doongari, Jaipur-302 004
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 Registered

File No : F(MUID)/Bharatpur(Bharatpur)/2(1)/2012-2013/3759-3761

Order No: 2012-2013/MUID/883

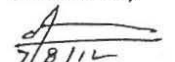
Dispatch Date: 07/08/2012

- 14 That this consent to establish is being issued for construction of STP of 5 MLD at Karauli. For any change in capacity, the unit has to seek fresh consent to establish.
- 15 That the unit shall install adequately designed rain water harvesting structure for prevention and recharge of ground water in and around the area.
- 16 That the unit shall not allow to install any air pollution source i.e.D.G.Set etc without prior permission of the Board under the Air Act 1981.
- 17 That the unit shall dispose the sludge of STP in scientific manner.
- 18 That the consent to operate under the Water Act 1974 from the State Board shall be obtained before commissioning of the STP.
- 19 That the unit shall not allow making any obstacles to any natural water flow i.e. natural nallah/stream carrying rain water to any water body.
- 20 That, not withstanding anything provided hereinabove, the State Board shall have power and reserves its right, as contained section 27(2) of the Water Act to review anyone or all the conditions imposed here in above and to make such variation as it deemed fit for the purpose of compliance of the Water Act.
- 21 That the grant of this **Consent to Establish** is issued from the environmental angle only, and does not absolve the project proponent from the other statutory obligations prescribed under any other law or any other instrument in force. The sole and complete responsibility, to comply with the conditions laid down in all other laws for the time-being in force, rests with the industry/ unit/ project proponent.
- 22 That the grant of this **Consent to Establish** shall not, in any way, adversely affect or jeopardize the legal proceedings, if any, instituted in the past or that could be instituted against you by the State Board for violation of the provisions of the Act or the Rules made thereunder.

This **Consent to Establish** shall also be subject, beside the aforesaid specific conditions, to the general conditions given in the enclosed Annexure. The project proponent will comply with the provisions of the **Water Act** and to such other conditions as may, from time to time, be specified by the State Board under the provisions of the aforesaid Act(s). Please note that, non compliance of any of the above stated conditions would tantamount to revocation of **Consent to Establish** and project proponent / occupier shall be liable for legal action under the the relevant provisions of the said Act(s).

This bears the approval of the competent authority.

Yours Sincerely


 7/8/12
 Group Incharge



Rajasthan State Pollution Control Board
4, Institutional Area, Jhalana Doongari, Jaipur-302 004
Phone: 0141-5159600,5159695 Fax: 0141-5159697
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Registered

File No : F(MUID)/Bharatpur(Bharatpur)/2(1)/2012-2013/3759-3761

Order No: 2012-2013/MUID/883

Dispatch Date: 07/08/2012

Copy To:-

- 1 Regional Officer, Regional Office, Rajasthan State Pollution Control Board, Bharatpur
inspect the unit for verification of compliance of consent to establish conditions within 0
months time and intimate to Head Office.
- 2 Master File.

[Signature]
5/8/12
Group Incharge

[Initials]