Initial Environmental Examination

(Enhanced Scope)

Waste Water Subproject is already in execution. Scope of works under execution includes Trunk Main Sewer and STP work. Enhancement in work proposed to above includes constructing a comprehensive sewerage system for the southern part of the city and a separate 3 MLD STP

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India: Rajasthan Urban Sector Development Investment Program- Dholpur Sewerage and Sanitation Subproject (Tr-02)

Prepared by Local Self Government Department

For the Government of Rajasthan
Rajasthan Urban Infrastructure Development Project

ABBREVIATION

ADB	Asian Development Bank
CWR	Clear Water Reservoir
DSC	Design and Supervision Consultancy
EA	Executing Agency
EAC	Expert Appraisal Committee
FI	Financial Intermediary
GLSR	Ground Level Service Reservoir
GoI	Government of India
GoR	Government of Rajasthan
GSI	Geological Survey of India
IA	Implementing Agency
IEE	Initial Environmental Examination
IPMC	Investment Programme Management Consultancy
IPMU	Investment Programme Management Unit
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
LPCD	Litre Per Capita per Day
LPS	Litre Per Second
LSGD	Local Self-Government Department
MFF	Multitranche Financing Facility
MLD	Million litre Per day
MoEF	Ministry of Environment and Forests
NAAQS	National Ambient Air Quality Standards
OD	Outer Diameter
OHSR	Over Head Service Reservoir
OM	Operations Manual
PHED	Public Health Engineering Department
PMU	Project Management Unit
RCC	Reinforced Cement Concrete
ROW	Right of Way
RPCB	Rajasthan State Pollution Control Board
RSPM	Respirable Suspended Particulate Matter
RUIDP	Rajasthan Urban Infrastructure Development Project
RUSDIP	Rajasthan Urban Sector Development Investment Program
SPM	Suspended Particulate Matter
STP	Sewerage Treatment Plant
ToR	Terms of Reference
UA	Urban Agglomeration
UIDSSMT	Urban Infrastructure Development Scheme for Small and Medium Towns
uPVC	Unplasitized Poly Venyl Chloride
USEPA	United States Environmental Protection Agency
WC	Water Closets
WTP	Water Treatment Plant

WEIGHTS AND MEASURES

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

NOTE{S}

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

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EXECUTIVE SUMMARY

1. 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 is being implemented over a seven year period beginning in 2008, and being funded by a Multitranche Financing Facility (MFF) loan from the Asian Development Bank (ADB). The Executing Agency is the Local Self-Government Department (LSGD) of the Government of Rajasthan; and the Implementing Agency is the Project Management Unit (PMU) of the Rajasthan Urban Infrastructure Development Project (RUIDP). ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for Environmental Assessment are described in ADB's SPS. This states that ADB requires environmental assessment of all project loans, program loans, sector loans, sector development program loans, loans involving financial intermediaries, and private sector loans.

2. This Initial Environmental Examination (IEE) has been prepared for the Dholpur Sewerage and Sanitation Subproject as part of RUIDP Phase II – Tranche 2. The subproject site is located in Dholpur town; the administrative headquarter of Dholpur District. The subproject covers trunk & lateral Sewers and construction of two STPs (10 MLD & 3 MLD) in Dholpur town. The enhanced scope, for which the IEE has been updated, consists of the addition of a comprehensive sewerage system for the southern part of Dholpur, as well as the 3 MLD STP.

3. The sub-project is needed because there is no underground sewage system in Dholpur town and this subproject will improve the sanitation problem of the town.

4. Detailed design for phase–I begun in the second quarter of 2008 and completed in the end of the year. The work of Phase-I is under execution. Detailed design for phase-II begun in January 2012. Construction of all elements should be completed by the middle of 2014.

5. The subproject sites are within the Dholpur town. It is not prone to salinisation, and flash flood. There are also no wetlands, mangroves, or estuaries within or near the sub project sites. Trees, vegetation and animals in the subproject site are those commonly found in built-up areas.

6. Potential negative impacts were identified in relation to construction and operation of the improved infrastructure. No impacts were identified as being due to the subproject design or location. An Environmental Management Plan (EMP) is proposed as part of this IEE which includes (i) mitigation measures for significant environmental impacts during implementation, (ii) environmental monitoring program, and the responsible entities for mitigation, monitoring, and reporting; (iii) public consultation and information disclosure; and grievance redress mechanism. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. A number of impacts and their significance have already been reduced by amending the designs.

7. During the construction phase, impacts mainly arise from the need to disturb large areas due to excavation, transportation, vehicle and equipment operation and other construction activities which can result to increase in dust and noise levels, disturbance to residents and businesses along the delivery routes, and traffic. These are common impacts of construction in built-up areas, and there are well developed methods for their mitigation.

One field in which impacts are low of interest in the subproject is archaeology because, a series of specific measures have been developed to avoid damaging important remains during construction.

8. The sub-project will improve the local environment significantly. There is no infrastructure for collection, treatment and disposal of sewage of the Dholpur town. Raw sewage is mostly been disposed directly into the existing open municipal drains except a few thousand population which is covered by private septic tanks disposing off their effluent in the same existing open drains. Besides this, there are localities which have no drains at all and their Waste Water is being disposed in the adjoining open land or spreads all along the narrow lanes leading to unhygienic conditions to the city population. The sewerage and sanitation sub-project will improve the aesthetic environment as well as unhygienic condition which are prone to many diseases.

9. Apart from providing hygienic environment the sub project will employ in the workforce people who live in the vicinity of construction sites to provide them with a short-term economic gain; and ensure that people employed in the longer term to maintain and operate the new facilities are residents of nearby communities.

10. Mitigation will be assured by Environmental Monitoring Program to be conducted during construction and operation stages. The environmental monitoring program will ensure that all measures are implemented, and will determine whether the environment is protected as intended. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries. Any requirements for remedial action will be reported to the IPMU.

11. The stakeholders were involved in developing the IEE through face-to-face discussions on site and a City Level Committee meeting held in the town, after which views expressed, were incorporated into the IEE and the planning and development of the project. The IEE will be made available at public locations in the town and will be disclosed to a wider audience via the ADB and RUIDP website. The consultation process will be continued and expanded during project implementation, when a nationally-recognised NGO will be appointed to handle this key element to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation.

12. The subproject is unlikely to cause significant adverse impacts. The potential adverse impacts that are associated with design, construction, and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures. Based on the findings of the IEE, the classification of the Project as Category “B” is confirmed, and no further special study or detailed EIA needs to be undertaken to comply with ADB Environment Policy (2002) or GoI EIA Notification (2006).

1. INTRODUCTION

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

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

1.2. Extent of the IEE study

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

1.2.1. ADB Policy

5. ADB's Environment Policy (2002) requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for Environmental Assessment as described in its Operations Manual (OM). This states that ADB requires environmental assessment of all project loans, programme loans, sector loans, sector development programme loans, financial intermediation loans and private sector investment operations.

6. The nature of the assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project, the sensitivity, scale, nature and magnitude of its potential impacts, and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental impacts and are assigned to one of the following categories:

Category A: Projects that could have significant environmental impacts. An Environmental Impact Assessment (EIA) is required.

Category B: Projects that could have some adverse environmental impacts, but of less significance than those for category A. An Initial Environmental Examination (IEE) is required to determine whether significant impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.

Category C: Projects those are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.

Category FI: Projects that involve a credit line through a financial intermediary (FI) or an equity investment in a FI. The FI must apply an environmental management system, unless all subprojects will result in insignificant impacts.

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

1.2.2. National Law

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

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

10. Category B projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA). The State level EAC 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 Common Municipal Solid Waste Management Facilities (CMSWMF)[1], where

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

EC is required for all Common Municipal Solid Waste Management Facilities. Thus the Environmental Clearance (EC) is not required for this subproject however to fulfill ADB procedure and IEE need to be prepared and approved by ADB.

12. The summary of environmental regulations and mandatory requirements for the proposed subproject is shown in **Table 1.1**

Table 1.1: Applicable Environmental Regulations & Legislations and its applicability

Acts/Guidelines	Purpose	Applicability to subproject
The EIA notification, 2006 (and its subsequent amendments in 2009) provides for categorization of projects into category A and B, based on extent of impact	This states that Environmental Clearance (EC) is required for specified activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorized as A or B depending on the scale of the project and the nature of its impacts. Categories A projects require Environmental Clearance from the National Ministry of Environment and Forests (MoEF). Category B projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA).	Not applicable The sub project is not included in schedule of environmental impact assessment notification 2006 and its subsequent amendments till dates so it is not categories as either Category A or Category B. As a result, environmental clearance is not required, either from the state or the central Government.
The Wildlife Conservation Act, 1972,	Clearance from state and national wildlife boards, Central Empowered Committee of Hon'ble Supreme Court of India and the State Wildlife Department, as applicable.	Not Applicable
Rajasthan Forest (Conservation) Act, 1953	Clearance from Forest department for cutting of trees, if any.	Applicable
The Ancient Monuments and Archaeological Sites and Remains Act, 1958, and the rules, 1959 provide guidance for carrying out activities, including conservation, construction and reuse in and around the protected monuments.	Permission from the Archaeological Survey of India for carrying out any construction activities within the prohibited and regulated areas of the ancient monuments and archaeologically protected sites.	Not Applicable
Water (Prevention and control of pollution) Act, 1974, as amended Air (prevention and control of pollution) Act, 1981, as amended and	Consent to Establish (CTE) and Consent to Operate (CTO) from the RSPCB for setting up of sewage treatment plant (STP) & hot mix plants, wet mix plants, stone crushers and diesel generators (if installed for construction). To be obtained by the Contractor, prior to construction.	Applicable
Water (Prevention and Control of Pollution) Cess Act, 1977 including Rules	Applicable to all activities, which discharge effluents as a result of process or operations	Applicable
Public Liability and	Protection form hazardous materials and	Applicable

Insurance Act 1991	accidents.	
Noise Pollution (Regulation and Control Act) , 2000	The standards for noise for day and night have been promulgated by the MoEF for various land uses. DG sets at construction sites should be provided with acoustics enclosures.	Applicable
Central Motor Vehicle Act 1988 and Central Motor Vehicle Rules1989	To check vehicular air and noise pollution. All vehicles in Use shall obtain Pollution Under Control (PUC) certificates by the contractor	Applicable
Child Labour Act 1986	No child shall be employed or permitted to work in any of the scheduled occupations	Applicable

1.2.3. Review and Approval Procedure

13. For Category B projects the Draft Environmental Status report and its summary (SIEE) are reviewed by ADB's Regional Department sector division and Environment and Social Safeguards Division, and by the Executing Agency, and additional comments may be sought from project affected people and other stakeholders. All comments are incorporated in preparing the final documents, which are reviewed by the Executing Agency and the national environmental protection agency. 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.

1.2.4. Scope of Study

14. This is the IEE report for the Dholpur 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.

2. DESCRIPTION OF THE PROJECT

2.1. Type, Category and Need

15. 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 Dholpur Town at present.

16. 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.

2.2. Location, Size and Implementation Schedule

17. The sub-project is located in Dholpur, the headquarters town of Dholpur District, in the eastern part of Rajasthan (Figure 2.1). The infrastructure will extend throughout many parts of the town, where pipes for new secondary and tertiary sewer networks (approx. 93 km under earlier scope & 26.7 km under new scope) will be buried within or alongside roadways. A new trunk sewer for 1 km under earlier scope & 700 m under new scope, where it will be buried alongside the Road. In addition of a new Sewage Treatment Plant (STP), to be built on 16 bigha of government land under earlier package, one more STP of 3MLD is proposed under enhanced scope. Proposed sewer system of Dholpur city is shown in Figure 2.2 and location of STPs shown in Figure 2.3 and 2.4. Environmental features in and around the proposed STPs are shown in Figure 2.8 (SOI Toposheet).

18. Detailed design for phase–I begun in the second quarter of 2008 and completed in the end of the year. The work of Phase-I is under execution. Detailed design for phase-II begun in January 2012. Construction of all elements should be completed by the middle of 2014.

2.3. Description of the Subproject

2.3.1. Existing situation of sewerage and sanitation in the city

19. There is no sewerage system existing in Dholpur town. Sewage disposal is primarily through septic tanks. Effluent from septic tank, in general, is discharged to the open street drains. Some soak pits of shallow depth and inadequate size are also in existence. These soak pits do not function properly and after some time is overflowing. The street drains carrying not only sullage but also sewage, as also untreated sewage in some cases, is ultimately discharged to water courses.

20. The work of sewerage is already taken-up under package DLP/WW-04 and the portion of the town considered to be benefited from this subproject is fairly densely populated. Out of 40 municipal wards, under the Subproject it is proposed to cover a population (2001 census) of 67,478 encompassing 29 municipal wards. Branch and lateral sewers will be provided in these wards, where necessary facilities for house connections will also be provided under the Subproject. These wards are ward nos. 1 to 6, 10 to 19, 27 to 36 & 38 to 40. Out of these 29 wards covered under phase-I, 10 & 28 will be partly covered and all the other 27 wards will be fully covered.

21. Under another package DLP/WW-05 the construction of STP is taken-up. The sewerage system proposed will comprise construction of 10 MLD sewage treatment plant (with Upflow Anaerobic Sludge Blanket process) at Tagwali village.

22. Under another package DLP/WW-06 some portion of the town considered to be benefited the leftout area to be discharged to STP at Tagwali village. These 16 wards are 16 to 19, 31, 35 & 36 are fully covered and 10, 11, 27, 29, 30, 32 to 34 & 38 are partly covered)

2.3.2. 2. Subproject Description including Detailed Scope

Earlier Scope of Work:-

23. The sewerage system proposed will comprise construction of 10 MLD sewage treatment plant (with Up-flow Anaerobic Sludge Blanket process), laying of Trunk main sewer line diameter 1000mm for a length of 1.00 km and secondary/ laterals for a length of 93.00 km in diameter ranging from 200 mm to 800mm. In the system one, intermediate pumping station has also been proposed to pump about 4 mld of sewage to be transported to a gravity sewer through a pumping main of 350mm diameter and a length of 650 metres. For house service connection it has been proposed 110&160mm OD uPVC pipes (4 to 6 per manholes). The house service connection is normally to the manholes. However, provisions for required numbers of road side chambers are also made which, if required, shall be used in wide roads for ease in construction and maintenance where 2 or 3 House service connections (HSC) shall be to Road side Chamber (RSC) and RSCs will be in turn connected with manholes. Also provision has been made in the cost estimate for dismantling cum refilling the septic tank / soak pit utilities for those who do not find space for effecting a separate connection.

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

25. **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 to treat sewage to Indian standards. The descriptions shown in **Table 2.1** are based on the present proposals, although certain details may change as development of the subproject progresses.

26. Under Tranche-II, works of the STP (which will be of approx.10 MLD capacity in 1st phase and can be increased in phase manner) will be constructed comprising of secondary treatment by Conventional Activated Sludge process as the land requirement is limited and Sewerage Network of pipe line in the main old town including out fall and Trunk sewer, Laterals and house connection. Under Tranche-II, the work for sewerage network for the city including laying of laterals and sewer lines in surrounding developed areas of the town and house connections to be considered. Land identified to an extent of 16 bighas (approx.6.4 ha) and in the process of acquisition by PHED, Dholpur.

27. The network pipes will be of Reinforced Cement Concrete (RCC), and will be located alongside roads and streets, in the government-owned Right of Way (ROW). The 93 km secondary and tertiary network will collect sewage from individual houses have a sufficient water supply. These pipes will be of small diameter (200 to 800 mm) and will be located in shallow trenches (ca 1.5 m in depth).

28. The 1 km trunk sewer will also be of RCC pipes. The pipes will be 1000 mm in diameter.

Enhanced Scope of Work:-

29. The entire city is divided in three parts under the system i.e. Western Zone, Eastern zone Part 'A' and Eastern zone Part 'B'. The entire city was considered in the design but only Western Zone and Eastern zone Part 'A' was taken up in the phase-I. These zones did not require any pumping but it is required in the Eastern zone part 'B'. The scope of eastern zone part 'B' has taken up in package WW/08.

- Laying of Trunk Mains of RCC (NP-3) sizes 600 mm and 700 mm dia. for a length of 467 m.
- Laying of Sub-Mains & laterals sizes 200 mm 400 mm dia. for a length of 24962 m of RCC (NP-3/NP-4) and 500 m length of PVC-U of 200/250 mm dia.
- PVC-U pipes of dia. 110/160 mm for a length of 32000 m. for property connections.
- Construction of Intermediate sewage pumping station (SPS) 9.71 MLD Avg. flow in eastern Part-B.
- Construction of treated sewage pumping station (TSPS) for 10 MLD Avg. flow at outlet of STP to Pump treated effluent from SPS to Node-9.
- Pumping main & Gravity main GRP pipe of 500 mm dia. for a length of 4700 m.

30. The STP being constructed under Project-2 covers only the Northern part of the Dholpur city. There is ridge line passing through near the Govt. Hospital separating the Slope of the city in North & Southern direction. In this area there are 11 Nos. of wards namely 7, 8, 9, 20, 21, 22, 23, 24, 25 & partly ward No. 10 & 26 having population of 29213 (Year 2008).

31. It is proposed to construct a comprehensive sewerage system for this area and separate 3 MLD STP is proposed based on SBR process under new package DLP/WW-09. The land for STP has been identified at Shekhupura village, which is about 700 mtr away from the city. The treated effluent will be disposed off through gravity in the nearby existing nallah (drain) and will be used for irrigation purposes and the excess amount or during non demand period the treated effluent will be disposed off in the river Chambal. The scope under DLP/WW-09 is summarized as below

- Laying of Trunk Mains of RCC of 700 mm dia. for a length of 627 m.
- Laying of Sub-Mains & laterals sizes 200 mm 500 mm dia. for a length of 26914 m of PVC-U and 1905 m of RCC (NP-4).
- Y and T connections are proposed on the PVC-U pipes for property connections.
- Construction of 3 MLD Sewerage Treatment Plant (STP) based on SBR (Sequential Batching Reactor) process at Shekhupura village. 3.5 hectare of land of Shekhupura village (Khasara No. 538 and 539) is available for the proposed STP of a capacity of 3 MLD.
- Construction of drain at outlet of STP to guide the treated effluent to effluent disposal drain.
- Construction of laboratory facilities on site to ensure good quality of the effluent.

Figure 2.1: Map showing the location of the project

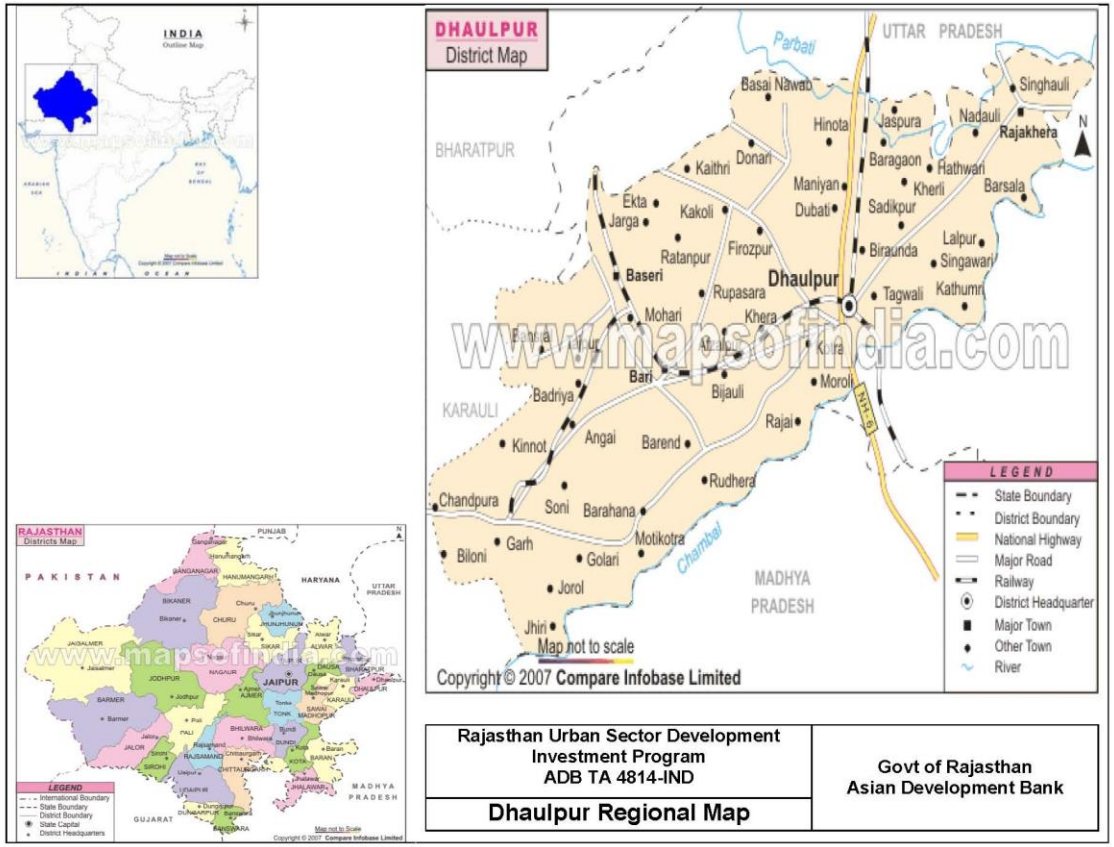


Figure 2.2: Schematic of the proposed sewerage system

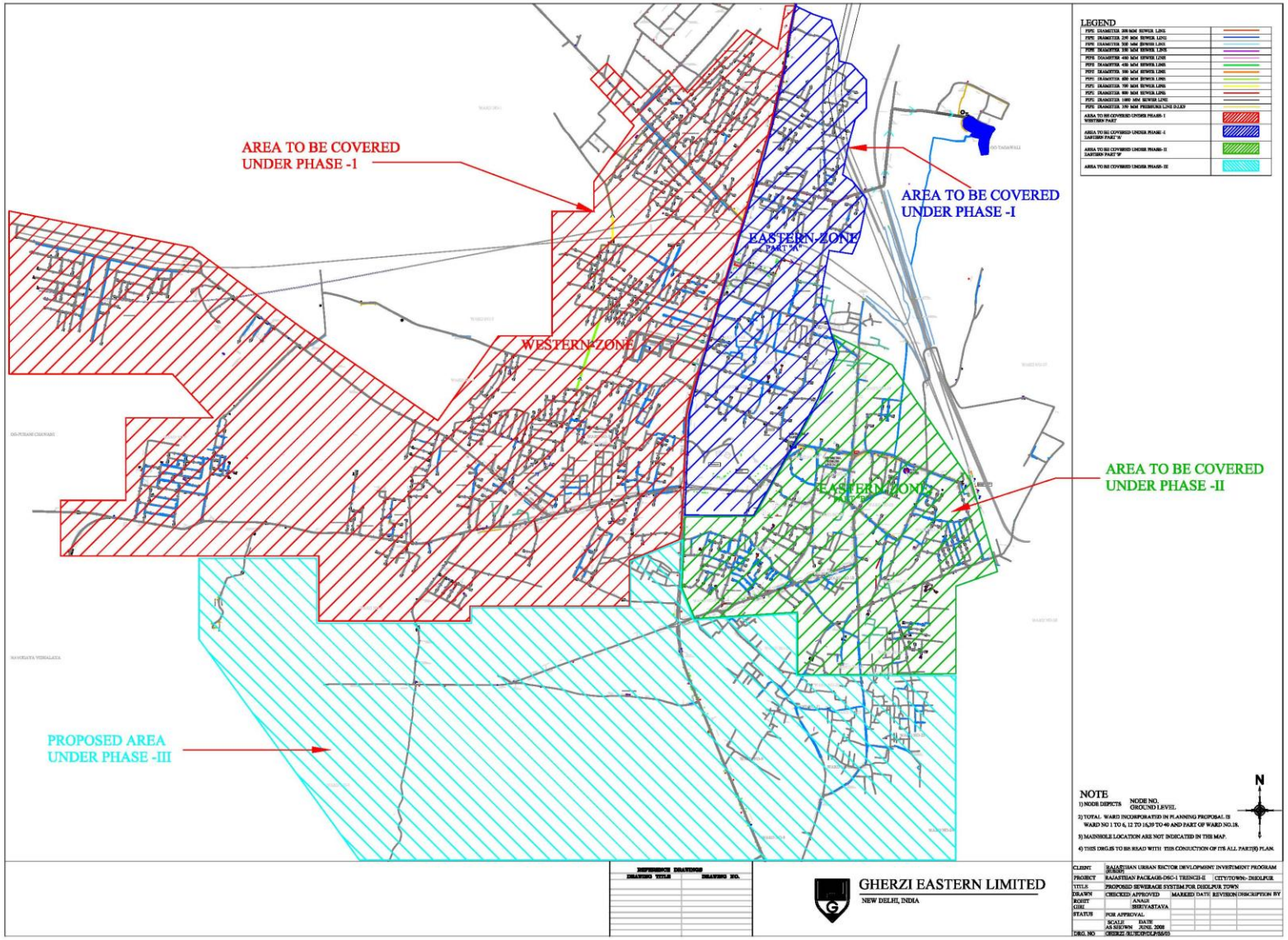


Fig 2.3: Proposed STP site (10 MLD) of Dholpur

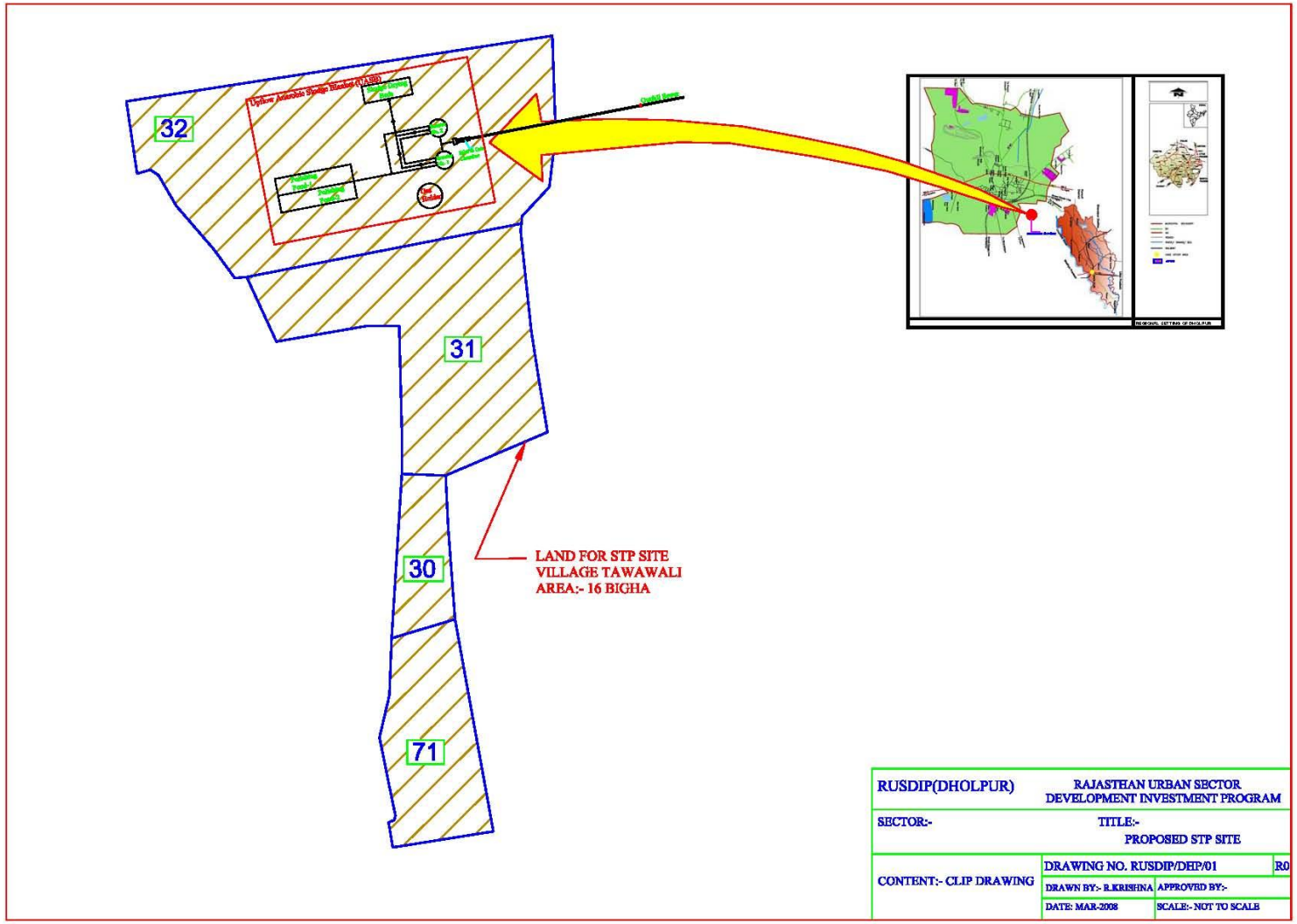


Figure 2.4: Revenue Map showing location of proposed 3MLD STP

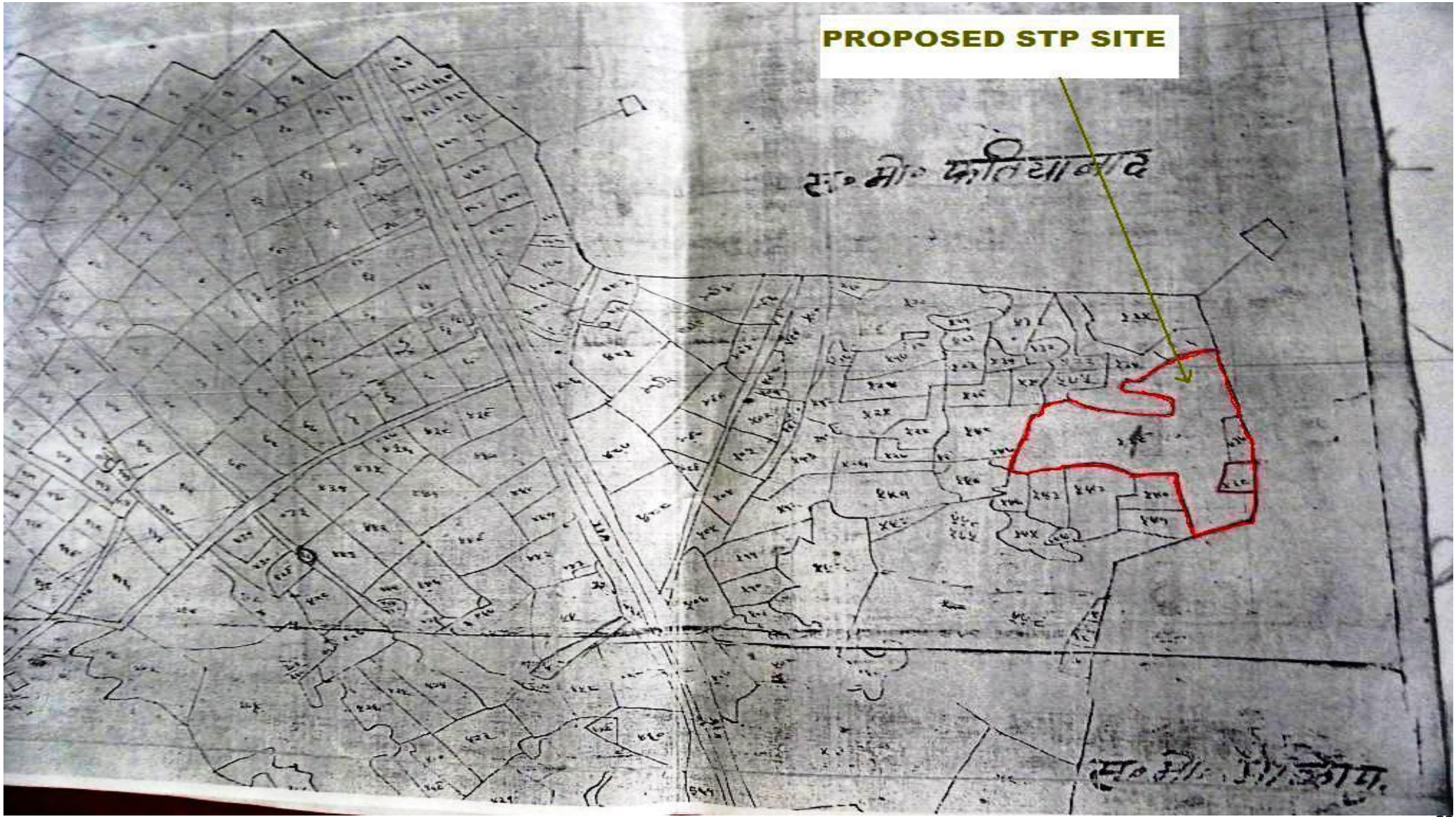


Figure 2.5: Layout of proposed 3 MLD STP

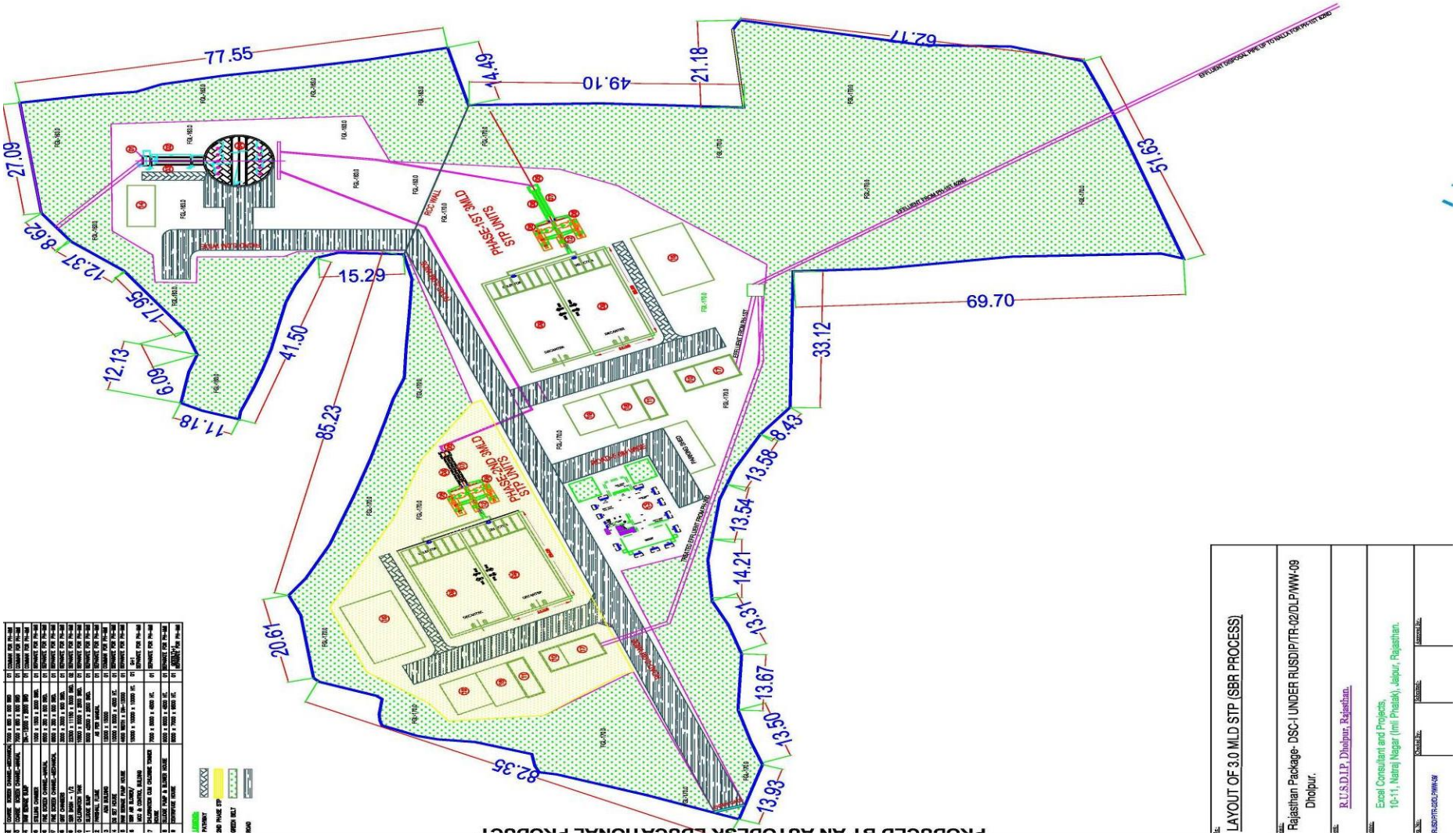


Figure 2.6: Prop Layout of proposed 3 MLD STP with plot no and road

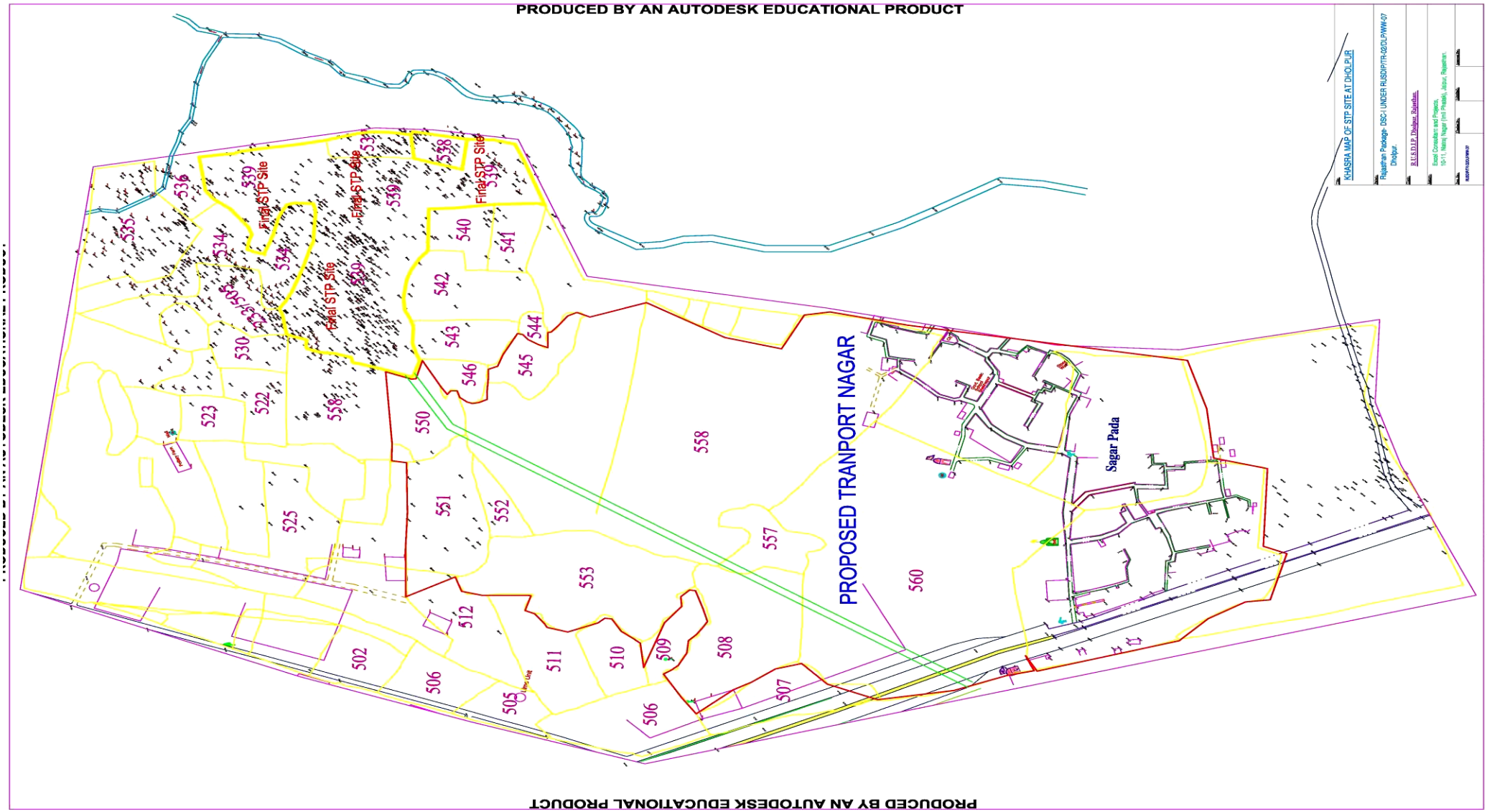


Figure 2.7: Process flow diagram of Proposed 3 MLD STP

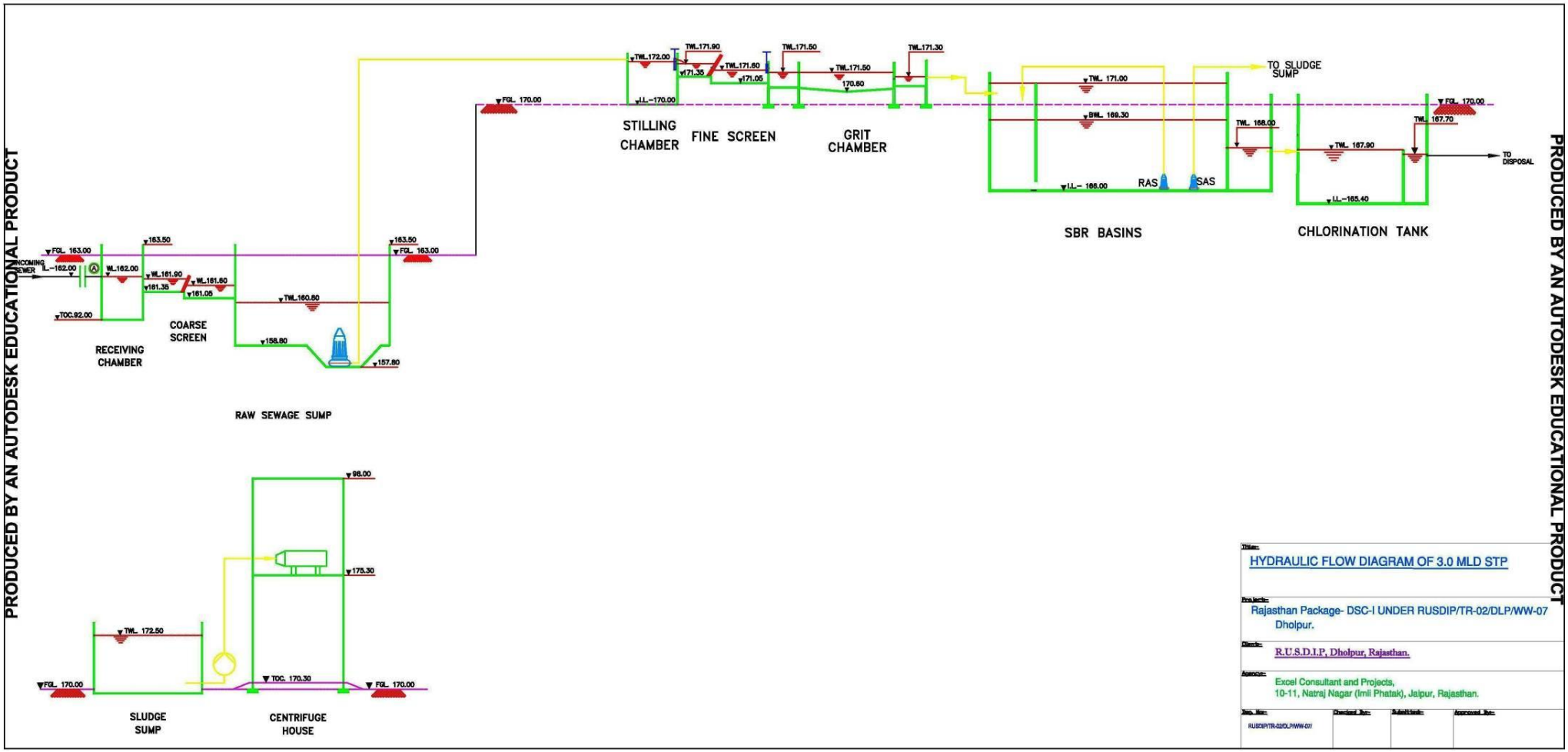


Figure 2.8: Map Showing Location of Proposed STP (3MLD) land & Sensitive Receptors

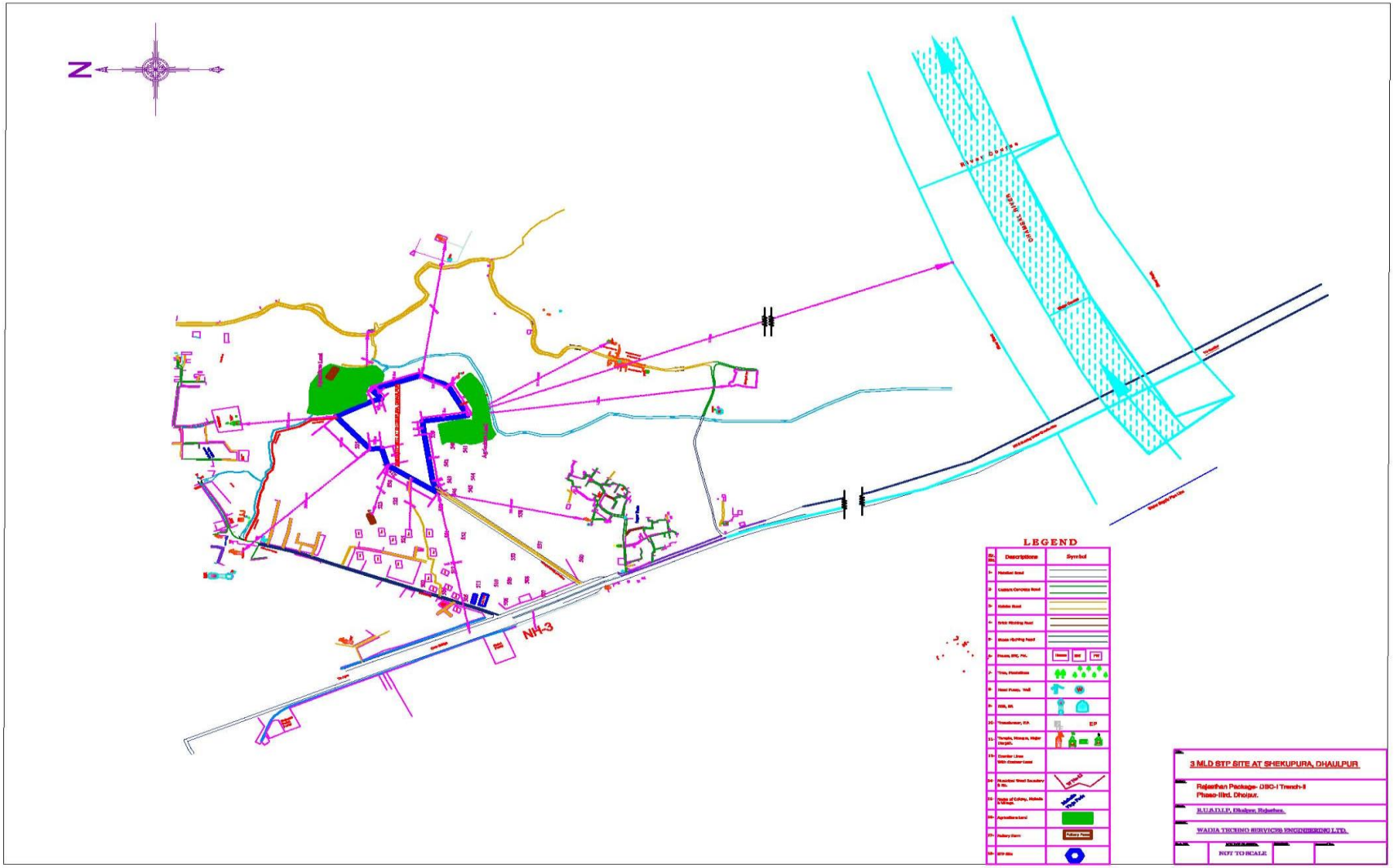


Table 2.1: Improvements in sewerage infrastructure proposed in Dholpur

Infrastructure	Function	Description	Location
Earlier Scope of Work:-			
Sewage Treatment Plant (STP)	For treatment of Raw Sewage.	10 MLD STP proposed for short term assessment where capacity can be increased in Phases – with UASB process Components - 1 inlet chamber, 1 no. cross screen channel, 1 no. fine screen channel, 2 nos. grit channel, 1 distribution chamber, 2 nos. reactor, 2 nos. degassing aeration tanks and 2 nos. polishing tanks	Land identified of total 16 bigha (approx. 6.4 ha.) at Tagawali Village for STP
Trunk /Outfall Sewer	To connect collection network up to STP	1km. length of trunk sewer	
Lateral (Secondary) Sewers and tertiary network and house connection	Different dia. of sewer network and to connect with outfall sewer.	93 km. length of 200 to 800 dia. Sewer line.	Different parts of the city
Network for Disposal of treated effluent	Disposal of treated effluent	Construction of treated sewage pumping station (TSPS) for 10 MLD Avg. flow at outlet of STP to Pump treated effluent from SPS to Node-9. Pumping main & Gravity main GRP pipe of 500 mm dia. for a length of 4700 m.	STP site at Tagawali Village
Enhanced Scope of Work:-			
Package DLP/WW/08			
Trunk /Outfall Sewer	To connect collection network up to STP	0.467 km. length of trunk sewer	
Lateral (Secondary) Sewers and tertiary network and house	Different dia. of sewer network and to connect with outfall sewer	57.462 km. length of 110 to 400 mm dia. Sewer line	Different parts of the city

Infrastructure	Function	Description	Location
connection			
Sewage Pumping Station (SPS)	Intermediate sewage pumping	sewage pumping station	
Network for Disposal of treated effluent	Disposal of treated effluent	Construction of treated sewage pumping station (TSPS) for 10 MLD Avg. flow at outlet of STP to Pump treated effluent from SPS to Node-9. Pumping main & Gravity main GRP pipe of 500 mm dia. for a length of 4700 m.	STP site at Tagawali Village Treated effluent will be used for irrigation purpose and left over will be transported to the channel (nalla) through 3300 m long pipeline
Package DLP/WW/09			
Sewage Treatment Plant (STP)	For treatment of Raw Sewage.	3 MLD STP is proposed with SBR process Components - 1 inlet chamber, 2 nos. cross screen channel, 2 nos. fine screen channel, 1 no. grit channel, 2 nos. reactor, 2 nos. DWPE Dosing Tanks, 1 no Chlorination Tank, 1 no well equipped laboratory	Land identified of total 3.5 hectare at Sekhupura Village for STP
Trunk /Outfall Sewer	To connect collection network up to STP	700 m. length of trunk sewer	
Lateral (Secondary) Sewers and tertiary network and house connection	Different dia. of sewer network and to connect with outfall sewer.	29.52 km. length of 200 to 700 dia. Sewer line.	Different parts of the city

3. DESCRIPTION OF THE ENVIRONMENT

3.1. Physical Resources

3.1.1. Location sensation

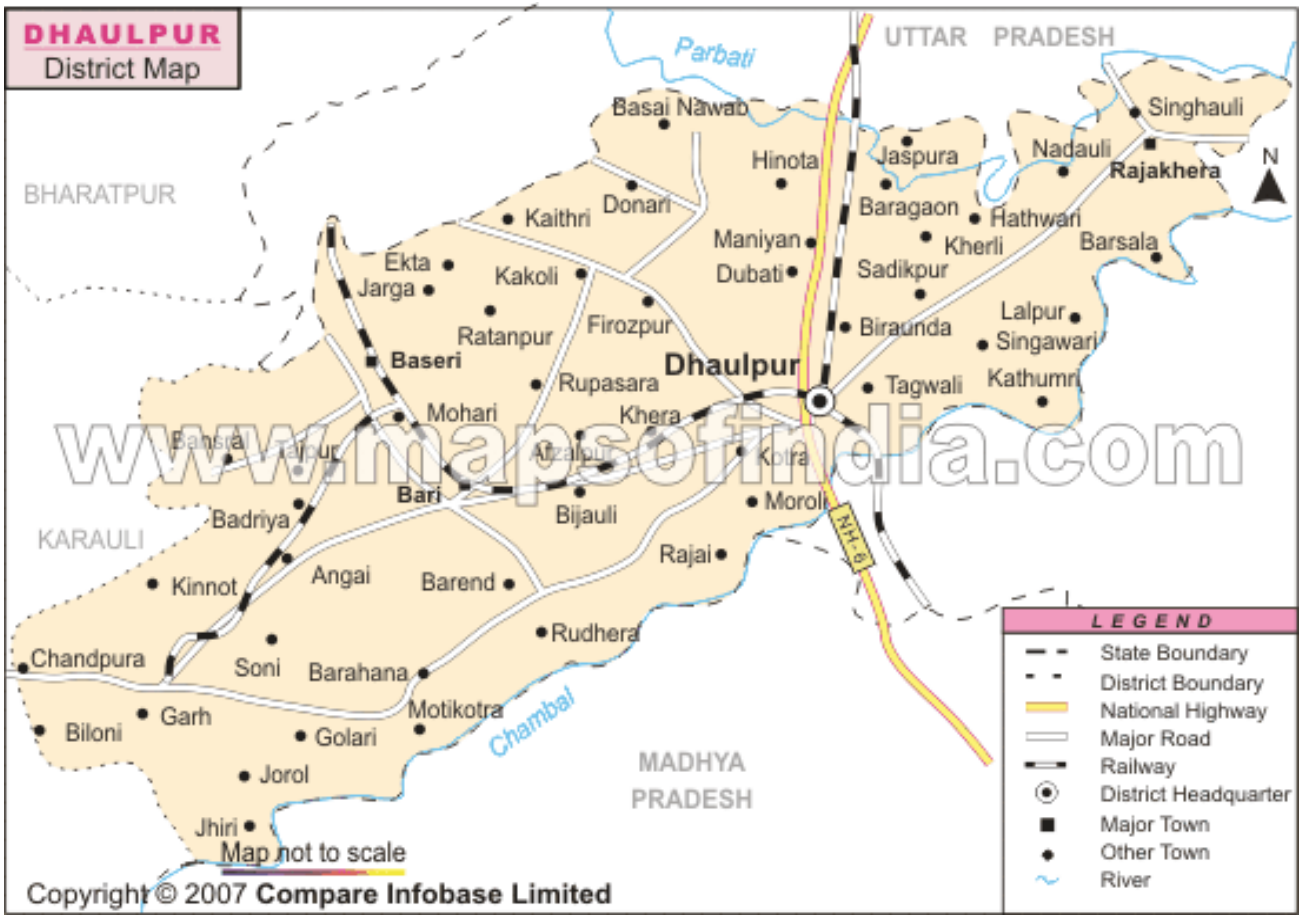
32. The Urban Agglomeration (UA) of Dholpur is located abutting territories of Uttar Pradesh and Madhya Pradesh and is Eastern gateway of Rajasthan. Dholpur is 270 kms from state capital Jaipur whereas the world famous Taj Mahal at Agra is only 55 Kms. The Gwalior city of Madhya Pradesh is at 60 kms on south. A bridge over river Parvati connects Dholpur with Uttar Pradesh and another bridge on river Chambal links it with Madhya Pradesh. National Highway number 3 passes through Dholpur and it is well connected with Agra, Gwalior and major cities of Rajasthan like Bharatpur, Alwar, Jaipur etc. by road network. It also falls on the rail network and is well connected with cities of North as well as South India. Dholpur is located on highlands along River Chambal and comprises of three kinds of landforms. The North & Northwest part is sandy, Western part is hilly and the South & Southeast part falls under Chambal Valley. The ravenous landform along River Chambal called 'Daang' in local dialect used to be famous hideout for dreaded dacoits of Chambal region. Dholpur is an important centre for trade and commerce in the District. Applique works occupies an important place in the city economy and basically the craft includes stone carving.

33. This town has a historic famous fort named Shergadh rebuilt by then ruler Shershah Suri. There is one palace which was built by Mughals. This town has been of historic importance and there are offices of archeological department of Govt. of India who are care takers of makbara's Masjid. There are there historic gate surround the city. These gates are Delhi Gate in north east, Udaibhan gate in north and Gwalior gate in south east. District map of Dholpur is shown in Figure 3.1.

34. The proposed location of 3 MLD STP is near village Shekhupur. The owner of land is municipal council, Dholpur. The topography of the land is ravine. The highlands of the Chambal valley eroded due to less vegetation cover and rainfalls which in due course of time converted into big cracks and formed ravines.

Flood is not reported in Dholpur district in past years, The backwater of Chambal river is also not accessible to proposed site during monsoon. It was also confirmed by local residents during consultation. However, the risk of flooding has been considered during design and safe finishing ground level (FGL) has taken.

Figure 3.1: District map of Dholpur



3.1.2. Topography, Drainage, Natural hazard and Drought

35. **Topography**: The Dholpur Town is located at 770 53' E Longitude and 260 24' N Latitude. The average elevation is 502 m above the mean sea level. Dholpur is located in high level terrain of Chambal valley and is having rocky formation of disintegrated rock and not a much fertile zone. The Dholpur Town is divided into three main topographies viz., the northern region is characterized by sand dunes, western by hilly ranges, there is perennial river namely Chambal river at eastern to south western region. The area is plain having alluvial and sandy soil ands slopes towards eastern direction.

36. **Drainage**: The general slope of the Town is from west to east, which is also the direction of drainage. Nearly, all ephemeral streams flow in this direction. The old settlement area was originally located on the rocky side to provide an easy drainage system on either side but the future expansion of the city took place towards the northern and southern direction.

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

38. **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

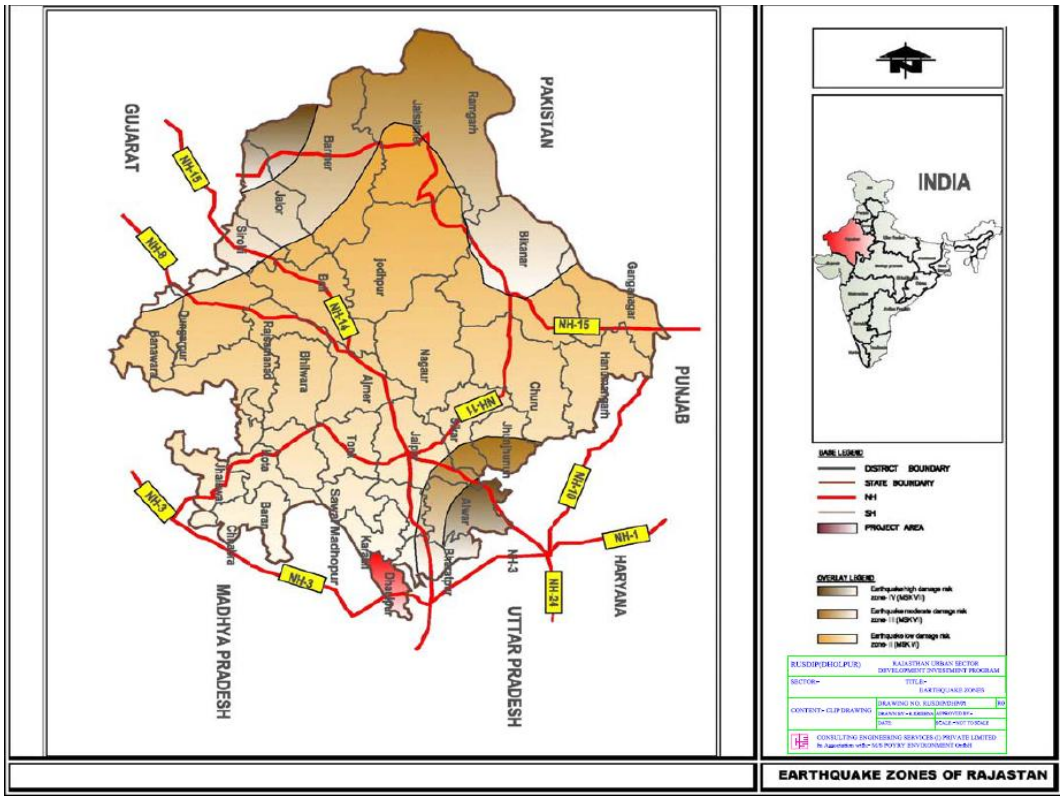
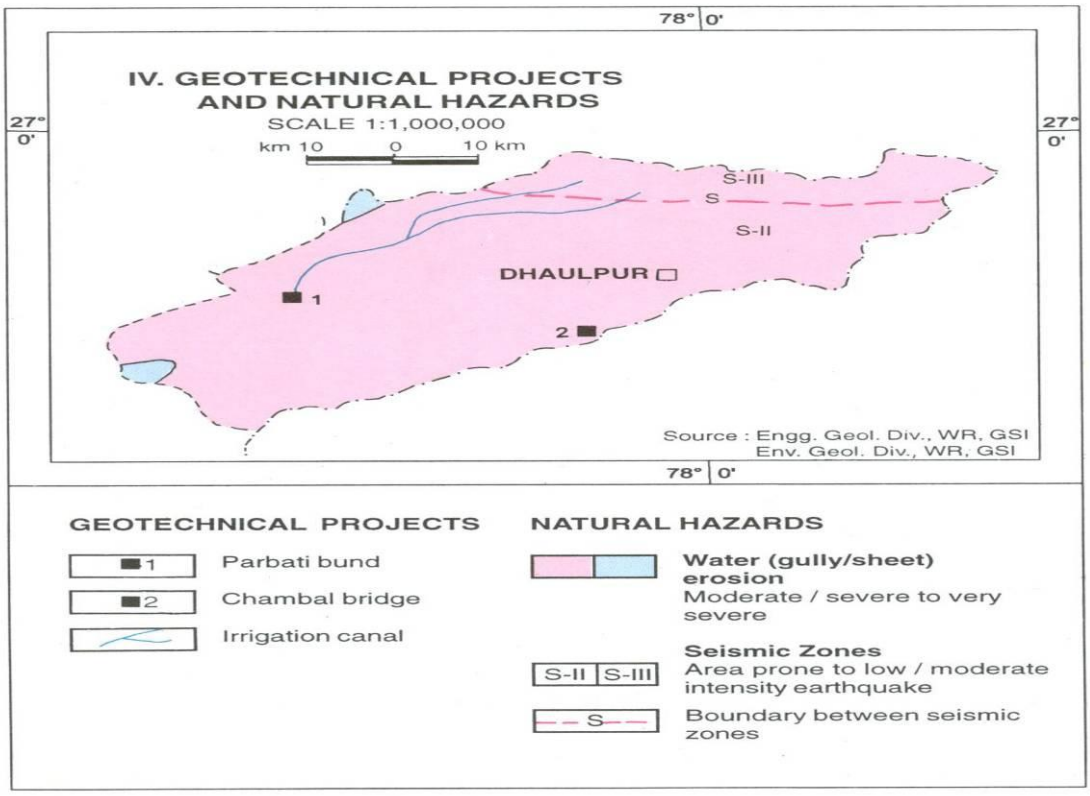


Figure 3.3: natural hazard map of Dholpur (Source: GSI resource map)



3.1.3. Geology, geomorphology, mineral resources and soil

39. Major parts of the district falls within the flood plain of the Chambal river system .As such much of the district is covered by Alluvium and Aeolian sand of Quaternary age. The area experiences semi-arid climate.

40. The southern part of the district exposes the Rewa and Bhander Groups of Rocks belonging to the Vindhyan Super Group .The Rewa Group is represented by the Inargarh sandstone .Its outcrops are exposed west of Baseri and northwest of Sepau. The shirbu shale occurs with interbeds of limestone which are exposed west of Baseri and north- west of Border. Geology and mineral map of Dholpur shown in **Figure 3.4**, while geomorphological map of Dholpur depicted in **Figure 3.5.**

41. Mineral Resources: Dholpur district is a leading producer of sandstone .The white – spotted reddish sandstone of the Upper Bhander Group is extensively quarried as building stone southwest of Dholpur and in other Parts of the district. The different quarries produce 30 to 60 cm wide and 2 to 3 m long slabs and tiles .The district has yielded excellent stones for the monumental structures in Delhi Agra and other cities of Northern India.

Figure 3.4: Geology and mineral map of Dholpur district (source: GSI Resource map)

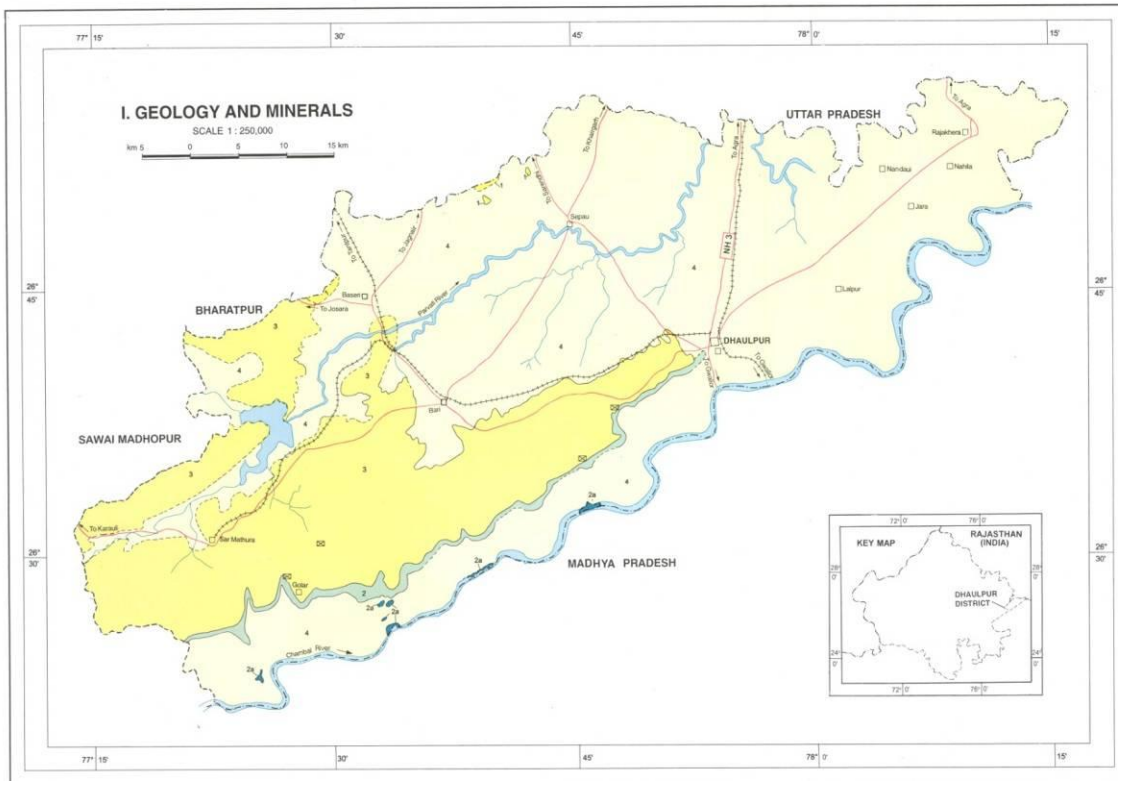
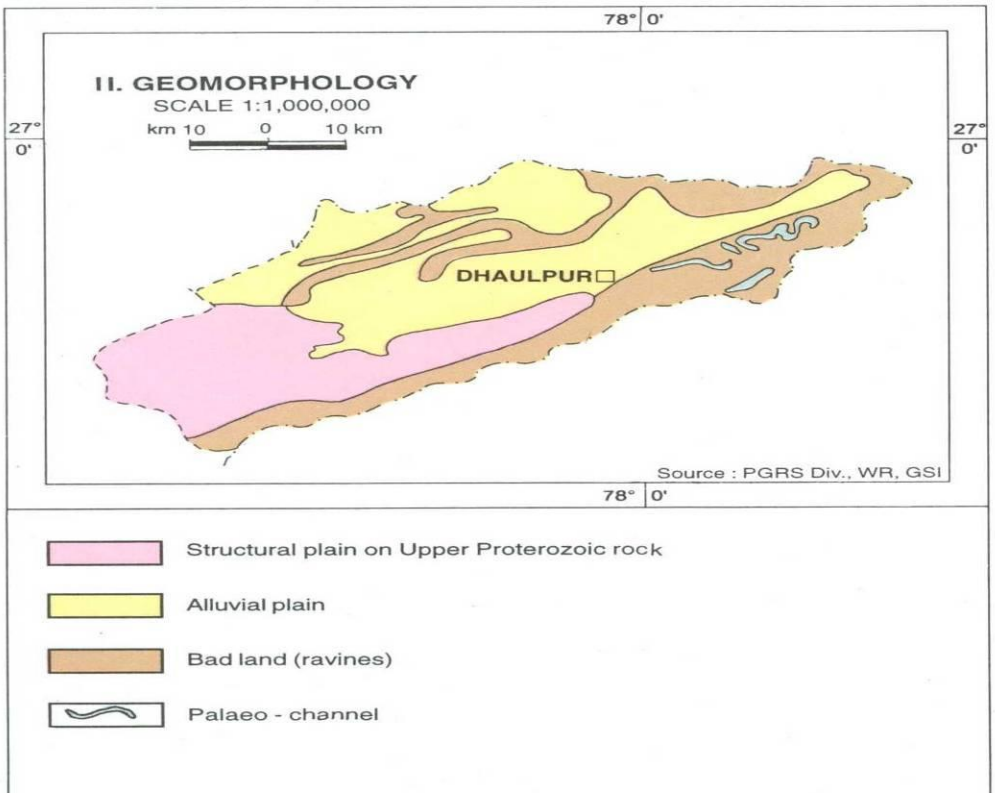


Figure 3.5: Geomorphology of Dholpur district (source: GSI Resource map)



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

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

	Nutrient			Saline Soil(Ha)	Sodic or Alkali(Ha)
	N	P	K		
Status	L	M	M	5373	20121

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

3.1.4. Climate and Rainfall

43. The climate of Dholpur Town is generally dry. The average maximum temperature during summer is 48°C and minimum during winter can go down to nearly 2°C. Humidity in air has been known to drop to as low as 20 percent. It is only during the southwest monsoon that the humidity increases to nominal levels of 70 percent or more. The normal annual rainfall is 614.74 mm and the highest rainfall was recorded as 1,032.2 mm in 1995. The prevailing wind direction is generally from southwest to northeast in summer and north to northwest during winter.

44. The rainfall over Dholpur is scanty and is concentrated over three month i.e. from June to August. 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. The total rainfall over last 20 years is compiled and shown in **Table 3.2.** Seasonal Rainfall data for the recent year (2011) is shown in **Table 3.3.**

Table 3.2: Rainfall data of Dholpur

S. No.	Year	Rainfall in mm
1	1991	262.4
2	1992	853.7
3	1993	898.9
4	1994	549.2
5	1995	1032.2
6	1996	803.7
7	1997	678.8
8	1998	775.6
9	1999	613.6
10	2000	443.5
11	2001	409.0
12	2002	299.5
13	2003	649.4
14	2004	640.7
15	2005	784.1
16	2006	303.0
17	2007	620.0
18	2008	1319.6
19	2009	521.0
20	2010	975.5
	Average of 20 years	**13433.4 / 20 =671.67 mm**

(Source: Water Resources Department, Govt. of Rajasthan)

Table 3.3: Rainfall at Dholpur in recent year (2011)

SL	Months	Rainfall (mm)
1	January	0
2	February	9
3	March	0
4	April	0
5	May	3
6	June	120
7	July	275
8	August	106
9	September	233
10	October	0
11	November	0
12	December	0
	Annual Rainfall	746
	Annual Rainy Days	37

(Source: Irrigation Department, Govt. of Rajasthan)

3.1.5. Air and Noise Quality

45. Ambient Air Quality Monitoring was carried out at various locations in Dholpur town in May-June 2012. The results of air quality monitoring are shown below in Table 3.4. It may be observed from the Table 3.4 that levels of particulate matter (particle size ≤10µm) are higher than the standards. Traffic is the only significant source of pollutant in Dholpur so levels of oxides of sulphur and nitrogen are within the National Ambient Air Quality Standards (NAAQS). Similarly Noise Level Monitoring was done in the May-June 2012, as shown in **Table 3.5**.

Table 3.4: Ambient Air Quality in Dholpur

Monitoring Station	Sulphur Dioxide as SO2 (mg/m3)	Oxides of Nitrogen as NO_2 (mg/m^3)	Carbon Monoxide as CO (mg/m^3)	PM10 (mg/m^3)	PM 2.5 (mg/m^3)
RUIDP Office	8.09	17	>0.5	89.4	43.3
Dholpur Bus Stand	9.9	18.1	>0.5	139.3	55.5
Agriculture Office, RIICO Road	9.9	19.9	>0.5	125.5	57.6
Shekhupura village STP (3MLD) site Dholpur	10.3	22.2	>0.5	130.7	53.5
Tagawali village STP (10MLD) site Dholpur	10.1	17.2	>0.5	121.0	54.4
Permissible limits as per CPCB Notification, New Delhi, 18th November, 2009 (24 Hours)	80	80	2*, 4#	100	60

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

Table-3.5: Result of Noise Monitoring at Different Locations

SN.	Location	Land Use	Observation Value [in dB(A)] L Daytime			Observation Value [in dB(A)] L Night Time		
			Lmax	Lmin	Leq	Lmax	Lmin	Leq
1	RUIDP Office	Residential	66.30	43.50	60.94	60.90	42.70	52.62
2	Near Water Treatment Plant	Commercial	80.20	50.10	64.28	70.10	48.10	54.28
3	Near Bus Stand	Commercial	82.90	58.20	74.18	78.10	53.20	70.10
4	Near Agriculture Office,RIICO Rd.	Commercial	80.80	53.10	64.16	67.10	48.10	54.20
5	Radhavihari Mandir	Commercial	66.80	45.10	57.20	64.80	43.20	54.10
6	Near Gen. Hospital (J.L Road)	Commercial	75.80	54.20	64.18	68.10	43.60	54.80
7	Near Umadutt Mahila College	Commercial	65.90	48.20	61.11	61.30	43.00	53.87
8	Nr. STP Site (3 MLD) Sagarpada village	Residential	62.90	46.50	54.10	55.30	40.80	44.26
9	Nr. STP Site (10 MLD) at village Tagawali	Residential	74.50	47.10	58.99	70.10	44.10	48.10
Standard Limits in dB(A) Leq, [THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000]		Residential	-	-	55	-	-	45
		Commercial	-	-	65	-	-	55

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

3.1.6. Surface Water

46. The Chambal River is passing through Dholpur district. But there is no monitoring station at Dholpur. The monitoring has been carried out by pollution control board at Rangpur Kota. The data on DO, pH, BOD and Electrical conductivity is given in **Table 3.4.** During 2009 to 2010 DO, pH and BOD ranged from 2.94 – 5.34 mg/l, 5.31 – 8.94 and 20 – 150 mg/l respectively.

Table 3.4: Chambal River Water Quality

Date of Sample Collection	Dissolved Oxygen (mg/lt)	P^H	BOD (mg/lt) (3 days at 27^o C)	Total Coliforms, MPN/100ml
15/4/2009	4.84	8.77	28	1.44
5/20/2009	2.94	8.92	28	3.68
6/17/2009	5.34	8.94	28	2.44

Date of Sample Collection	Dissolved Oxygen (mg/lt)	P^H	BOD (mg/lt) (3 days at 27° C)	Total Coliforms, MPN/100ml
7/17/2009	4.56	7.83	28	2.7
8/14/2009	4.75	5.59	20	2.82
9/16/2009	4.93	8.9	150	2.95
10/15/2009	5.21	5.31	150	3.4
11/13/2009	4.79	7.84	28	4.58
12/9/2009	6.4	8.45	93	3.15
1/6/2010	5.05	7.92	28	3.91
2/15/2010	6.8	7.98	93	3.1
3/21/2010	5.34	8.19	20	1.61

Source: Annual Report 2009-2010 Rajasthan State Pollution Control Board

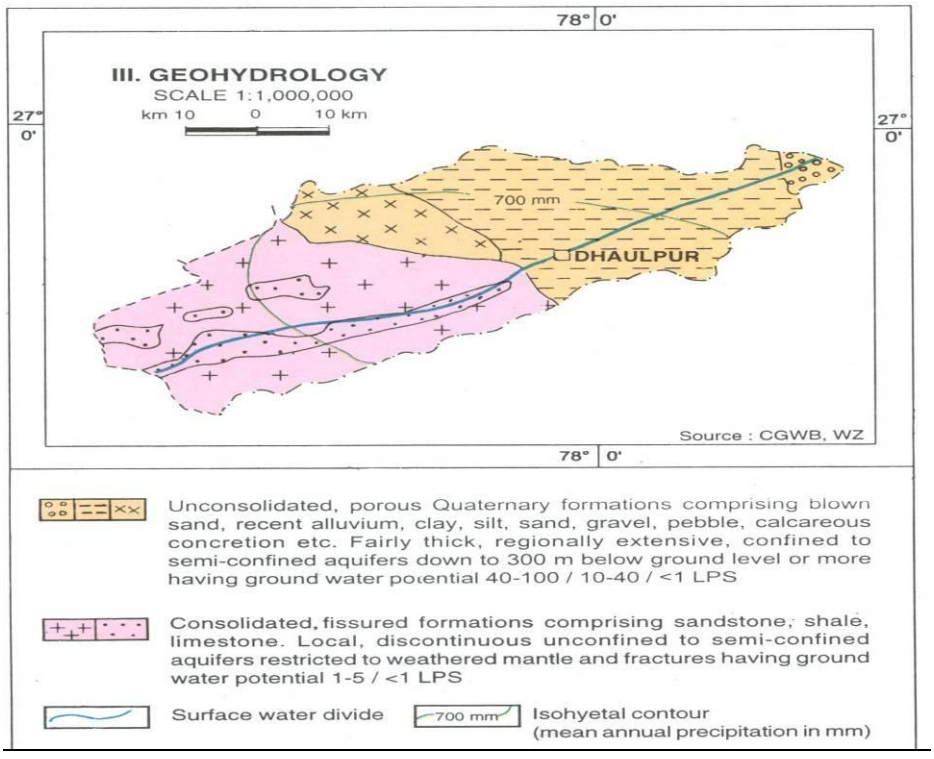
3.1.7. Geohydrology and Groundwater

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

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

48. On an average 60-70% of the district area (mostly north and eastern part of the district) covered with porous formations.

Figure 3.6: Geohydrological map of Dholpur (source: GSI Resource map)



49. There are number of National Hydrographic monitoring stations of Central Ground Water Board in and around Dholpur. Fluctuation of ground water level is shown in **Table 3.5.** In most of the cases ground water table ranged between 10-20 m bgl.

Table 3.5: Number and Percentage of National Hydograph Network Stations with water fluctuation range

Period	No of wells analysed	Range		0-2 m		2-5 m		5-10m		10-20m		20-60m		>60 m	
		Min	Max	No	%	No	%	No	%	No	%	No	%	No	%
Jan-06	18	6.29	30.08	0	0	0	0	3	16.67	11	61.11	4	22.22	0	0
Nov-05	17	3.39	27.17	0	0	2	11.76	1	5.88	10	58.82	4	23.53	0	0
Aug-05	17	3.36	28.09	0	0	1	5.88	2	11.76	10	58.82	4	23.53	0	0
May-05	20	5.99	42.47	0	0	0	0	5	25	10	50	5	25	0	0

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

50. The Central Ground Water Board carried out chemical testing of tube well water seasonally. The average concentrations of major constituents are shown in Table 3.6.

Table 3.6: Ground Water Quality in and around Dholpur

Parameters	Maximum Level	Minimum Level	Standard of Drinking water (IS: 10500: 1991)	
			Desirable limit (mg/l)	Maximum Permissible limit (mg/l)
pH	9.18	7.96		
EC in micro mhos/cm at 25^{o}C	7440	390		
Cl (mg/l)	1953	14	250	1000
SO_4(mg/l)	1017	4	200	400 (if Mg does not exceeds 30 ppm)
NO_3(mg/l)	242	3.5	-	100
PO_4(mg/l)	1.21	0.05		
Total Hardness(mg/l) as $CaCO_3$	1520	130	300	600
Carbonate CO_3 in PPM	96	0	-	-
bicarbonate HCO_3 in PPM	1086	171	-	-
F(mg/l)	3.7	0.3	1.0	1.5
Fe(mg/l)	8.27	0.03	0.3	1.0

Source: Central Ground Water Board, Jaipur (2010)

51. 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 1000 ppm to 3500 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. As reported by PHED, the turbidity of raw water from Chambal varies widely in rainy

season due to flood. It is therefore recommended that as far as possible existing tube wells should be abandoned.

52. Table below shows chemical quality of supply water as recently measured by PHED. It is noted that TDS level is more or less high. Also it is observed that at present supply water contains fluoride.

Table 3.7: Present supply water quality at Dholpur

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
120	Both (G:S 9.1:90.9)	9.1	90.9	4	7	0.4	0.7	547	1292	10	80

3.2. Ecological Resources

53. FLORA: The common species of this region found in this district are kumta, babul (*Accasia nilotica*), arunj (*Terminalia arjuna*), dhok (*Anogeissus pendula*), bekal, chhonkar (*Prosopis cineraria* , pilu (*Salvadora oleoides*), kair (*Accacia catechu*), shisham (*Dalbergia sissoo*), siris (*Albizzia lebbek*), thor (*Euphorbia royleana*), and dhamasa (*Fangonia arabica*).

54. FAUNA:The typical fauna of the oriental region in this district is represented by mor (*Pavo cristatus*) , Bandar (*Macaca mulatta)*, langur (*Presbytis entellus*), bagh (*Panthera tigris)*, baghera (*Panthera pardus)* and kala hiran (*Antilope cervicapra).*

55. Wildlife and wild lands go together. The district has varied wildlife because there are different habitats varying from thick dhok forests to open thorn forests, from hills to ravines and flat lands, numerous wetlands in the form of perennial rivers; seasonal rivulets; extensive agricultural fields to grasslands and naturally the variety of wildlife is equally variable.

56. River Chambal near Dholpur is protected as National Chambal Sanctuary. The sanctuary is the habitat of some important species. It has the largest remaining Gharial population (Gavialis gangeticus). This is a critically endangered species. Another critically endangered species which lives in the Chambal River is the red-crowned roofed turtle. The river is also the habitat of the Gangetic dolphin (Platanista gangetica). Apart from the gharial, the red-crowned roofed turtle and the Gangetic dolphin, the major fauna of the Chambal River includes the mugger crocodile (Crocodylus palustris), smooth coated otter (Lutra perspicillata), other species of freshwater turtles, and 78 species of wetland birds. The sanctuary is significantly away from the proposed sub-project site.

3.3. Environmental and cultural Sensitive receptor

57. There are few sensitive location around the proposed 3 MLD site and special attention will be required during construction and operation. Type of sensitive receptors and distance from proposed location of STP has been mention in table below

Table 3.8- Description of Sensitive receptor

SL No	Type of sensitive receptor	Distance from proposed 3 MLD STP (in meter)	Remarks

1	Temple	650	No significant impact as its not only significantly away but also not in way of temple. The small dirt road connecting to this temple will not be used for movement of worker and construction vehicle. The worshiper of temple is local and visit occasionally. Due to ravine topography near 3 MLD STP site is visual impact is also unlikely.
2	Mosque	1200	Much away from proposed site and any impact are very unlikely.
3	River	2300	River Chambal is significantly away from site, however treated water may be discharge through nearby drain, if the quantity of water is surplus to irrigation. The quality of treated water will be monitored closely before discharge
4	Highway	350	No significant impact is identified except additional movement of construction vehicles.
5	Fort (Monument)	350	The fort is in rune condition and no significant impacts are identified. Due to ravine topography near 3 MLD STP site is visual impact is also unlikely.
6	Settlement	250	Negative impacts like odor, and visual impact are likely if the thick green belt not given around boundary of 3 MLD STP site

Note- The distance of sensitive receptor has been generated from google earth, the actual ground distance may slightly vary

3.4. Economic Development

58. Dholpur, being the district headquarters for Dholpur District, performs all administrative and revenue functions required of a district center. Traditionally, Dholpur 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. Dholpur is also a cultural town depicting original rajasthani heritage.

59. According to the Census of 2001, the work force participation ratio in Dholpur is 24.25 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%).

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

Table 3.9: Consumption of Electricity in Million Kwh

District	Domestic	Non-Domestic (Commercial)	Industrial	Public Lighting	Public Water Works	District	Domestic
			Small	Medium	Large		
Dholpur	14.128	3.854	6.11	6.549	15.52	0.012	3.943

(Source: District statistics book, 2003-04)

3.4.1. Land use

61. Under the Rajasthan Urban Improvement Act, 1959, the Master plan for Dholpur is prepared for the year 1999-2023. The state Government issued a notification, under Sec 3(1) of Rajasthan Urban Improvement Act, 1959 and required preparation of the Dholpur Master Plan comprising 32 revenue villages. This was required to ensure that housing schemes and industrial development should occur in a concurrent manner with efficient provision of basic urban facilities such as housing, schools, dispensaries, parks and recreation centre etc. A survey had been carried out by the Town planning Department, Dholpur, on various physical and socio-economic characteristics of Dholpur town to prepare the Draft Master Plan. The Draft Master Plan was notified in January, 1998 for public objections and suggestions. Finally the government approved the Master Plan as per the said Act and notified the same under Section 7 of the said act on May, 2000 with a projection that the city population in 2023 will grow to 1.68 lakhs. Out of the total area of 32.03 Sq. km (3200 ha), only 700 ha area is urbanized, the southern portion is covered by rocky ground and the northern portion is agriculture area. Out of total developed area of 593 ha, 50.1% are is under residential and 14.9% area is under commercial and industrial development.

Table 3.10: Dholpur Urban Area Land use pattern

Land Use (1999)	***Area in acres***	***% of developed area***
Residential	743	50.1
Commercial	80	5.4
Industrial	140	9.5
Government	24	1.6
Recreation	21	1.4
Public/Semi Public	204	13.8
Circulation/Transport	270	18.2
Developed Area	1482	100
Agriculture	80	-
Government reserved area	142	-
Other vacant and undeveloped land	40	-
Urbanized Area	1744	-

Source: Dholpur Master Plan, 1999-2023

Figure 3.7: Land use proportion for Dholpur Developed area

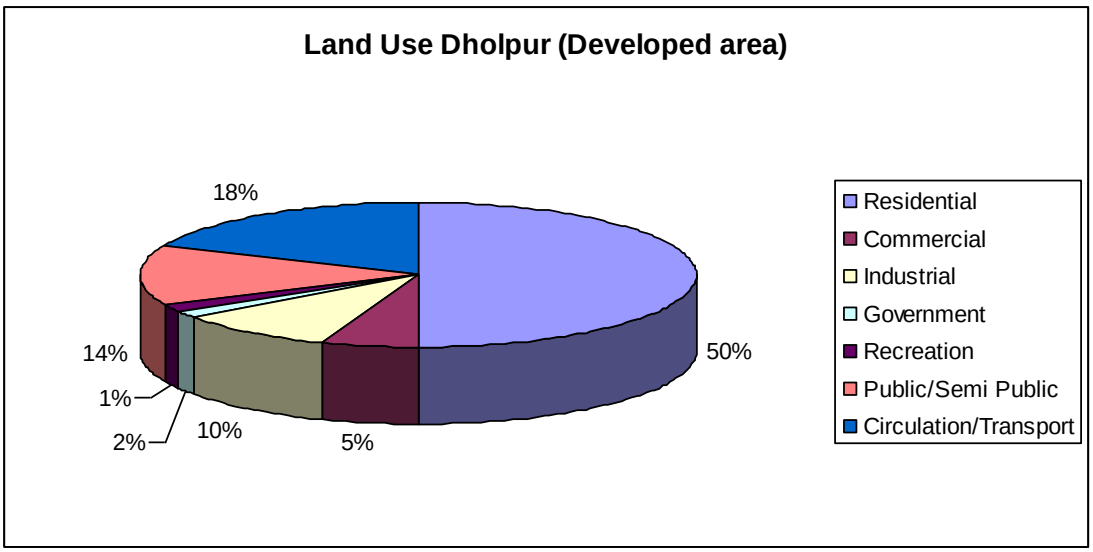
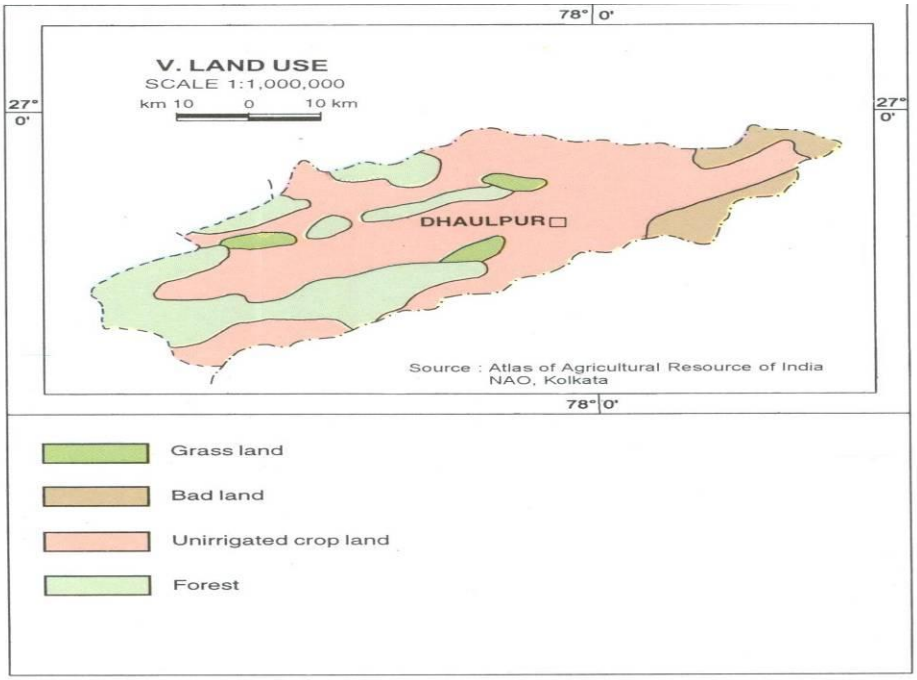


Figure 3.8: Current land use of Dholpur District (Source: GSI Resource map)



3.4.2. Commerce, Industry and Agriculture

62. Dholpur is an important center for trade and commerce in the District. Art works occupies an important place in the town 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. Presently there are 5 market complexes; Vegetable market at Nusingh road, Lal bazzar, Kirana Bazzar and few general stores at Hospital road, medical shops are functioning in the town. Also street shops have developed along some of the major road, such as Collectorate office, along NH-3. 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 NH 3. Several of the commercial activities such as wholesale markets are located close to the city palace. 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 especially in Lal bazaar. 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 Dholpur.

63. During the last century, Dholpur 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. Baroli, Bari, Baseri, Sirmathura were important place where building and millstone were quarried. These quarries have been famous for quality stone and have been worked on for several centuries. Industrial activity in recent year has declined and may spurt pursuant to urbanization along the NH-3 and improved links to other industrial regions of the state.

64. In and around the Dholpur Town, there are about 80% of lands used for agricultural purpose. Crop production statistics as depicted in **Table 3.10** indicates double the total crop production during Rabi season in compare to Kharif season and that basically due to oilseed production during Rabi season.

Table 3.10: Crop production in around Dholpur (Prod in Tonnes)

Type of Crops	Under Rabi Crops	Under Kharif
Cereals	224991	168664
Pulses	5679	823
Food Grains	230670	169487
Oilseeds	95598	2073
Others	43682	2012
Total	369950	173572

(Source: Agricultural Statistics 2009-10, Directorate of Agriculture, Rajasthan)

3.4.3. Infrastructure

65. Water supply: Water supply to Dholpur is from two different sources; one source groundwater sources[2] comprising tube well and open wells and other one is surface water from perennial River Chambal. Groundwater is tapped through open wells (8 nos.) and tube-wells (14 nos.).There are no records available for the quantum of ground water supplied to the town. In the case of surface based source, raw water is presently pumped from River Chambal through an intake well constructed 30 years back. Raw water is then treated at an old filter plant of capacity 5.4 MLD is at PHED campus and a newly constructed filter plant of capacity 9.6 MLD is at Sagarpada. Treated water is being supplied through 7.0 nos of overhead service reservoirs (OHSR) to the residents. The present supply of the city is reported as 100 lpcd. Average Ground water table depth is 20.0 m

66. Sewerage System: There is no underground sewage system in Dholpur City at present. Only few households have covered with individual septic tanks. 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 sullage and sewage which is leading to unhygienic and unsanitary conditions. As reported by the Dholpur MC, there is 13,000 nos individual disposal systems covering 65,000 population and 1000 nos of septic tanks covering 5000 population. Besides individual disposal systems, 20 nos seats exists as Public Convenience systems (Sulabh Sauchalaya) covering 500 population.

67. Sanitation: less than 50% of the households reportedly have septic tanks and soak-wells for sewerage disposal. The remaining accounted for households 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. Slum areas were also not equipped with requisite sanitation (LCS etc.) resulting in open defecation.

68. Drainage: Presently the road in Dholpur city is equipped with open drains, but most of the drains are silted resulting in overflow and resulting flooding in monsoon. As reported by DMB, the total length of drains is approximately 20 Km. An efficient network of storm

[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 percent of the total water use in Dholpur.

water drains and outfall system is required to drain out storm water runoff. When the rainfall is maximum, main area like Jagan Chourah, Santer road and Gadapura are significantly inundated. The DMB has already reportedly conducted a survey of the entire city to prepare a drainage scheme through local agency in 2004. The general elevation of Dholpur is approximately 502 m above Mean Sea Level and the overall topography is from East to West direction of the town. There is no existence of major drain for catchment area of the town.

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

70. Solid Waste: Dholpur generates 39 tons (approximately) of solid waste daily in 2007 (new data on generation of solid waste is not available) and waste collected per day is only 19 tons (approximately). Major source of generation of waste in Dholpur town is domestic. 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, and other tourism related activities – Dholpur attracts some number of tourists. Solid waste management activity of Dholpur Municipal Council (MC) are as under,

- 19 nos. of dustbin of 3.0 cum. Capacity each in city area
- There is no house-to-house waste collection system
- Individual households deposit their waste in dust bins / open collection points.
- Commercial and institutional establishments deposit waste at open collection points for further collection and transportation by Dholpur MC.
- Ad-hoc disorganized collection system is seen working for collection of solid waste.
- Street Sweeping
    - Dholpur MC carries out street sweeping on a regular basis with frequency varying from daily to weekly/fortnightly. In total road network of 220 Km, only 126 nos. sweepers are engaged
    - Fifty Wheel barrows are provided to sweepers to collect sweeping waste.
    - Use of short-handled brooms to sweep the streets – waste collected is transported to the nearest dust bins or open collection points for further transportation.
    - Beat length allotted to each sweeper varies from 1000 m to 1500 m depending on the population density

71. The street sweepers sweep roads and dump the waste at different points. The Dholpur MC carries out the waste from the open collection point to dust bin by wheel borrows and the dustbin is lifted by the dumper placer and transported to the existing dumping site. Sometimes tractors directly carry out the waste from town to disposal point.

The waste dumping area along Chambal Ravine and low lying area which is approx.3.00 km away from the Town.

3.4.4. Transportation

72. Road Network: Dholpur comprises a road network of 175 km, consisting of 40 km concrete roads, 8 km bituminous roads, and 64 km of water bound macadam roads and earthen road of 63 Km. and 45.5 km of BT road under PWD provides a road surface composition in Dholpur. 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. The existing transport network in Dholpur is,

- The road network within town is maintained by Dholpur MB and the PWD.
- PWD maintain approximately a total length of 45.50 Km comprising of NH-3 Agra-Gwalior road, Dholpur- Karauli road and SH-5 Gulabbag to Bharatpur road.
- Dholpur MB maintaining 175 Km of road including Kachha road also.
- In case of availability of public surface transport system, regular buses ply between Agra, Gwalior, and other major cities like Bharatpur, Alwar, Jaipur etc.
- The present system of traffic management and control at intersections is mostly manual.
- The traffic and transportation system is inadequate and requires significant strengthening and improvement.

3.5. Social and Cultural Resources

3.5.1. Demography

73. According to Census 2001, the population of Dholpur Urban Agglomeration is 97,795 and spreads over Dholpur Municipal Council (organized into 37 wards, 35 nos. M & 2 nos OG).The total spread of the Urban Agglomeration is approximately 32.03 sq. km. The UA supports an average density of 3,053 persons per sq. km. While the UA witnessed a high growth between 1981 and 2001 on account of induced industrial development, the growth rate fell substantially during the last decade i.e. 1991-2001, primarily because of the failure of the single most important commercial growth along Bari road and Agra road. Table 3.12 indicates the demographic characteristics for the UA. There are two nos. of OG (Tagawali rural and Purani Chhawni) exists in the adjacent of MC area and are considered in the planning.

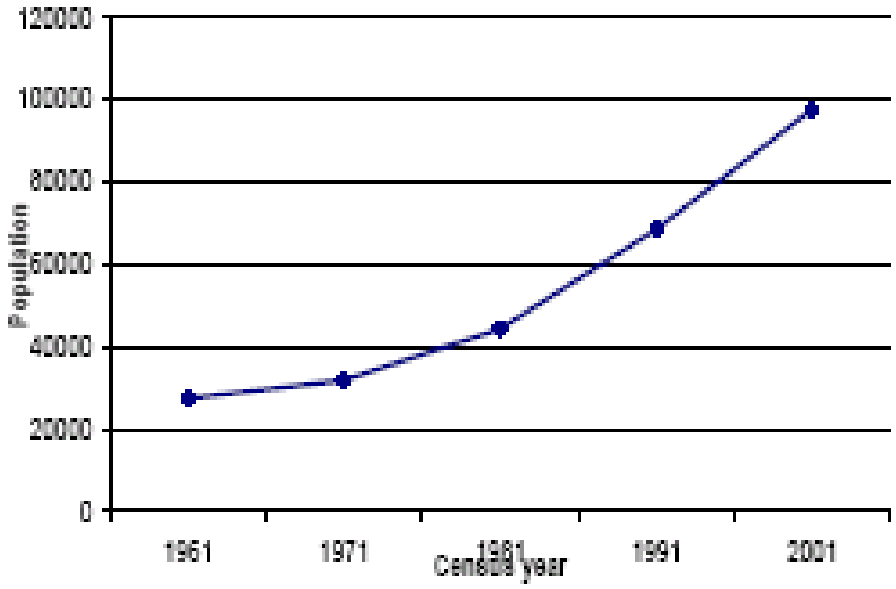
Table 3.12: Population Growth in Dholpur town

Year	Population	Growth Rate	Area	Density
	Dholpur Town	***(%)***	***Sq. Km***	***Persons / sq. km***
1901	13310			
1911	19922	3.17		
1921	16206	-18.65		
1931	19586	20.86		
1941	21311	8.81		

Year	Population *Dholpur Town*	Growth Rate *(%)*	Area *Sq. Km*	Density *Persons / sq. km*
1951	20651	-3.10		
1961	27412	32.74	-	-
1971	31865	16.24	-	-
1981	44375	39.26	32.03	1385
1991	68533	54.44	32.03	2140
2001	97795	42.70	32.03	3053

Source: Census of India, 2001.

Figure 3.9: Growth trend of Dholpur



74. Occupational structure of Dholpur urban area is given in **Table 3.13.**

Table 3.13: Occupation Structure in Dholpur UA

S.No.	Category of Business	Working Population as per 1991 census	
1.	Agriculture, agriculture labour, Forestry, mining and allied works	2746	16.42
2.	Industries and cottage industries	3137	18.75
3.	Construction	896	5.36
4.	Business & Trading	2767	16.54
5.	Transport	1206	7.21
6.	Others	5975	35.72
	Total	**16727**	**100.00**

Source: Dholpur Master plan

75. Overall literacy rate in Dholpur district is 60.77%, reported at 75.85% for males and 42.36% for females, which is slightly better than literacy in the state as a whole, which is 60.4% overall, and 75.7% for males and 44.0% for females. In Dholpur town, the overall literacy rate is 70.80% of which male 80.51% and female 59.65%.

76. The sex ratio is however significantly below the natural 1:1 ratio; being 827 females per 1000 males, lower than both the state and national averages (921 and 929 respectively).

77. According to the census, in 2001 only 25-30% of the population was in paid employment, significantly lower than both the state and national averages (42.1 and 39.1% respectively). This indicates that most of the townspeople are engaged in the informal sector earning a living from small trading, casual labour, etc.

3.5.2. Health and educational facilities

78. There are good educational facilities in Dholpur district, which serve both townspeople and inhabitants of surrounding villages and towns in the hinterland. There are 848 primary schools, 169 secondary schools and 57 higher secondary schools, plus four general degree colleges and three industrial training institutes (ITI).

Table 3.14: Educational facility of Dholpur District

Primary School	848
Upper Primary School	561
Secondary School	169
Senior Secondary School	57
Siksha Karmi Vidyalaya	83
Madarasa	32
College	4 (One Govt.)
I.T.I.	3
D.I.E.T.	1
Sanskrit College	1

(Official website Govt. of Rajasthan)

79. As the district headquarters town, Dholpur is the main centre for health facilities in the area and there is a district general hospital, 1 CHC, 22 primary health centers in the district. The detail of the health facilities given in **Table 3.15.**

Table 3.15: Health facility Dholpur District

General Hospital	1
CHC	3
PHC	22
Sub Centre	156
T.B. Clinic	1
Ayurvedic Hospital	1(A Category)
Ayurvedic Aushadhalya	52
Homoeopathic Hospital	1
Unani Hospital	1

(Official website Govt. of Rajasthan)

3.5.3. History, culture and tourism

80. According to the epics, Dholpur was initially known as Dhawalgiri. Sikandar Lodi (of the Delhi sultanate fame) conquered it in 1501. Babur subsequently conquered the city in 1526 and Dholpur was under Mughal rule. It is also believed that during Humayun's rule, the city was moved northwards to avoid erosion by river Chambal.

81. The main attractions in Dholpur are Talab Shahi and Muchkund Lake. This picturesque lake and the palace were built in the year 1617 AD as a shooting Lodge for Mughal Prince Shah Jahan. Muchkund is about 5.0 Km from Dholpur and is named after Raja Muchkund. It was also believed that the Mughal emperor Akbar built the enclosures adjoining the Lake.

82. Dholpur is a good tourist palace and located 55 km away from Agra and 60 km away from Gwalior and NH-3 connect the town to Agra and Gwalior. The tourist flow in the town is limited and still to be accounted.

Muchkund Lake at Dholpur

83. The Department of Tourism through Rajasthan Tourism Development Corporation and Rajasthan State Hotel Corporation Ltd (public sector entities) and Rajasthan Institute of Tourism and Travel Management (society) is responsible for tourism development in the State. The Archaeology Survey of India (ASI) and the State Department of Archaeology and Museums are responsible for conservation of cultural and heritage sites in the State. The Rajasthan Tourism Policy, 2005, provides the framework for tourism development and promotion in the State. The Rajasthan Heritage Conservation Bill, 2005, provides the framework for conservation of cultural and heritage sites in the State.

84. The Department of Tourism has identified that the attraction of Muchkund Lake is now become less due to non availability of water in the lake. During the discussion with the local people it was found that the pathway of water coming to the lake is almost closed due to silting activity and that should be cleared for the want of water during rainy season comes into the Lake, the water can fill the lake and the beautifulness of this lake can modified. The adjoining area of the lake is also required to be modified to increase the attraction to both domestic and foreign tourists.

4. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES: LOCATION AND DESIGN

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

86. 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.

87. 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:

- Location of STP (10 MLD) selected at Tagawali Village. There is one water body (pond) adjoining to the proposed site therefore this aspect need to be considered during finalization of design. Also, one school is located near (approx 400m) to the proposed site appropriate measure need to adopted. Before finalization of design proposed location (including peripheral environment) should be taken into consideration. The land size is also small as further expansion is totally rule out.

- Location of new 3 MLD STP has been proposed at Shekhupur village. Near location there are few sensitive locations which need to consider during construction and operation. These location are (a. Temple -650m distance from 3 MLD STP site b. Mosque -1200 m c. River Chambal-2300m d. Fort-350 m e. Highway (NH-3)-350m and nearest settlement village Shekhupur at distance of 300m. The significant locational impacts are likely on village. During construction (increase in SPM, Noise) as well as during operation (odor and visual impact) there may be negative impact on village.

- 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;

- 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;

- 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.

88. The most of the usual impacts as a result of location and design can be easily mitigated. The proposed STP sites are away from the town. The ownership of surrounded land to the land of 10 MLD STP is private; however the ownership of surrounded land of 3

MLD STP site is both private and government. The enclosed land within 500 meter from proposed 3 MLD STP is barren except few even sections of farming land while at 10 MLD STP the land is predominantly agricultural. The topography of the proposed STP (3MLD) site is ravines, so the expectation for the potentials of future development adjacent to the proposed STP sites is unlikely. The following measures should be implemented to avoid any impact

- A thick green buffer zone with suitable plantation around the STP sites should be developed; this will increase the aesthetical appearance of the area and will act as a visual barrier (green belt has already been taken into consideration in the design of STPs)

- Any development like residential and sensitive receptors like schools, hospitals etc, within 500m around the site shall be controlled;

89. 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.

90. The monitoring of the quality of the treated effluent will be carried out through the laboratories of the STPs.

91. It should be ensure before discharging the treated effluent that the quality of the effluent will meet up the prescribed standards (Table 6.2). .

5. POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES: INFRASTRUCTURE CONSTRUCTION

5.1. Screening out areas of no significant impact

92. From the descriptions given in Section above, 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. Areas outside the town will also be affected, by construction of the trunk sewer and STP.

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

- Most of the network and the trunk sewer will be built on unused ground alongside existing roads and can be constructed without causing major disruption to road users and any adjacent houses, shops and other businesses;
- The STP will be located on government-owned land that is not occupied or used for any other purpose;
- Most network construction will be conducted by small teams working on short lengths at a time so most impacts will be localised and short in duration;
- The overall construction programme will be relatively short for a project of this nature, and is expected to be completed in 1.5 years.
- At STP sites negative impact due to construction is expected as the site is near to village shekhupura. The SPM and noise level are likely to increase during construction and movement of vehicle.

94. 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.

95. These environmental factors have thus been screened out presently but will be assessed again before implementation of the 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
Coastal resources	Dholpur is not located in a coastal area

96. **Annexure 1** shows Rapid Environmental Impact Assessment checklist (REA) for the said sub-project.

5.2. Sewage Treatment Plants

5.2.1. Construction method

97. As explained above, provision of two Sewage Treatment Plants will involve construction of the necessary structures on the land.

- Regarding the 10 MLD plant, 16 bigha land isidentified at Tagawali Village. But there is one water body near the proposed site which is mainly used for agricultural

purpose hence proper care will be required during construction and operation period. One primary school is also located nearby the project site, so proper mitigation measures should be considered in the design. A thick green belt is required to be consider to minimize the impact on the school. Secondly, the land available is too small for providing expansion in later phase as well as provision of outfall of treated water. The STP being constructed under Project-2 covers only the Northern part of the Dholpur city. There is ridge line passing through near the Govt. Hospital separating the Slope of the city in North & Southern direction.

- For the southern part of the city comprehensive sewerage system and a separate 3 MLD STP has been proposed. The land for this STPs (3 MLD) has been identified in Shekhupra village The proposed site is barren, asymmetrical, unused government land however few patches of the surrounding land are used for agriculture. The STP site is also surrounded by one poultry farm and habitation at a distance approximately 250 m from the STP.

98. A number of available technologies including conventional system like attached and suspended growth aerobic systems, Anaerobic systems , oxidation ditch and unconventional systems like Reed beds or Constructed wetlands, Soil application methods and Waste Stabilization ponds are reviewed. The review of available technologies is made with the consideration to the local climate, power requirements and O&M obligations. A sewage treatment system, based on Sequential Batch Reactor (SBR) Process finds favor owing to discharge standards requirement of 10 mg/l BOD, familiarity with technology and comparatively lower land requirement.

99. It is proposed to construct a comprehensive sewerage system for the southern part of the town and also identify a proper site for 3MLD STP and final disposal of the treated effluent which is proposed to be treated at Shekhura site. The main sewer design capacity is 7.70 MLD for year 2041. At this stage 3.0 MLD capacity STP (for present flow) is proposed. The remaining capacity sewage flow STP will be constructed as per requirement. The land available for STP is about 3.50 hectare which is sufficient for the STP required for ultimate design flow.

100. The intended treatment levels for both STPs are to conform to the effluent standards for application on land as per The Environment Protection Act, 1986. The effluent of the 3 MLD STP is proposed to be discharged in a local drain which ultimately discharges in River Chambal. The effluent of the 10 MLD STP will be collected in a pond and will be used for irrigation, the surplus is proposed to be discharged in the local channel through pipeline The effluent standards for inland surface water discharge includes 5 day BOD at 20^0C as ≤10 mg/l and suspended solids of 10 mg/l.

101. Work components of both STPs involves:

- A series of reactor chambers, ponds for tertiary treatment
- Pump stations and pipes with valves to transfer material between ponds;
- A trunk sewer

102. An access road of approximately 500m needs to be constructed to approach the site for the 3 MLD STP.

103. Although the site of 10 MLD is fairly not large, the construction will be straightforward involving mainly simple excavation. The 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.

104. The site of 3MLD STP at Sekhupura village is proposed to be divided in to two different finished ground levels (FGL) looking to the topography of the area. Inlet units (Inlet chamber, coarse screen , raw sewage sump and ADM building) are proposed at 163.0 FGL. Secondary units (fine screen to sludge handling and out let) are proposed at 170.0 FGL. This system will minimize the quantities of cutting and filling of the earth in the area. In case of further requirement of filling, the soil will be brought from the approved quarries.

105. 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.

106. 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.

5.2.2. Physical Resources

107. Although the impacts of constructing the STPs 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.

108. Ponds will be dug on around 80% of the Tagawali STP site (10MLD), and if these are 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:

- 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;

- 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.

109. As discussed above the topography of the site of 3MLD STP is uneven and most of the excavated soil will be reused for reclamation of the land.

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

5.2.3. Ecological Resources

111. At proposed site for the 10 MLD STP, one water body is located therefore some ecological interest at the site, so construction will cause moderate 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 along the boundary of STP (10MLD) for every one that is removed. However at 3 MLD site no such issues are there but plantation need to be done along the boundary of STP site.

5.2.4. Economic Development

112. The site of the proposed STPs is owned by the government so 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 grazing of goats, and there is other suitable grazing nearby, so this activity should not be affected. The land is not farmed and there are no industries or housing in the vicinity so there should be no impact on income-generating activities. There is one infrastructure like school on the site of the 10 MLD STP, and the construction work will be designed to avoid impact on the school.

113. 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 movements of trucks, which could disrupt short term traffic near the site and particularly in Dholpur 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:

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

5.2.5. Social and Cultural Resources

114. Although both STPs will be constructed on an uninhabited and un-used land, with a sparse residential areas nearby, but there is a risk that the other related work could damage social and cultural resources specially during construction work, so careful mitigation and strict adherence by the EA and Contractor will be necessary.

115. 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 very 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:

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

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

116. There are no modern-day social and cultural resources (such as schools and hospitals) near the site (except a small private school near 10MLD at a distance of approx 350 from proposed site), and no areas that are used for religious or other purposes, so there is no risk of other impacts on such community assets.

117. 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.

5.3. Sewerage Network and Trunk Sewer

5.3.1. Construction method

118. Provision of a sewerage system in part of the town during the second phase of investment will involve construction of:

- The 93 km secondary and tertiary network will collect sewage from individual houses have a sufficient water supply, these pipes will be of small diameter (200 to 800 mm) and will be located in shallow trenches (ca 1.5 m in depth).
- The 1 km trunk sewer will also be of RCC pipes and will convey sewage from the secondary network to the STP These pipes will be 1000 mm in diameter
- Laying of Trunk Mains of RCC of 700 mm dia. for a length of 700 m.
- Laying of Sub-Mains & laterals sizes 200 mm 500 mm dia. for a length of 26914 m of PVC-U and 1905 m of RCC (NP-4).

119. 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.

120. 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.

121. 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.

122. Pipes are normally covered by 1.2 m of soil, and a clearance of 100 mm is left between the pipe and each side of the trench to allow backfilling. Trenches will therefore be quite large, a maximum of 2.3 m deep and 1.2 m wide for the trunk main, and a minimum of 1.5 m deep and 0.4 m wide for the tertiary network.

123. 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.

124. 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.

5.3.2. Physical Resources

125. 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 only 700 m the generation of waste will be moderate. Although this is <20% 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:

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

126. 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.

127. 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.

5.3.3. Ecological Resources

128. There are no significant ecological resources in the town (protected areas or rare or important species or habitats), so construction of the network and trunk sewer in the town should have no significant ecological impacts. 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.

5.3.4. Economic Development

129. 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.

130. 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:

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

131. 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.

132. 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:

- Obtaining details from the Municipal Council of the nature and location of all infrastructure, and planning the sewer networks so that all such sites are avoided;
- Integrating the construction of the various Dholpur 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.

133. 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.

134. 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:

- 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;
- Scheduling the transportation of waste to avoid peak traffic periods, the main tourism season, and other important times.

5.3.5. Social and Cultural Resources

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

- Consulting national and state historical and archaeological authorities to assess the archaeological potential of all construction sites;
- Selecting alternative routes to avoid any areas of medium or high risk;
- Including state and local archaeological, cultural and historical authorities and interest groups as project stakeholders to benefit from their expertise;

- Developing a protocol for use in conducting all trenching, to recognize, protect and conserve any chance finds (see Section V.B.5 for details).

136. 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, 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:

- 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;
- Limiting dust by removing waste soil quickly, covering and watering stockpiles, and covering soil with tarpaulins when carried on trucks;
- Increasing the workforce in sensitive areas to complete the work quickly;
- Providing wooden bridges for pedestrians and metal sheets for vehicles to allow access across open trenches where required (including access to houses);
- Using modern vehicles and machinery with standard adaptations to reduce noise and exhaust emissions, and ensuring they are maintained to manufacturers' specifications.

137. In addition the Executing Agency and Contractor should:

- 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.

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

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

139. 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:

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

140. Given the unsafe 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:

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

141. 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.

[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

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

6.1. Screening out areas of no significant impact

142. Although the sewerage system will need periodic 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 factors which should be unaffected by this system once it begins to function. These are identified in **Table 6.1** below, with an explanation of the reasoning in each case. These factors are thus screened out of the impact assessment and will not be discussed further.

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

Field	Rationale
Climate, topography, geology, seismology	There are no known instances where the operation of a relatively small sewerage system has affected these factors
Coastal resources	Dholpur is not located in a coastal area

143. These environmental factors have thus been screened out presently but will be assessed again before implementation of the sub-project work.

6.2. Operation and maintenance of the improved sewerage system

144. The new sewerage system will collect and treat all surface water, domestic wastewater and sewage produced by 40% 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 3**, and the discharge after treatment will comply with Indian wastewater standards. At both STPs, the effluent will be discharged as waste water suitable for Land Irrigation. (**Table 6.2**).

145. As discussed above the discharge point for both of the STPs (10 MLD & 3 MLD) plant will be nallah and the treated effluent will be used for irrigation and only the excess water will disposed in the river please be specific. Mention clear reasoning and come to a conclusion with regard to the magnitude of impact on fisheries and aquatic biology, on natural vegetation, etc.

146. The impact of releasing of the surplus treated water on the river ecology is unlikely as the quality of discharge will be ensured to comply with the Indian wastewater standards and the quantity of the treated water will remain insignificant at discharge point at river.

Table 6.2: Waste Water Quality Discharge Standards

SL.no	Parameter	Standards			
		Inland surface water	Public sewers	Land irrigation	Marine/coastal areas
1.	Colour and odour	remove as far as practicable			
2.	Suspended solids mg/l. max.	100	600	200	(a) For process waste water100 (b) For cooling water

SL.no	Parameter	Standards			
		Inland surface water	**Public sewers**	**Land irrigation**	**Marine/coastal areas**
					effluent 10% above total suspended matter of influent.
3.	Particle size of suspended solids	shall pass 850 micron IS Sieve			(a)Floatable solids, max. 3mm. (b)Settable solids (max 850 micron)
4.	pH value	5.5. to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
5.	Temperature	shall not exceed 5^0C above the receiving water temperature			shall not exceed 5^0C 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.	Ammonical 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 27^0C), 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 chro- mium (as Cr. +6). mg/l, max	0.1	2.0		1.0
18.	Total Chromium (as Cr) mg/l,	2.0	2.0		2.0

SL.no	Parameter	Standards			
		Inland surface water	Public sewers	Land irrigation	Marine/coastal areas
	max				
19.	Copper (as Cu) mg/l, max	3.0	3.0		3.0
20.	Zinc (as Zn) mg/l, max	5.0	15		15
21.	Selenium (as Se) mg/l, max	0.05	0.05		0.05
22.	Nickel (as Ni) mg/l, max	3.0	3.0		5.0
23.	Cyanide (as CN) mg/l, max	0.2	2.0	0.2	0.2
24.	Fluoride (as F) mg/l, max	2.0	15		15
25.	Dissolved phosphates (as P) mg/l, max	5.0			
26.	Sulfide (as S) mg/l, max	2.0			5.0
27.	Phenolic compounds (as C_6H_5OH) mg/l, max	1.0	5.0		5.0

147. 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.

148. There is a chance of potential odor nuisance to nearby locality of both STPs if adequate measures are not adopted as the distance of nearby locality is within 400-500m.

149. During operation odor control system will be adopted (a) sodium hypochlorite scrubbers (b) adding a surfactant to the raw odorous air to remove nonwater-soluble odors or to allow them to be sorbed into the scrubber's chemical solution.

150. Other method of odor removal may be adopted based on ground situation during operation. The proposed green belt at the periphery of STP site also helps in reducing odor.

151. 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.

152. At the STPs, 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 also be used for agriculture purpose.

6.3. Environmental impacts and benefits of the operating system

6.3.1. Physical Resources

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

154. 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.

155. 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 construction procedure. 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.

156. Treated effluent from an STPs 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 STPs site, effluent may be discharged into this channel, which may then pollute surface and groundwater and present a risk to the health of humans and animals if it is consumed via well water. This can be avoided by developing a system to sell the treated wastewater to farmers (delivered by tanker) to irrigate their fields. This would provide water and plant nutrients and thus improve agricultural productivity and farm incomes, as well as allowing further cost-recovery by the EA. This should be operated in conjunction with a scheme to sell inert sewage sludge as a farm fertilizer as recommended above, and some of the capacity building and training provided by the project should focus on providing the GA with the skills to operate these measures. This should be preceded by rigorous bacteriological tests to confirm that the treatment methods render all dried sludge and effluent free from enteric bacteria and pathogens, so that it is safe to humans, animals and crops (see Section below). This treated wastewater can be used for agriculture purpose.

6.3.2. Ecological Resources

157. 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.

6.3.3. Economic Development

158. 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:

- 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;
- Requiring contractors employed to conduct these works to provide wooden walkways across trenches for pedestrians and metal sheets where vehicle access is required;
- Consulting the local traffic police regarding any such work so that it can be planned to avoid traffic disruption as far as possible, and road diversions can be organized if necessary.

159. 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.

6.3.4. Social and Cultural Resources

160. Although there is a chance of discovering material of historical or archaeological importance during excavation in the town, 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.

161. 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:

- 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;
- Completing work in these areas quickly;
- Providing wooden bridges for pedestrians and metal sheets for vehicles to allow access across open trenches where required;
- 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.

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

163. 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.

164. The resident 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 diarrhea 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.

7. INSTITUTIONAL REQUIREMENTS AND ENVIRONMENTAL MONITORING PLAN

7.1. Summary of environmental impacts and mitigation measures

165. Table 7.1 lists the potential adverse impacts of the Dholpur sewerage subproject as identified and discussed in Sections IV, V and VI, and the mitigation proposed to reduce these impacts to acceptable levels. The table also shows how the mitigation will be implemented, who will be responsible, and where and when the mitigation activities will take place.

7.2. Institutional arrangements for project implementation

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

- LSGD is the Executing Agency (EA) responsible for management, coordination and execution of all activities funded under the loan.

- The Implementing Agency (IA) is the Project Management Unit of the ongoing RUIDP, which will be expanded to include a broader range of skills and representation from the Urban Local Bodies (ULB, the local government in each town). Assigned as the RUSDIP Investment Program Management Unit (IPMU), this body will coordinate construction of subprojects across all towns, and ensure consistency of approach and performance.

- The IPMU will be assisted by Investment Program Management Consultants (IPMC) who will manage the program and assure technical quality of design and construction; and Design and Supervision Consultants (DSC), who will design the infrastructure, manage tendering of Contractors and supervise the construction process.

- Investment Program Implementation Units (IPIU) will be established in seven zones across the State to manage implementation of subprojects in their area. IPIUs will be staffed by professionals seconded from government departments (PHED, PWD), ULBs, and other agencies, and will be assisted by consultants from the IPMC and DSC as necessary.

- The IPMU will appoint Construction Contractors (CC) to build elements of the infrastructure in a particular town. The CCs will be managed by the IPIU, and construction will be supervised by the DSC.

- LSGD will be assisted by an inter-ministerial Empowered Committee (EC), to provide policy guidance and coordination across all towns and subprojects. The EC will be chaired by the Minister of Urban Development and LSG, and members will include Ministers, Directors and/or representatives of other relevant Government Ministries and Departments.

- City Level Committees (CLCs) have also been established in each town, chaired by the District Collector, with members including officials of the ULB, local representatives of state government agencies, the IPIU, and local NGOs and CBOs. The CLCs will monitor project implementation in the town and provide recommendations to the IPIU where necessary.

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

Figure 7.1: Institutional Responsibility- RUSDIP

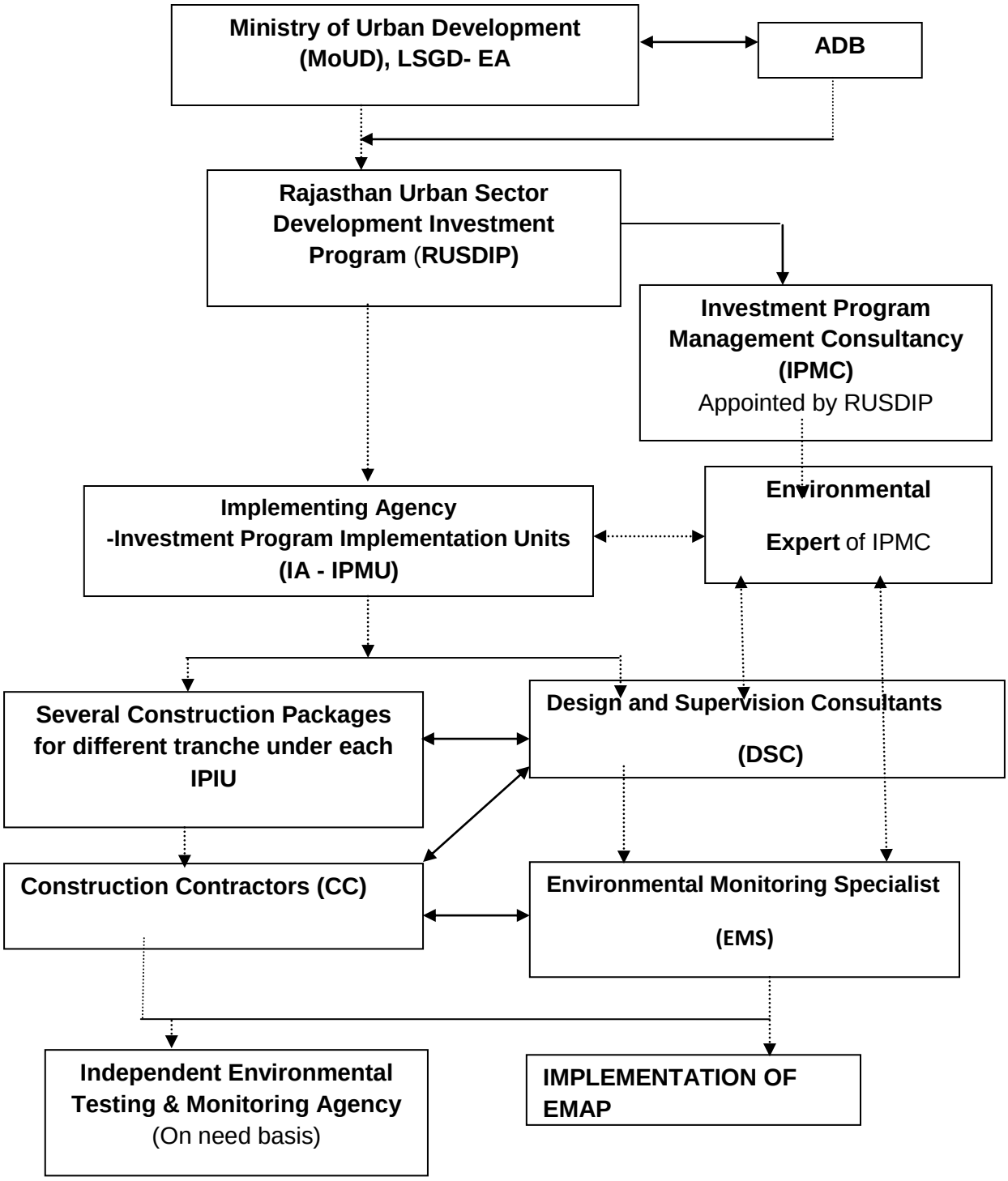


Table 7.1: Environmental impacts and mitigation for the Dholpur Sewerage Subproject

Potential Negative Impacts	Sig	Dur	Mitigation Activities and Method	Responsibility	Location[4]
Location and Design					
Discharge of treated effluent to *nallah* could pollute surface & groundwater with nitrate, phosphate, etc	M	P	Conduct bacteriological tests to ensure safety of effluent	GA	STP 10 MLD and 3 MLD
			Sell treated wastewater to farmers for irrigation Development of aquaculture can be mooted		
Potential flooding of 3 MLD STP during monsoon	NS	T	Proper drainage plan to be developed	Contractor/ DSC	STP 3 MLD
Construction: Sewage Treatment Plant					
Excavation will produce large amounts of waste soil	M	T	Find beneficial uses for waste soil in construction, land raising and infilling of excavated areas	DSC	All sites
Stockpiled soil could create dust in windy weather	M	T	Remove soil as soon as it is excavated	DSC	All sites
Dust could also be produced when soil is transported	M	T	Use tarpaulins to cover dry soil when carried on trucks	DSC	
			Water access road to 3 MLD site		
Rain and ground water could collect in excavated areas	M	T	Conduct all excavation in the dry season	DSC	All sites
			Pump out groundwater & provide to farmers for irrigation	DSC	STP site
Some trees will need to be removed from the site	M	P	Only remove trees if it cannot be avoided	DSC	All sites
			Plant and maintain two trees for every one removed		
Traffic may be disrupted by lorries carrying waste soil	M	T	Plan routes to avoid Dholpur Town and narrow local roads	Contractor/ DSC	From STP site
			Schedule transportation to avoid peak traffic periods		
Ground disturbance could damage archaeological and historical remains	S	P	Request state and local archaeological authorities to assess archaeological potential of proposed STP site	DSC	All sites

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

Potential Negative Impacts	Sig	Dur	Mitigation Activities and Method	Responsibility	Location[4]
			Select alternative if site has medium-high potential	DSC	
			Include state and town historical authorities as project stakeholders to benefit from their expertise	LSGD	
			Develop and apply protocol to protect chance finds (excavation observed by archaeologist; stop work if finds are suspected; state authority to plan appropriate action)	DSC and Contractor	
Economic benefits if local people are employed in Contractor's workforce	M	T	Contractor should employ at least 50% of workforce from communities in vicinity of STP site	Contractor	All sites
Construction: Sewerage Network and Trunk Sewer					
Trenching will produce additional amounts of waste soil	M	T	As above: find beneficial uses in construction or infill	DSC	All sites
Waste soil may create dust when stored or transported	M	T	As above: remove waste soil as soon as it is excavated	DSC	All sites
			As above: cover soil with tarpaulins on trucks	DSC	
			Cover or damp down stored soil in dry weather		
Trees may be removed along pipeline routes	M	P	As above: avoid removing trees, plant 2 for every 1 cut	DSC	All sites
Shops may lose income if customers' access is impeded	M	T	Leave spaces for access between mounds of soil	DSC	Network sites
			Provide bridges to allow people/vehicles to cross trench	DSC	
			Increase workforce in these areas to finish work quickly	DSC	
			Inform shopkeepers of work in advance	LSGD	
			*Compensate businesses for lost income	LSGD	
Trenching could damage other infrastructure	S	P	Confirm location of infrastructure and avoid these sites	DSC	Network sites
			Locate water and sewer pipes on opposite sides of roads	DSC	
Roads/people may be disturbed by repeated trenching	M	T	Integrate subprojects to conduct trenching at same time	DSC/LGD	Network

Potential Negative Impacts	Sig	Dur	Mitigation Activities and Method	Responsibility	Location[4]
Traffic will be disrupted if lack of space means that dug soil has to be placed on the road, and/or sewers have to be located in the road itself	M	T	Consult authorities – work in light traffic periods	Contractor	Network sites
			Ensure police provide diversions when necessary	Contractor/ DSC	
			As above: increase workforce to finish this work quickly	Contractor/ DSC	
Traffic, people and activities could be disrupted by trucks carrying waste soil or delivering materials to site	M	T	Plan routes to avoid narrow streets, congested roads, important/fragile buildings, key religious and tourism sites	Contractor/ DSC	Network sites
			Plan work to avoid peak traffic and main tourism season		
Major risk that ground disturbance in town could damage archaeological and historical remains	S	P	As above: ask authorities to assess potential of all sites	DSC	All sites
			As above: alternative sites where risk is high/medium	DSC	
			As above: include state/local authorities as stakeholders	LSGD	
			As above: apply protocol to protect chance finds	DSC/CC	
Sites of social/cultural importance (schools, hospitals, temples) may be disturbed by noise, dust, vibration and impeded access	M	T	Identify buildings at risk from vibration damage and avoid using pneumatic drills nearby	DSC/ Contractor	Network sites
			As above: remove waste quickly, cover/spray stockpiles, cover soil when carried on trucks		
			As above: increase workforce to finish work quickly		
			As above: use bridges to allow access (people/vehicles)		
			Use modern vehicles/machinery & maintain as specified	DSC/ Contractor	All sites
			Consult relevant authorities, custodians of buildings, local people to address issues & avoid work at sensitive times	DSC/ Contractor	Network sites
Workers and the public are at risk from accidents on site	M	T	Prepare and implement a site Health and Safety Plan that includes measures to:	DSC/ Contractor	All sites
			- Exclude the public from site;		
			- Ensure that workers use Personal Protective Equipment		

Potential Negative Impacts	Sig	Dur	Mitigation Activities and Method	Responsibility	Location[4]
			- Provide Health & Safety Training (including process of transmission of HIV/AIDS) for all personnel;		
			- Follow documented procedures for all site activities;		
			- Keep accident reports and records.		
Existing water supply system uses AC pipes, a material that can be carcinogenic if inhaled as dust particles	S	T	Design infrastructure to avoid locations of AC pipes	DSC	Network
			Train all construction personnel in dangers of AC pipes and how to recognise them in situ	DSC/ Contractor	All sites
			Develop and apply protocol if AC pipes are encountered. This should include:	DSC and Contractor	Network sites
			- immediate reporting of any occurrence to management	DSC/ Contractor	Network sites
			- removal of all persons to a safe distance		
			- use of appropriate breathing apparatus and protective suits by workers delegated to deal with AC material		
			- safe removal and long-term disposal of AC material		
Economic benefits for people employed in workforce	M	T	As above: 50% of workforce from affected communities	DSC/ Contractor	All sites
Operation and Maintenance					
Smell from the 10 MLD STP operation in the adjoining school premises	M	P	A thick Green belt should be developed around the STP to minimise the odour impact	GA	STP 10 MLD
Smell from the 3 MLD STP operation in the nearby village	M	P	A thick Green belt should be developed to minimise the odour impact	Contractor	STP 3 MLD
Leaking sewers can damage human health and contaminate soil and groundwater	M	T	Detect and repair sewer leaks rapidly and effectively	OMC/GA	Network sites
Sludge is removed from treatment ponds every 5 years	S	T	Dry sludge and test for absence of bacteria & pathogens	OMC/GA	STP
			Sell dried sludge to farmers to fertilize land		
Shops may lose small amounts of income if customers' access is impeded by network repair works	S	T	As before: inform shopkeepers of work in advance	GA	Network sites
			As before: provide walkways and bridges for vehicles	OMC	
			As before: request police to divert traffic if necessary	OMC	

Potential Negative Impacts	Sig	Dur	Mitigation Activities and Method	Responsibility	Location[4]
Sites of social/cultural importance may be disturbed by noise, dust, vibration, impeded access for short time during network repairs	S	T	As before: avoid using drills/trucks near fragile buildings	OMC	Network sites
			As before: finish work quickly in sensitive areas	OMC	
			As before: provide walkways and bridges for vehicles	OMC	
			As before: consult authorities and communities, inform them of work in advance, avoid sensitive periods	GA/OMC	
Health and safety of workers & the public could be at risk from repair work and AC pipes of old water supply system	M	T	Prepare and operate H&S plan with same measures as used in construction phase	OMC	All sites
			Apply previously-developed protocol to protect all persons if AC pipes are encountered		
Local people will benefit if employed by project	M	P	STP workers should be residents of neighbouring areas	GA	STP

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

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

7.3. Environmental Monitoring Plan

170. **Table 7.1** shows that most mitigation activities are the responsibility of the Construction Contractors[5] (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.

171. A program of monitoring will be conducted to ensure that all parties take the specified action to provide the required mitigation, to assess whether the action has adequately protected the environment, and to determine whether any additional measures may be necessary. This will be conducted by a qualified Environmental Monitoring Specialist (EMS) from the DSC. The EMS will be responsible for all monitoring activities and reporting the results and conclusions to the IPMU, and will recommend remedial action if measures are not being provided or are not protecting the environment effectively. The EMS may be assisted by environmental specialists in particular technical fields, and junior or medium-level engineers who can make many of the routine observations on site. Post-construction monitoring will be conducted by the relevant Government Agency (GA) to whom responsibility for the infrastructure will pass once it begins to operate6.

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

[5] 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

[6] 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)

173. Table 7.2 shows the proposed Environmental Monitoring Plan (EMP) for this subproject, which specifies the various monitoring activities to be conducted during all phases. Some of the measures shown in Table 7.1 have been consolidated to avoid repetition, and there has been some re-ordering to present together those measures that relate to the same activity or site. The EMP describes: (i) mitigation measures, (ii) location, (iii) measurement method, (iv) frequency of monitoring and (v) responsibility (for both mitigation and monitoring). It does not show specific parameters to be measured because as indicated above, most measures will be checked by simple observation, by checking of records, or by interviews with residents or workers.

174. 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 STPs are operating, to ensure the safety of dried sludge and treated effluent before sale to farmers to fertilize and irrigate fields. Table 7.2 shows that these long-term surveys will monitor:

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

175. 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 STPs. 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.

7.4. Environmental management and monitoring costs

176. 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.

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

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

178. These have not been budgeted elsewhere, and their costs are shown in Table 7.3, with details of the calculations shown in footnotes beneath the table. The figures show that the total cost of environmental management and monitoring for the project as a whole is INR 3,240,000.

Table 7.2: Environmental Monitoring Plan

Mitigation Activities and Method	Location	Responsible for Mitigation	Monitoring Method	Monitoring Frequency	Responsible for Monitoring
LOCATION AND DESIGN					
Minimise foul smells affecting the adjoining area	STP	GA	Site Observations	Monthly	GA/OMC
CONSTRUCTION					
Find beneficial uses for waste soil (construction, land raising, infill)	All sites	Contractor	Site observations; CC records	Monthly	EMS
Remove waste soil as soon as it is excavated	All sites	Contractor	Site observations	Weekly	EMS
Use tarpaulins to cover soil when transported on trucks	All sites	Contractor	Site observations	Weekly	EMS
Avoid Dholpur Town and narrow local roads when transporting soil	From STP	Contractor	Observations off site; CC record	Weekly	EMS
Avoid transporting soil during peak traffic periods	From STP	Contractor	Observations on and off site	Weekly	EMS
Cover or damp down stockpiled soil in dry weather	Inhabited areas	Contractor	Site observations	Weekly	EMS
Conduct all excavation work in the dry season	All sites	Contractor	Site observations	Monthly	EMS
Pump groundwater from excavated areas and provide to farmers	STP site	Contractor	Site observations; farmer survey	Monthly	EMS
Leave spaces for access between mounds of soil	Network sites	Contractor	Site observations	Weekly	EMS
Provide bridges to allow people & vehicles to cross open trenches	Network sites	Contractor	Site observations	Weekly	EMS
Only remove trees if it cannot be avoided	All sites	Contractor	Site observations	Weekly	EMS
Plant and maintain two trees for every one removed	All sites	Contractor	Observations on/off site; CC records	Monthly	EMS
*Compensate businesses for lost income	Where required	LSGD	Shopkeeper survey; LSGD record	As needed	IMA[7]
Increase workforce in inhabited areas to finish work quickly	Network sites	Contractor	Site observations; CC records	Monthly	EMS
Inform shopkeepers and residents of work in advance	Network sites	LSGD	Resident surveys; CC records	Monthly	EMS
Confirm location of infrastructure and avoid these sites	Network sites	DSC	Site observation; design reports	Monthly	EMS
Locate water and sewer pipes on opposite sides of roads	Network sites	DSC	Site observation; design reports	Monthly	EMS
Integrate subprojects to conduct trenching at same time	Network sites	DSC/LSGD	Site observation; design reports	Monthly	EMS
If work will affect traffic, conduct when traffic is light	Network sites	Contractor	Site observations; CC records	Monthly	EMS
Ensure police provide traffic diversions when required	Network sites	Contractor	Site observations; CC records	Monthly	EMS
Request archaeological authorities to assess potential of all sites	All sites	DSC	DSC records; design reports	As needed	EMS
Select alternatives if sites have medium or high potential	All sites	DSC	DSC records; design reports	As needed	EMS
Include state and town historical authorities as stakeholders	All sites	LSGD	CC records; observations at meetings	As needed	EMS
Develop and apply archaeological protocol to protect chance finds	All sites	DSC and CC	DSC and CC records; site observations	Weekly	EMS
Plan transport routes to avoid narrow streets, important or fragile buildings, religious and tourism sites	Network sites	Contractor	Observations off site: CC record	Weekly	EMS
Plan work to avoid peak traffic and main tourism season	Network sites	Contractor	Site observations; CC records	Monthly	EMS
Avoid using pneumatic drills near buildings at risk from vibration	Network sites	Contractor	Site observations; CC records	Weekly	EMS
Use modern vehicles and machinery and maintain as specified	All sites	Contractor	Site observations; CC records	Monthly	EMS
Consult authorities, custodians of buildings, communities: address	Network sites	Contractor	Site observations; CC records;	Monthly	EMS

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

Mitigation Activities and Method	Location	Responsible for Mitigation	Monitoring Method	Monitoring Frequency	Responsible for Monitoring
key issues, avoid working at sensitive times			resident surveys		
Prepare and implement a site H&S Plan including personal protection from transmission of HIV/AIDS (safety of workers/public)	All sites	Contractor	Site observations; CC records	Monthly	EMS
Exclude public from the site	All sites	Contractor	Site observations; CC records	Monthly	EMS
Ensure that workers wear Personal Protective Equipment	All sites	Contractor	Site observations; CC records	Monthly	EMS
Provide Health and Safety training including process of transmission of HIV/AIDS for all personnel	All sites	Contractor	CC records; worker interviews	Monthly	EMS
Follow documented procedures for all site activities	All sites	Contractor	Site observations; CC records	Monthly	EMS
Keep accident reports and records	All sites	Contractor	CC records	Monthly	EMS
Design infrastructure to avoid known locations of AC pipes	Network sites	DSC	DSC records; design reports	As needed	EMS
Train all personnel in dangers and recognition of AC pipes	All sites	Contractor	Site observations; CC records	Monthly	EMS
Develop and apply protocol if AC pipes are encountered	All sites	DSC/CC	DSC & CC records; site observations	Weekly	EMS
If AC pipes are encountered, report to management immediately	All sites	Contractor	Site observations; CC records	Weekly	EMS
Remove all persons to safe distance	All sites	Contractor	Site observations; CC records	Weekly	EMS
Workers handling AC: wear breathing apparatus; protective suits	All sites	Contractor	Site observations; CC records	Weekly	EMS
All AC material must be removed and disposed of safely	All sites	Contractor	Observations on and off site; CC records	As needed	EMS
Employ at least 50% of workforce from communities near sites	All sites	Contractor	CC records; worker interviews	Monthly	EMS
Air, water, noise, soil quality monitoring	Construction site	Contractor	CC records	Twice in a year	EMS
OPERATION AND MAINTENANCE					LSGD
Detect and repair sewer leaks rapidly and effectively	Network sites	GA	Site observation; resident survey	Monthly	LSGD
Sell dried inert sludge to farmers to fertilize land	STP	GA	Site observation; farmer survey	Monthly	LSGD
Inform shopkeepers and residents of work in advance	Network sites	GA	Resident surveys	Monthly	LSGD
Provide walkways and bridges for vehicles	Network sites	OM Contractor	Site observation; resident survey	Monthly	LSGD
Request police to divert traffic if necessary	Network sites	OM Contractor	Site observations	Monthly	LSGD
Avoid using drills or heavy vehicles near fragile buildings	Network sites	OM Contractor	Site observations	Monthly	LSGD
Finish work quickly in sensitive areas	Network sites	OM Contractor	Site observations; OMC records	Monthly	LSGD
Consult communities, avoid working during sensitive periods	Network sites	GA	Site observation; resident survey	Monthly	LSGD
Prepare and operate H&S plan to protect workers and citizens	All sites	OM Contractor	Site observations; OMC records	Monthly	LSGD
Apply AC protocol to protect all persons if AC pipes encountered	All sites	OM Contractor	Site observations; OMC records	Monthly	LSGD
STP workers should be residents of neighbouring areas	STP	GA	Employer record; worker survey	Monthly	LSGD
Sell treated wastewater to farmers for irrigation Development of Aquaculture	STP	GA	Site observation; farmer survey	Monthly	LSGD
LONG-TERM SURVEYS					
Survey of chemical and bacteriological quality of STP effluent	STP	GA	Water quality sampling/analysis	Monthly for 5 years	Consulting lab
Bacteriological surveys of dried STP sludge	STP	GA	Bacterial sampling/analysis		Consulting lab
Survey of public health and incidence of water borne disease	Dholpur Town	GA	Hospital records; resident surveys	Annual for 6 years	Social studies consultant

Table 7.3: Environmental management and monitoring costs (INR)

Item	Quantity	Unit Cost	Total Cost	Sub-total
1. Implementation of EMP (2 years)				
Domestic Environmental Monitoring Specialist	1 x 5 month	130,000[8]	650,000	
Survey Expenses	Lump sum	150,000	150,000	800,000
2. Survey of STP sludge and effluent (5 years)				
Domestic Consultant	5 x ½ month	130,000	325,000	
Sample Analysis	5 x 30	3,500[9]	525,000	
Other Expenses	Lump sum	300,000	300,000	1,150,000
3. Survey of public health (6 years)				
Domestic Consultant	6 x ½ month	130,000	390,000	
Expenses	Lump sum	200,000	200,000	590,000
4. Environmental mitigation measures including Green Belt development near both STPs	Lump sum	1000,000	1000,000	1000,000
TOTAL				3,540,000

Note- The above budget include entire Sewerage project including 10 MLD and 3 MLD STP)

7.5. Associated Facilities

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

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

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

[8] Unit costs of domestic consultants include fee, travel, accommodation and subsistence
[9] Cost of a standard bacteriological analysis (total and faecal coliforms, E.coli, enterococci, etc) is $90 (INR 3,500) per sample

8. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

8.1. Project stakeholders

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

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

183. Secondary stakeholders are:

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

8.2. Consultation and disclosure to date

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

- Awareness and extent of the project and development components
- Benefits of Project for the economic and social upliftment of community
- Labour availability in the Project area or requirement of outside labour involvement
- Local disturbances due to Project Construction Work
- Necessity of tree felling etc. at project sites

- Water logging and drainage problem if any
- Drinking water problem
- Forest and sensitive area nearby the project site
- Movement of wild animals within the village

185. 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 3.**

186. The public Consultation and group discussion meeting were conduct by RUIDP on Date 26 June, 2008 after advertising in Local NEWS papers. The objective of the meeting was to appraise the stakeholders about the environmental and social impacts of the proposed program and the safeguards provided in the program to mitigate the same. In the specific context of Dholpur, the environmental and social impacts of the proposed subprojects under Tranche 2 in Dholpur were discussed.

187. A second round of consultations was held for the additional scope of work in April 2012 and October 2012Meetings 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 Dholpur; and discussed the Government and ADB's Environment policies acts and potential environment impacts of the sub-projects in Dholpur. During the workshop, Hindi versions of the Environmental Framework were provided to ensure participants understood the objectives, policy principles and procedures related to Environment, English and Hindi versions of the Environmental Framework have been placed in the Urban Local Body (ULB) office and Environmental Framework will be provided later on. The NGO to be engaged to implement the Mitigation Measures will continue consultations, information dissemination, and disclosure. The Environmental Framework will be made available in the ULB office, Investment Program Project Management Unit and Implementation Unit (IPMU and IPIU) offices, and the town library. The finalized IEE containing Mitigation Measures will also be disclosed in ADB's website, the State Government website, the local government website, and the IPMU and IPIU websites. ADB review and approval of the RP is required prior to award of civil works contracts.

188. **Major Issues discussed during the 2008 Public consultations were**

(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 as people do not faith about the local contractors in respect of quality of works as well as timely completion of work;

(iii) Livelihood affected households should be given assistance in the mode of cash compensation;

(iv) Local people should be employed by the contractor during construction work;

(v) Adequate safety measures should be taken during construction work;

(vi) Mobile kiosks/vendors/hawkers have shown willingness to shift in nearby places without taking any compensation and assistance from the Executing Agency;

(vii) Local people have appreciated the waste water management proposal of the government and they have ensured that they will cooperate with the Executing Agency during project implementation.

185 Major issues discussed during the 2012 public consultations were:

- Most of the local labour should be employed during construction
- Cutting of trees should be avoided
- Local residents have appreciated the sub-project and ensured their cooperation
- Engagement of reputed contractors to be ensure timely completion of the project

8.3. Future consultation and disclosure

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

- Consultation during detailed design:
  - 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.
- 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;
- 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.

9. FINDINGS AND RECOMMENDATIONS

9.1. Findings

190. 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 town's 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.

191. 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.

192. The process described in this document has assessed the environmental impacts of all elements of the infrastructure proposed under the Dholpur 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:

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

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

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

- Locating the STPs on government-owned land to avoid the need for land acquisition and relocation of people;
- Locating the 1 km trunk main in the ROW alongside the Road, to avoid acquiring agricultural land and affecting the livelihoods of farmers and farm workers.

195. 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 sites; 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.

196. 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:

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

197. 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 assisted project, so these losses will be compensated through a Resettlement Plan and Framework prepared to comply with Bank policy on Involuntary Resettlement.

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

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

199. 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:

- Avoid all known sites of AC pipes when the locations of new infrastructure are planned in the detailed design stage;
- Train all construction personnel to raise awareness of the dangers of AC and enable early recognition of such pipes if encountered;
- Develop and apply a protocol to protect workers and the public if AC pipes are encountered (including evacuation of the immediate area, use of protective equipment by workers, and safe removal and disposal of AC material).

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

- Employ in the workforce people who live in the vicinity of construction sites to provide them with a short-term economic gain;

- Ensure that people employed in the longer term to maintain and operate the new STPs are residents of nearby communities.

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

202. 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:

- 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;

- Treated effluent from the STPs is sold to farmers to fertilize and irrigate fields instead of being discharged into a nearby *nallah*.

203. 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.

204. 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.

205. 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.

206. 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.

9.2. Recommendations

207. 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 environmental status report (**Table 7.1**) are implemented in full, as described in the text above;

- The Environmental Monitoring Plan proposed in Section VI.C of this report is also implemented in full.

- The mitigation measures at the STP site are designed from the inception to take care of sensitivities involved due to its location.

10. CONCLUSIONS

208. The environmental status of the proposed improvements in sewerage and sanitation in Dholpur 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.

209. The overall conclusion of process is that provided the mitigation, compensation and enhancement measures are implemented in full, there should be no noteworthy negative environmental impacts as a result of location, design, construction or operation of the subproject. There should in fact be significant 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.

210. No further studies are required to comply with ADB procedure or national law.

Annexure 1

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 Program

Sector Division: SEWAGE TREATMENT - Dholpur

Screening Questions	Yes	No	Remarks
B. Project Siting Is the project area…			
▪ Densely populated?		√	Project is within the municipal area which is in general moderately populated. As of 2001 India census, Dhaulpur had a population of 92,137. The total spread of the Urban Agglomeration is approximately 32.03 sq. km. The UA supports an average density of 3,053 persons per sq. km
▪ Heavy with development activities?		√	Project area is not heavy with developmental activities.
▪ Adjacent to or within any environmentally sensitive areas?			
• Cultural heritage site	√		There is no cultural heritage site near the sub-project site.

Screening Questions	Yes	No	Remarks
• Protected Area	√		Van Vihar Wild Life SanctuaryJust 18 kms of the city lies the Van Vihar Wildlife Sanctuary, This is one of the oldest wildlife reserve of the Dholpur rulers. Spanning over an area of 59. 86 sq km, Van Vihar is located over Vidhyan Plateau The National Chambal (Gharial) Wildlife Sanctuary approx. 2.0 kms from the Dholpur waste water sub-project area. The sanctuary has rich diversity of flora & fauna.
• Wetland		√	No
• Mangrove		√	No
• Estuarine		√	No
• Buffer zone of protected area	√		No
• Special area for protecting biodiversity		√	No
• Bay		√	No
A. Potential Environmental Impacts Will the Project cause…			
▪ impairment of historical/cultural monuments/areas and loss/damage to these sites?		√	The sewerage system is not impacting any such structures. The STP sites far way from such sites. No encroachments on historical/cultural areas are identified.
▪ interference with other utilities and blocking of access to buildings; nuisance to neighboring areas due to noise, smell, and influx of insects, rodents, etc.?	√		Improvement of the sewerage system will minimize all these problems. STP sites are far way from settlement. So these problems will be minimum.
▪ dislocation or involuntary resettlement of people?		√	STPs have been proposed on government land and sewerage lines will be laid along the roads and streets and it's not disturbing any private property

Screening Questions	Yes	No	Remarks
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	No such impact is expected.
▪ impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage?		√	The treated water will be discharge to downstream water only confirming the prescribed standards. Secondarily, the treated water preferably will be use in irrigation and if the quantity exceeds the limit, only then it will be discharge in downstream water.
▪ overflows and flooding of neighboring properties with raw sewage?		√	Not expected, proper operation and maintenance will be done.
▪ environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers?		√	There is separate industrial area called RIICO and it has separate treatment facility. No one will be allowed to connect with the system without permission of the authority even for domestic connection permission is required.
▪ noise and vibration due to blasting and other civil works?	√		Blasting is not required, short term noise and vibration pollution is expected in all civil work.. Mitigation measures is to be provided and will be taken care in EMP
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, and biological hazards during project construction and operation?	√		Occupational health and safety related issues are associated during operation mainly cleaning work. However during construction work its also applicable Proper implementation of EMP shall be required.
▪ discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers?		√	Confined underground domestic sewerage system. However proper implementation of EMP shall be required.
▪ inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances, and protect facilities?		√	STP sites are away from settlement. All the pumps will be within enclosure and treatment plant will be surrounded by boundary. Buffer zones as per CPHEEO/MOEF norms will be provided.

Screening Questions	Yes	No	Remarks
▪ road blocking and temporary flooding due to land excavation during the rainy season?	√		Mitigation measures to be provided will be taken care in EMP. Contractor will be suggested not to take such works in rainy season
▪ noise and dust from construction activities?	√		It is expected as all kind of civil work produce noise. Appropriate mitigation measures is to be provided
▪ traffic disturbances due to construction material transport and wastes?	√		Short term limited to construction period is expected. Mitigation measures are to be provided.
▪ temporary silt runoff due to construction?		√	Not expected due to
▪ hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?		√	Hydro testing will be carried out for all material
▪ deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?		√	No direct discharge. Only treated sewage will be discharged after confirming the standards.
▪ contamination of surface and ground waters due to sludge disposal on land?		√	It will be disposed off in designated site.
▪ 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?		√	Ventilation Shaft will be provided at the trunk main. Proper safety gear shall be provided to worker to avoid any risk.
▪ large population increase during project construction and operation that causes increased burden on social infrastructure (such as sanitation system)?		√	Local labour will be preferred to employ. only skilled labour (if not available) may be engaged from outside.
▪ social conflicts between construction workers from other areas and community workers?		√	Most of the worker will be from local area.
▪ 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 explosive material will be used. Proper mitigation measures will be adopted.
▪ 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?		√	Project area lie in seismic zone-II which is considered as low risk zone further the site is also not susceptible to flood. However mitigation measures will be provided for any possible such risk.

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)?		√	Dholpur town lies in sesmic zone-II which is considered as low damage. Project area is highland area and no flood is reported in last 50 years
▪ 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 2

Up Flow Anaerobic Sludge Blanket (UASB)

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

The sewage after being retained in the reactor for about 8 to 10 hours over flows and shall be either retained in a tank for about 30 minutes or allowed to pass through an Cascade type aeration arrangements to give slight aeration to the effluent to destroy anaerobicity.
The effluent, if required, further may allowed to stay at Polishing Pond one day, after which, can be used for irrigation, horticulture or for washing purposes.

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

Sludge Production and nutrient Requirement:

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

Gas Recovery:

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

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 odor nuisance from any H_2S present in gas.

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

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

The Treatment Plant shall consist of following units
1) Initial Pumping

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

Sequencing Batch Reactor (SBR) Technology
In Municipal Sewage Treatment

Sequencing batch reactors (**SBR**) or **sequential batch reactors,** on the concept of Suspended Growth technology for sewage towards reduction of Biochemical Oxygen Demand/Chemical Oxygen Demand are, during its stage of inception, industrial processing tanks for the treatment of wastewater more similar to UASB.

SBR reactors are utilized to treat waste water such as sewage or output from anaerobic digesters or mechanical biological treatment facilities in batches.

Oxygen is bubbled through the waste water to reduce BOD and COD to make suitable for discharge into sewers or for use on land.

The SBR technology (Somewhat Similar and comparable to ASP) is being undertaken by Municipal Bodies recently. This process may accommodate some chemical contaminants also.

The operating principles of a batch activated sludge process, or SBR, are characterized in six discrete periods:

1. (a) Anoxic Fill (b) Aerated Fill
2. React
3. Settle
4. (a) Decant (b) Idle

While there are several configurations of SBRs the basic process is similar.

The availability of artificial intelligence (working with automated control) has now made the option of a SBR process more attractive thus providing better controls and results in wastewater treatment.

This is coupled by the flexibility of a SBR in the treatment of variable flows, minimum operator interaction required, option for anoxic or anaerobic conditions in the same tank, good oxygen contact with microorganisms and substrate, small floor space, and good removal efficiency.

Effluent Standard:

Effluent Standard is based on the capacity of receiving body by flow wise or quantity wise and also due to physical, chemical and biological Characteristics of the particular Component of the Environment (Soil/Water-still or flowing).

Based on the value of sewage, its probable use, if any, and proposed discharge to Environment, the treatment modality is normally decided.

The treated effluent even if clear (by vision) and less in Strength, the aesthetic acceptance cannot be received for effluent till the same is received and recycled through natural 'Hydrological Cycle' through land/water and realized as a part of natural water.

Partial acceptance is there if reuse in industrial application (which does not involve direct intake such as cooling or other similar application) is programmed.

Through SBR technology, the treated effluent is giving a BOD value < 5 mg/land Suspended Solids <13mg/l .

Inferences:

(A) When the land prices are less or where land is available and effluent quality requirement is not very high,(irrigation requirement/discharged on land) WSP /USAP (with PP) shall be the viable option(s).

In case if this SBR technology is adopted where the effluent is proposed to be used for irrigation,

The mechanism should have provision for monitoring / manipulating with less aeration and appropriate settling, so that the final effluent should come towards than 100 mg / l and with nutrients. (The nitrogen phosphorous removal shall not to allowed)

(If irrigation requirements are not required during certain months in a year, then the normal settings need to be resorted to.)

(B) Where the land prices are more and capacity of Plant up to 25 MLD which need not contemplate Gas Recovery and effluent quality requirement is more (which is to cater to any subsequent reuse/or effluent discharged to a water body) SBR shall be preferable.

For larger capacity when accommodated with Primary Clarifier and other units for Gas Recovery it is different and comparison has merits & demerits which is case specific.

However the option in inviting tenders can be kept open so that the bidder should quote both for the (modified) ASP and SBR basic or with possible modifications identifying the (re)use of Effluent similar to zero discharge Concept.

This shall facilitate the client to select the Process based on field conditions and future additions.

Annexure 3

PUBLIC CONSULTATION- ENVIRONMENT

An informal consultation has been carried out to know the perception about proposed project at different locations around 3 MLD STP with different age group and gender. The location wise details of outcome has been elaborated below :-

Predominant 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: - 03.04.2012 at 02.45 pm

Location: - STP (3MLD) site, Sekhupura Village

Table-1: Issues of the Public Consultation- Design phase

Sr.No.	Key Issues/Demands	Perception of community
1	Awareness of the project – including coverage area	People partly aware on the location of STP.
2	In what way they may Associate with the project	They demand that labour of the village should get employment on the S.T.P site and during operation local people should be given priority for employment.
3	Presence of any forest, wild life or any sensitive/ unique environmental components nearby the project area	Except River Chambal no such environmentally sensitive are identified. However, presence of temple nearby the site (approx 650 meter). Proper buffer zone and mitigation measures should be applied.
4	Presence of historical/ cultural/ religious sites nearby	No historical / cultural sites nearby the proposed STP site
5	Unfavorable climatic condition	May –to- June there is very hot season ,otherwise the condition of climate is favorable for work.
6	Occurrence of flood	Storm water flow within 500 m of the S.T.P. site. No effect of Flood in the area.

Sr.No.	Key Issues/Demands	Perception of community
7	Drainage and sewerage problem facing	No such of problem in the STP site.
8	Present drinking water problem – quantity and quality	No organized water supply in the nearby village Local people use ground water through hand pumps and wells for drinking. They also store rain water in storage tank for other purposes.
9	Present solid waste collection and disposal problem	Solid waste collection manually & disposal of low land area.
10	Availability of labour during construction time	Sufficient labour available in this area.
11	Access road to project site	Partially available
12	Perception of villagers on tree felling and afforestation	Few shrubs, small trees will be affected. Villagers demand for more plantation during project execution.
13	Dust and noise pollution	People are aware of the problem. It has been explained that as per Safeguard policy of the project for abatement of pollution, control system should be consider.
14	Disturbances during construction work	Vehicles movement will be controlled & appropriate measure will be taken to combat the same.
15	Setting up worker camp site within the village/project locality	No such camp is proposed because mainly engaged labours will be from the nearby villages.
16	Safety of residents During construction Phase and plying of vehicle for construction activities	People are aware of the problem. It has been explained that as per Safeguard policy of the project vehicles movement will be controlled & appropriate measure will be taken to combat the same.
17	Conflict among Beneficiaries downstream users – water supply project using of river water	The benefits should be equally shared to all nearer villagers.
18	Requirement of enhancement of other facilities	Yes they want other developments like potable water and road
19	Whether local people agreed to sacrifice their lands (cultivable or not) for beneficial project after getting proper compensation	S.T.P site has been proposed in Government land. No need of acquisition of private land

Summary of consultation:

Consulted people are partially aware about the location of project. People are suffering from water born various health problems due to spread of untreated sewerage mainly during rainy season. They are concerns about the problems of odor that might come of STP. Some of the consulted farmers were also concern of the quality of the treated sewage water to be given to them for irrigation purpose. They are highly concern about the movement of construction vehicle on unpaved road connecting to STP as there is chance of increase of dust. They also

ask that labour of the village should get employment during construction of sewerage project and during operation local people should be given priority for employment at STP. People have been assured by the DSC's consultant that proper care will be taken of their problems during implementation of the same. People are ready to extend all types of support during execution of the project.

Date & time of Consultation :- 04.06.08 10.45 am

Location: - STP site, Tagawali Village

Table-2: Issues of the Public Consultation- Design phase

Sr. No.	Key Issues/Demands	Perception of community
1	Awareness of the project – including coverage area	People partly aware on the location of STP
2	In what way they may Associate with the project	They demand that labour of the village should get employment on the S.T.P site through the Rozgar Guarantee Scheme and during operation local people should be given priority for employment.
3	Presence of any forest, wild life or any sensitive/ unique environmental components nearby the project area	Presence of water-body, school nearby the side. Proper buffer zone/No construction Zone and mitigation measures should be applied.
4	Presence of historical/ cultural/ religious sites nearby	No historical / cultural/ religious sites Nearby the STP
5	Unfavorable climatic condition	May –to- June period is extreme dry season; otherwise the condition of climate is favorable for civil work.
6	Occurrence of flood	The project site is not prone to flood,. The annual average rain fall is generally within 500 mm. The chance of flood is very unlikely.
7	Drainage and sewerage problem facing	Due to its natural topography there is no drainage problem, however the nearby settlement is not covered in sewerage scheme so there is problem of sewerage.
8	Present drinking water problem – quantity and quality	No organized water supply in the nearby village Local people use ground water through hand pumps and wells for drinking.
9	Present solid waste collection and disposal problem	Solid waste collection is very poor in near bye settlement, generally it is collected manually & dumped in low lying area.
10	Availability of labour during construction time	Sufficient labours are available in nearby locality .
11	Access road to project site	At present dirt road is available to connect STP Site and nearby village.
12	Perception of villagers on tree felling and afforestation	Small quantity of shrubs and very few numbers of tree might need to be removed from site, significant impact is anticipated. However, Green belt will be developed around the boundary.
13	Dust and noise pollution	Each and every civil work generate dust and noise and its very likely in this project also. People are also aware of the problem. It has been explained that proper mitigation measured will be adopted during civil work as per prevailing safeguard policy.

Sr. No.	Key Issues/Demands	Perception of community
14	Disturbances during construction work	Route, time and Vehicles movement will be controlled & appropriate measure will be taken to minimize the negative impact.
15	Setting up worker camp site within the village/project locality	A small worker camp cum construction yard will be established as most of the unskilled workers engaged in construction work are from near bye locality.
16	Safety of residents During construction Phase and plying of vehicle for construction activities	The work zone will be access controlled, other than work with proper PPE, no one will be allowed. The vehicle route, timing will be defined and demarcated Accident prone are in route will be identified and signboard will be placed. The driver will also give special instruction to take attention in these accident prone area to avoid any misshapes.
17	Conflict among Beneficiaries downstream users – water supply project using of river water	As the project of sewerage system such situation is not expected to happen. However, the treated water will be shared for the purpose of irrigation to near bye farmer.
18	Requirement of enhancement of other facilities	Yes, most of the people also need the other associated facilities like , water supply , street, connecting road, park and other urban facilities.
19	Whether local people agreed to sacrifice their lands (cultivable or not) for beneficial project after getting proper compensation	Since, S.T.P site has been proposed to be constructed in Government land. Any land acquisition from private owener is not required.

Name and Position of Persons Consulted

1. Chanu balmik — Labour
2. Manu mistri — Labour
   Sarman — Farmer
3. Rannu — Farmer
4. Bhole lal — Teacher
5. Ram avadh — Farmer
6. Kukuu Koli — Beldar
7. Rati Ram — Farmer
8. Battasho — Daily need Merchant
9. Bakko Choudhary — Dairy
10. Rajkumar — Farm Beldar
11. Angad Jatav — Govt. Servant
12. Prahlad Faujdar — Farmer
13. Harmesh kant — Dairy work

Summary of outcome:

People are well aware about the project through different sources. Consulted people expressed their concern as they are suffering from various health problems due to consumption of hard water and spread of untreated sewerage mainly during rainy season. They concerns about the problems the students of the school have to face (bad odour from the STP). They are also concern of the quality of the treated sewage water to be given to them for irrigation purpose. They are highly concern about the road condition connecting to STP and near bye village. People have been assured by the DSC's consultant that proper care will be taken of their problems during implementation of the same. People are ready to extend all types of support during execution of the project.

Date & time of Consultation: - 03.04.2012 at 02.45 pm

Location: - STP (3MLD) site, Sekhupura Village

Table-3: Issues of the Public Consultation- Design phase

Sr.No.	Key Issues/Demands	Perception of community
1	Awareness of the project – including coverage area	Local community is partly aware about the location of proposed STP
2	In what way they may Associate with the project	They demand that at least unskilled labour should be employed from nearby locality during construction, and few of them should be engaged as permanent employ during operation.
3	Presence of any forest, wild life or any sensitive/ unique environmental components nearby the project area	Within the periphery of 2000 meter there are chambal river.
4	Presence of historical/ cultural/ religious sites nearby	A fort (in rune condition) a small temple is situated, however consulted people do not feel that any negative impact on it due to proposed project..
5	Unfavorable climatic condition	May –to- June there is very dry season ,otherwise the condition of climate is favorable for work.
6	Occurrence of flood	Very unlikely, consulted people have not seen any major flood in this area in last 40 years
7	Drainage and sewerage problem facing	There is a good natural drainage system as the topography around the site is ravine, however at present there is no sewerage system are available.
8	Present drinking water problem – quantity and quality	No organized water supply in the nearby village Local people use ground water through hand pumps and wells for drinking. They also store rain water in storage tank for other purposes.
9	Present solid waste collection and disposal problem	Solid waste collection is very poor and some how its manually collected and dumped in vacant area
10	Availability of labour during construction time	Sufficient labour are available in nearby locality.
11	Access road to project site	Proposed STP site is connected with dirt/ mud road.
12	Perception of villagers on tree felling and afforestation	Few shrubs, small trees will be affected. Villagers demand for more plantation along the boundary of STP.
13	Dust and noise pollution	Each and every civil work generate dust and noise and its very likely in this project also. People are also aware of the problem. It has been explained that proper mitigation measured will be adopted during civil work as per prevailing safeguard policy.
14	Disturbances during construction work	Route, time and Vehicles movement will be controlled & appropriate measure will be taken to minimize the negative impact.
15	Setting up worker camp site within the village/project locality	A small worker camp cum construction yard will be established as most of the unskilled workers engaged in construction work are from near bye locality.

Sr.No.	Key Issues/Demands	Perception of community
16	Safety of residents During construction Phase and plying of vehicle for construction activities	The work zone will be access controlled, other than work with proper PPE, no one will be allowed. The vehicle route, timing will be defined and demarcated Accident prone are in route will be identified and signboard will be placed. The driver will also give special instruction to take attention in these accident prone area to avoid any misshapes.
17	Conflict among Beneficiaries downstream users – water supply project using of river water	As the project of sewerage system such situation is not expected to happen. However, the treated water will be shared for the purpose of irrigation to near bye farmer.
18	Requirement of enhancement of other facilities	Yes, most of the people also need the other associated facilities like , water supply , street, connecting road, park and other urban facilities.
19	Whether local people agreed to sacrifice their lands (cultivable or not) for beneficial project after getting proper compensation	Since, S.T.P site has been proposed to be constructed in Government land. Any land acquisition from private owner is not required.

Date & time of Consultation :- 05.10.2012 at 02.15 pm, 06-08.10.2012 at 01.30 pm and 9.10.2012 at 1 pm

Location: - STP (3MLD) site near Poultry farm, Agriculture land and Temple Sekhupura Village, Mahatma Nand Ke Bagiche, Near Sekhupura Chunabhatti ,Near STP Site

Table-4: Issues of the Public Consultation- Design phase

Sr.No.	Key Issues/Demands	Perception of community
1	Awareness of the project – including coverage area	People are aware of the location of STP site.
2	In what way they may Associate with the project	They demand that labour of the village should get employment on the S.T.P site and during operation local people should be given priority for employment.
3	Presence of any forest, wild life or any sensitive/ unique environmental components nearby the project area	No sensitive area nearby site but National Chamble Gharial Wildlife Sanctuary is located approx distance of 2 KM away consulted people also feel there will not any negative impact on sanctuary due to proposed project.
4	Presence of historical/ cultural/ religious sites nearby	There is a small temple situated approx 200 meter away from site few people come for worship occasionally in temple. However, consulted people do not think that there will be any adverse impact except odor as the connecting path/tract is away from STP site.
5	Unfavorable climatic condition	No unfavorable climatic condition, However during June-July the climate is very dry.
6	Occurrence of flood	Storm water very rarely cause flood condition in lower areas. No effect of Flood in the STP area.

Sr.No.	Key Issues/Demands	Perception of community
7	Drainage and sewerage problem facing	There is a good natural drainage system as the topography around the site is ravine, however at present there is no sewerage system are available.
8	Present drinking water problem – quantity and quality	PHED provide water supply in nearby locality but the Quantity is not sufficient, therefore local people using ground water through hand pumps
9	Present solid waste collection and disposal problem	Solid waste collection is very poor and people manually collect it and dumped in low/ vacant area along the city roads.
10	Availability of labour during construction time	Unskilled labour are available in penalty in locality.
11	Access road to project site	At present STP site is accessible thorough dirt road. The all weather road is proposed to be constructed.
12	Perception of villagers on tree felling and afforestation	At present no trees are there however plantation is proposed along the boundary of STP site. Consulted people also expressed their positive view on green belt generation.
13	Dust and noise pollution	Each and every civil work generate dust and noise and its very likely in this project also. People are also aware of the problem. It has been explained that proper mitigation measured will be adopted during civil work as per prevailing safeguard policy.
14	Disturbances during construction work	Route, time and Vehicles movement will be controlled & appropriate measure will be taken to minimize the negative impact.
15	Setting up worker camp site within the village/project locality	A small worker camp cum construction yard will be established as most of the unskilled workers engaged in construction work are from near bye locality.
16	Safety of residents During construction Phase and plying of vehicle for construction activities	The work zone will be access controlled, other than work with proper PPE, no one will be allowed. The vehicle route, timing will be defined and demarcated Accident prone are in route will be identified and signboard will be placed. The driver will also give special instruction to take attention in these accident prone area to avoid any missbapes.
17	Conflict among Beneficiaries downstream users – water supply project using of river water	As the project of sewerage system such situation is not expected to happen. However, the treated water will be shared for the purpose of irrigation to near bye farmer.
18	Requirement of enhancement of other facilities	Yes, most of the people also need the other associated facilities like , water supply , street, connecting road, park and other urban facilities.
19	Whether local people agreed to sacrifice their lands (cultivable or not) for beneficial project after getting proper compensation	Since, S.T.P site has been proposed to be constructed in Government land. Any land acquisition from private owner is not required.

Summary of Consultaion:

Most of the consulted people are known about the project. As the project does not require any land acquisition and there is no permanent impact on the livelihood but they are concerns about the problems have to face bad odors from the STP near areas. People are ready to extend all types of support to during execution of the project. They want development like proper Solid Waste Management and drinking water facility, Road and School (school is very far away because of that most of the girls or children don't send to school by their parents). During monsoon period villagers take their cattle's for grazing in

nearby lands however they do not anticipate much impact regarding grazing as much land will be available around the STP.

Priest of nearby temple are also aware about the project and they also not anticipate much impact due to project except odor. The project will help irrigation and manure for growth for crops. Give employment to local people.

Most of the consulted People are known of the proposed project as well as proposed location of STP. The proposed project does not involve any private land as the land belong to Municipal Council and has been allotted for project development . The local community are known and accepted that there will be no permanent livelihood lose. Few of the consulted people are worried about odors, generated from STP. Some of the consulted people also raise their voice regarding possible unwanted mosquito and other microbes. Local community also wanted to get their sewerage connection as early as possible. Most of the consulted People are ready to extend their all support during construction and operation of the project. They also want Solid waste management project should be taken up as early as possible.

Name of Persons Consulted:-

Sl. No.	Name	S/O	Occupation
1	Madhav Singh	C/o Jamil Khan	Farmer worker
2	Manju Khan	Gani Khan	Poultry farm owner /Land owner
3	Munna Khan	Gani Khan	Land owner
4	Salim Khan	Gani Khan	Land owner
5	Sahesh Khan	Gani Khan	Land owner
6	Jamil Khan	Gani Khan	Poultry farm / Land owner
7	Hamib Khan	Gani Khan	Land owner
8	Papu Khan	Gani Khan	Land owner
9	Gherulal		Priest
10	Rambhagan Malha	S/O Waman Singh	Labour
11	Bamalish	W/O Uday Singh	Housewife
12	Sunita	W/O Bashuden Singh	Housewife
13	Rekha	W/O Veer Singh	Housewife
14	Sanker	S/O Anter Ram	Labour
15	Bangali	S/O Papu	Truck Driver
16	Shikadai	W/O Ramkhilardi	Housewife
17	Guddi	W/O Ramnarish	Housewife

18	Ramish	S/O Antram	Labour
19	Bashu Dev	---	Shop
20	Udile Singh	---	labour
21	Vimal	Hotam Singh	Shop
22	Chanden Singh	Pati Ram	Labour
23	Samaram	Rambhorasa	Shop
24	Banshlal	Ramswroop	labour
25	Gulphan	D/O Farahdeen Khan	Home staying Girl
26	Sammi	D/O Farahdeen Khan	Home staying Girl
27	Phul singh	Narayan singh	Labour
28	Kalpana	W/O Ramveer	Housewife
29	Shukhi	Late Kurmodi	House wife
30	Ramshukhi	W/O Vimal	House wife

Photographs

Consultation with villagers near 3 MLD STP

A View of small scale agricultural activity near 3 MLD STP Site

View of Temple near 3 MLD STP (more than 600 m)

A View of small temple near 3 MLD STP Site

Front view of Temple

Consultation with priest of temple near 3 MLD STP Site

Consultation with women near Mahatma Nand Ke Bagiche, the nearest settlement (700 m)

Consultation with villagers near Mahatma Nand Ke Bagiche, the nearest settlement (700 m)

Consultation with women near "Chune Ke Bhatte" the nearest settlement (600 m)

Consultation with women near "Chune Ke Bhatte" the nearest settlement (600 m)

A view of consultation with Shekhupura villagers

A view of consultation with Shekhupura villagers