

Draft Initial Environmental Examination

September 2014

IND: Rajasthan Urban Sector Development Program – Water Supply and Sewerage in Jhunjhunu

Prepared by Rajasthan Urban Infrastructure Development Project, Government of Rajasthan for the Asian Development Bank

CURRENCY EQUIVALENTS

(as of 12 September 2014)

Currency unit	–	Indian rupees (Re/Rs)
Re1.00	=	\$0.016
\$1.00	=	Rs60.966

Abbreviations

ADB	–	Asian Development Bank
AC	–	Asbestos Cement
AE	–	Assistant Engineer
ADB	–	Asian Development Bank
ASI	–	Archeological Survey of India
ASO	–	Assistant Safeguards Officer
CFE	–	Consent for Establishment
CFO	–	Consent for Operation
CPCB	–	Central Pollution Control Board
EA	–	Executing Agency
EAC	–	Expert Appraisal Committee
EC	–	Environmental Clearance
EHS	–	Environmental Health & Safety
EIA	–	Environmental Impact Assessment
SEIAA	–	State Environmental Impact Assessment Authority
EMP	–	Environmental Management Plan;
GOI	–	Government of India
GOR	–	Government of Rajasthan
IA	–	Implementing Agency
IEE	–	Initial Environmental Examination;
PIU	–	Project Implementation Unit;
PMU	–	Project Management Unit
LSGD	–	Local Self Government Department
MOEF	–	Ministry of Environment and Forest
MLD	–	Million Liters per Day
LPCD	–	Liters per Capita per Day
PE	–	Polyethylene
DWC	–	Double Corrugated Duct
NHAI	–	National Highways Authority of India
NOC	–	No Objection Certificate
PHED	–	Public Health Engineering Department
PO	–	Project Officer
PMDSC	–	Project Management, Design and Supervision Consultant
PPTA	–	Project Preparatory Technical Assistance
PWD	–	Public Works Department
REA	–	Rapid Environmental Assessment Checklist
RoW	–	Right of Way
RPCB	–	Rajasthan Pollution Control Board
RUIDP	–	Rajasthan Urban Infrastructure Development Project
SPS	–	Safeguard Policy Statement, 2009
STP	–	Sewage Treatment Plant

JNP	–	Jhunjhunu Nagar Parishad
ULB	–	Urban Local Body
WTP	–	Water Treatment Plant

WEIGHTS AND MEASURES

°C	degree celsius
km	kilometre
lpcd	litres per capita per day
mm	millimeter
m	metre
MLD	million litres per day
Nos	numbers
sq.km	square kilometer

NOTES

(i) In this report, "\$" refers to US dollars.

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EXECUTIVE SUMMARY

1. The proposed Rajasthan Urban Sector Development Program (RUSDP) will complement the past and ongoing efforts of Government of Rajasthan (GOR) to improve water supply and wastewater services to the residents of the state of Rajasthan. The program component of the RUSDP will support policy reforms and consolidate institutional development and governance improvement in the urban sector in the state, while the investment component of the RUSDP will invest in water distribution network improvements and sewerage systems in the six project cities¹ each having a population of more than 100,000, and identified considering the lack of basic services at present and willingness to undertake reforms and institutional restructuring. RUSDP will be implemented over a five-year period beginning in March 2015, and will be funded by ADB via a sector development program (SDP) loan modality

2. Jhunjhunu water supply and sewerage subproject is one of the subprojects proposed under the investment component of RUSDP. Water supply at present in Jhunjhunu is intermittent, unreliable and suffers with huge losses and quality issues. There is no sewerage system in the town. Currently, sewerage project is under implementation by Jhunjhunu Urban Improvement Trust with technical support of the RUIDP Project Management Unit (PMU). Due to lack of sewerage system, most of the households depend on septic tanks for disposal of sewage. Effluent from septic tanks and sullage is let off into open drains which ultimately discharge into streams and ponds.

3. ADB requires consideration of environmental issues in all aspects of the Bank's operations, and the requirements for Environmental Assessment are described in ADB's SPS (2009). This Initial Environmental Examination (IEE) addresses the infrastructure components proposed under Jhunjhunu water supply and sewerage subproject.

4. **Categorization.** Jhunjhunu water supply and sewerage subproject is classified as Environmental Category B as per the SPS as no significant impacts are envisaged. Accordingly, this Initial Environmental Examination (IEE) assesses the environmental impacts and provides mitigation and monitoring measures to ensure that there are no significant impacts as a result of the project.

5. **Project Scope.** The subproject is formulated to address gaps in water and sewerage infrastructure in a holistic and integrated manner. The main objective of the RUSDP is to improve water efficiency, security, and provide safe sewage collection, and with the on-going investments in sewage treatment, this will have an important effect on public health and environment. Investments under this subproject include: (i) water distribution network improvement (265 km replacement, and 159 km new); (ii) provision of bulk water meters (iii) provision of house service connections with consumer meters; (iv) laying new sewers (171 km); and (v) provision of sewer connections to houses.

6. **Implementation Arrangements.** The Local Self Government Department (LSGD) of Government of Rajasthan will be the Executing Agency (EA) and existing RUIDP will be the Implementing Agency (IA). The LSGD will be responsible for overall strategic planning, guidance and management of the RUSDP, and for ensuring compliance with tranche release conditions and loan covenants. A policy support unit will be established in the LSGD to support the government for implementation of the tranche release policy actions under the program loan. The RUIDP will be responsible for planning, implementation, monitoring and supervision,

¹ Pali, Tonk, Ganganagar, Jhunjhunu, Bhilwara and Hanumangarh

and coordination of all activities under the RUSDP. The RUIDP will recruit two consulting firms – (i) project management, design and supervision consultant (PMDSC), and (ii) community awareness and participation consultant (CAPC) to provide support in implementation of RUSDP. Six Project Implementation Units (PIUs), one each of in six project towns, shall be set up directly to assist in implementation. PMU will support PIUs in implementation, management and monitoring of the project. PMU and PIUs will be assisted by PMDSC and CAPC. PIUs will appoint construction contractors to build infrastructure. Once the infrastructure is built and commissioned, the Urban Local Bodies will operate and maintain the infrastructure. Project Officer (Environment) at PMU and Assistant Safeguard Officer (ASO) at each of the PIUs will be responsible for environment management and monitoring activities, and will be supported by Environment Safeguard Specialist of PMDSC Team. Contractor personnel will include an Environment, Health and Safety (EHS) supervisor.

7. **Description of the Environment.** Subproject components are located in Jhunjhunu and in its immediate surroundings which were converted into urban use for many years ago, and there is no natural habitat left at these sites. The project sites are located in existing road right of way (RoW) and government-owned lands. There are no protected areas, wetlands, mangroves, or estuaries in or near the project locations. An open forest area (Jhunjhunu Bid Forest) is situated in north-eastern outskirts of the town. None of the components are located in the forest. Soils are deep, and do not require cutting of rocks for pipe laying.

8. **Environmental Management.** An environmental management plan (EMP) is included as part of this IEE, which includes (i) mitigation measures for environmental impacts during implementation; (ii) an environmental monitoring program, and the responsible entities for mitigating, monitoring, and reporting; (iii) public consultation and information disclosure; and (iv) a grievance redress mechanism. A number of impacts and their significance have already been reduced by amending the designs. The construction phase EMP will be included in civil work bidding and contract documents.

9. Locations and siting of the proposed infrastructures were considered to further reduce impacts. These include (i) locating facilities on government-owned land to avoid the need for land acquisition and relocation of people; and (ii) laying of pipes in RoW alongside main/access roads, to reduce acquisition of land and impacts on livelihoods specifically in densely populated areas of the town.

10. Potential impacts were identified in relation to location, design, construction and operation of the improved infrastructure. During the construction phase, impacts mainly arise from the need to dispose of moderate quantities of waste soil and disturbance of residents, businesses, and traffic. These are common temporary impacts of construction in urban areas, and there are well developed methods for their mitigation. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. Resettlement Plan prepared for the Jhunjhunu Subproject addresses temporary resettlement/livelihood issues resulting mainly from laying of sewer/pipelines in busy commercial areas. To avoid any impacts on Jhunjhunu Bid Forest, appropriate measures suggested, such as, locating workers camps away from the forest, preventing illegal entry of workers into forest for fire wood or hunting etc.

11. Measures such as appropriate scheduling of works (non-monsoon season, low traffic hours, etc.) and minimizing inconvenience by best construction methods will be employed. Traffic management plan will be prepared for pipe/sewer-laying works on busy roads. In the operational phase, all facilities and infrastructure will operate with routine maintenance, which should not affect the environment. Facilities will need to be repaired from time to time, but

environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only. Measures are included to prevent industrial discharges into sewers, which may affect the working of sewage treatment plants.

12. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. Mitigation will be assured by a program of environmental monitoring to be conducted during construction. 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 corrective action will be reported to the ADB.

13. The stakeholders were involved in developing the IEE through discussions on-site and public consultation, after which views expressed were incorporated into the IEE and in the planning and development of the project. The IEE will be made available at public locations in the city and will be disclosed to a wider audience via the ADB, RUIFDCO and PMU websites. The consultation process will be continued and expanded during project implementation to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation.

14. The citizens of the Jhunjhunu Town will be the major beneficiaries of this subproject. With the improved water supply, they will be provided with a constant supply of better quality water, piped into their homes. The sewerage system will remove the human waste from their homes safely and quickly. Combined with the on-going investments in sewage treatment, this subproject, in addition to improved environmental conditions, will improve the over-all health condition of the town. People would 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.

15. **Consultation, Disclosure and Grievance Redress.** Public consultations were done in the preparation of the project and IEE. Consultations will continue throughout the project implementation period with the assistance of the NGOs. A grievance redress mechanism is described within the IEE to ensure any public grievances are addressed quickly.

16. **Monitoring and Reporting.** The PMU and PMDS consultants will be responsible for monitoring. The PMDSC will submit monthly/semi-annual monitoring reports to PMU, and the PMU will review and send the semi-annual monitoring reports to ADB. ADB will post the environmental monitoring reports on its website.

17. **Conclusions and Recommendations.** The proposed project is therefore unlikely to cause significant adverse impacts. The potential 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, there are no significant impacts and the classification of the project as Category "B" is confirmed. No further special study or detailed environmental impact assessment (EIA) needs to be undertaken to comply with ADB SPS (2009) or GoI EIA Notification (2006).

I. INTRODUCTION

A. Background

1. **Project background and context.** The proposed Rajasthan Urban Sector Development Program (RUSDP) will complement the past and ongoing efforts of Government of Rajasthan (GOR) to improve water supply and wastewater services to the residents of the state of Rajasthan. The program component of the RUSDP will support policy reforms and consolidate institutional development and governance improvement in the urban sector in the state, while the investment component of the RUSDP will invest in water distribution network improvements and sewerage systems in the six project cities² each having a population of more than 100,000, and identified considering the lack of basic services at present and willingness to undertake reforms and institutional restructuring. RUSDP will be implemented over a five-year period beginning in March 2015, and will be funded by ADB via a sector development program (SDP) loan modality. The expected impact of the RUSDP will be sustainable urban development in Rajasthan. The expected outcome will be improved urban service delivery in Rajasthan. RUSDP will have five outputs, out of which Outputs 1 and 2 will be supported by the program component, while Outputs 3, 4 and 5 will be supported by the investment component.

2. The focus of the RUSDP investment will be on water supply and sewerage infrastructure. A series of subprojects will be implemented under the Project, with each subproject providing improvements to water supply or sewerage or both in a project town.

B. Background of IEE

3. Jhunjhunu water supply and sewerage subproject is one of the subprojects proposed in RUSDP. Water supply is currently intermittent, and suffers with huge losses and quality issues. There is no sewerage system exists in the town. 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 Safeguards Policy Statement (2009). Accordingly, this Initial Environmental Examination (IEE) has been conducted to assess the environmental impacts and provide mitigation and monitoring measures to ensure that there are no significant impacts as a result of the subproject.

C. Environmental Regulatory Compliance

4. Table 1 presents a summary of environmental regulations and mandatory requirements applicable to Jhunjhunu water supply and sewerage subproject.

Table 1: Applicable Environmental Regulations

Law	Description	Requirement
EIA Notification	The EIA Notification of 2006 set out the requirement for environmental assessment in India. Environmental Clearance is required for certain defined 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	Project is not a listed activity in Schedule I of this notification and hence environmental clearance is not required.

² Pali, Tonk, Ganganagar, Jhunjhunu, Bhilwara and Hanumangarh

Law	Description	Requirement
	impacts. Category A projects require Environmental Clearance from the Ministry of Environment and Forest (MoEF). Category B projects require Environmental Clearance from the State Environmental Impact Assessment Authority (SEIAA).	
Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments	<p>Act was enacted to provide for the prevention and control of water pollution and the maintaining or restoring of wholesomeness of water, by Central and State Pollution Control Boards and for conferring on and assigning to CPCB/SPCBs powers and functions relating to water pollution control.</p> <p>Control of water pollution is achieved through administering conditions imposed in consent issued under provision of the Water (Prevention and Control of Pollution) Act of 1974. These conditions regulate the quantity and quantity of effluent, the location of discharge and the frequency of monitoring of effluents. Any component of the subproject having the potential to generate sewage or trade effluent will come under its purview. Such projects have to obtain Consent For Establish (CFE) under Section 25 of the Act from Rajasthan Pollution Control Board (RPCB) before starting implementation and Consent For Operate (CFO) before commissioning.</p>	Not applicable
Air (Prevention and Control of Pollution) Act of 1981, Rules of 1982 and amendments.	<p>This Act was enacted to achieve prevention, control and abatement of air pollution activities by assigning regulatory powers to Central and State boards for all such functions. The Act also establishes ambient air quality standards</p> <p>The projects having potential to emit air pollutants into the atmosphere have to obtain CFE and CFO under Section 21 of the Act from RPCB The occupier of the project/facility has the responsibility to adopt necessary air pollution control measures for abating air pollution.</p>	Not applicable
Environment (Protection) Act, 1986 and CPCB Environmental Standards.	Emissions and discharges from the facilities to be created or refurbished or augmented shall comply with the notified standards	Appendix 2 provides applicable standards for ambient air quality.
Noise Pollution (Regulation and Control) Rules, 2000 amended up to 2010.	Rule 3 of the Act specifies ambient air quality standards in respect of noise for different areas/zones.	Appendix 3 provides applicable noise standards.
Ancient Monuments	The Act designates areas within 100 meters	There are no ASI protected

Law	Description	Requirement
and Archaeological Sites and Remains Act, 1958 and Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010	(m) of the “protected monument/area” as “prohibited area” and beyond that up to 200 m as “regulated area” respectively. No “construction” is permitted in the “prohibited area” and any construction activity in the “regulated area” requires prior permission of the Archaeological Survey of India (ASI).	monuments/sites in Jhunjhunu. Archeological potential is negligible. However, in case of chance finds, the contractors/PIU will be required to follow a protocol as defined in the Environmental Management Plan (EMP).
Rajasthan State Environment Policy, 2010 including And Rajasthan Environment Mission and Climate Change Agenda for Rajasthan (2010-14)	Follows the National Environment Policy, 2006 and core objectives and policies are: - Conserve and enhance environmental resources; assure environmental sustainability of key economic sectors; and, improve environmental governance and capacity building - it recommends specific strategies and actions to address the key environmental issues: water resources, desertification and land degradation, forest and biodiversity, air quality, climate change: adoption and mitigation, mining, industry, tourism, energy, urban development, etc. - Establishment of Environment Mission under the chairpersonship of the Chief Minister and a Steering Committee under the chairpersonship of Chief Secretary, Government of Rajasthan Tasks force set up for six key areas	- Project implementation should adhere to the policy aims of: conservation & enhancement of environmental resources, integration of environmental concerns into projects/plans, and capacity building in environmental management - under water sector, major concerns, as the policy notes, are: huge water losses & wastage, declining water availability, pollution - Relevant recommendations for the project include: control of losses, integrated water resources management, control of raw water pollution, reuse and recycling -avoid/minimize use of forest lands With reference to Climate change adoption & mitigation following should be considered in the project: - diminishing flows in surface water bodies, and groundwater depletion, and revival traditional water bodies as water sources (lakes/tanks) - equal stress on demand side management in water -minimize energy use - design energy efficiency systems-
The Rajasthan Monuments, Archaeological Sites and Antiquities Act, 1961; the Rajasthan Monuments, Archaeological Sites and Antiquities (amendment) Act 2007	Any construction/excavation work in the ‘protected area’ (as declared by GOR under the Act) requires priori permission of Department of Archeology & Museums -Application under the Rules shall be submitted to Director, State Archeological Department, at least 3 months prior to the work. Department provides conditional permission, including time for completion, procedures to be followed during the work and for chance finds etc.	There are no monuments in the town. However, in case of chance finds, the contractor/PIU will be required to follow a protocol as defined in the Environmental Management Plan (EMP).

Law	Description	Requirement
The Right to fair compensation and transparency in land acquisition, rehabilitation and resettlement Act, 2013	Private land acquisition is guided by the provisions and procedures of this Act.	Not applicable to this subproject as there is no private land acquisition or resettlement
Labor Laws	The contractor shall not make employment decisions based upon personal characteristics unrelated to job requirements. The contractor shall base the employment relationship upon equal opportunity and fair treatment, and shall not discriminate with respect to aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment or retirement, and discipline. The contractor shall provide equal wages and benefits to men and women for work of equal value or type.	Appendix 7 provides applicable labor laws including amendments issued from time to time applicable to establishments engaged in construction of civil works.
Biodiversity Act of 2002	The Biodiversity Act 2002 primarily addresses access to genetic resources and associated knowledge by foreign individuals, institutions or companies, to ensure equitable sharing of benefits arising out of the use of these resources and knowledge to the country and the people.	Not applicable
Ramsar Convention, 1971	The Ramsar Convention is an intergovernmental treaty that provides the framework for national action and international co-operation for the conservation and wise use of wetlands and their resources. India is one of the signatories to the treaty. The Ramsar convention made it mandatory for the signatory countries to include wetland conservation in their national land use plans.	There are no Ramsar sites in Jhunjhunu. Not applicable to Jhunjhunu water supply and sewerage subproject
Wildlife Protection Act, 1972	This overarching Act provides protection to wild animals, birds, plants and matters connected with habitat protection, processes to declare protected areas, regulation of wildlife trade, constitution of state and national board for wildlife, zoo authority, tiger conservation authority, penalty clauses and other important regulations.	Not applicable
Forest (Conservation) Act, 1980	The Forest (Conservation) Act prohibits the use of forest land for non-forest purposes without the approval of Ministry of Environment and Forests (MoEF), Government of India	Not applicable
Rajasthan Forest Act, 1953 and Rajasthan Forest	This Act makes the basis for declaration of Reserved Forests, constitution of village forest committees, management of reserved	Not applicable

Law	Description	Requirement
Rules, 1962	forests and penalties and procedures.	

5. The ADB guidelines stipulate addressing environmental concerns, if any, of a proposed activity in the initial stages of project preparation. For this, the ADB SPS categorizes the proposed projects into various categories (A, B or C) to determine the level of environmental assessment required to address the potential impacts. Level of environmental assessment required for each category is presented below.

- (i) **Category A:** Projects with potential for significant adverse environmental impacts. An Environmental Impact Assessment (EIA) is required to address significant impacts.
- (ii) **Category B:** Projects likely to have some adverse environmental impacts, but of lesser degree and/or significance than those for Category A. An initial environmental examination (IEE) is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.
- (iii) **Category C:** Projects unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are still reviewed.

6. The environmental impacts of Jhunjhunu water supply and sewerage subproject have been identified and assessed as part of the planning and design process. An environmental assessment using ADB's Rapid Environmental Assessment Checklist for Water Supply and Sewerage (**Appendix 1**) was conducted, and results of the assessment show that the subproject is unlikely to cause significant adverse impacts. Thus, this IEE has been prepared in accordance with ADB SPS's requirements for environment category B projects.

D. Scope of IEE

7. The IEE was based mainly on secondary sources of information and field reconnaissance surveys; no field monitoring (environmental) survey was conducted. Stakeholder consultation was an integral part of the IEE.

E. Report Structure

8. This Report contains nine sections: (i) executive summary; (ii) introduction and regulatory framework (iii) description of the project (iv) description of the environment; (v) anticipated environmental impacts and mitigation measures; (vi) public consultation and information disclosure; (vii) grievance redress mechanism; (viii) environmental management plan, and, (ix) conclusion and recommendation.

II. DESCRIPTION OF THE PROJECT

9. Jhunjhunu is situated in the North-Eastern part of Rajasthan State. It is the administrative headquarters of Jhunjhunu District. The town is located 28.13° Northern latitude and 75.4° Eastern longitude. Jhunjhunu is well connected by road and by railway line to Jaipur, New Delhi and other parts of the state and the country. It is located about 184 km from Jaipur and about 250 km from New Delhi. Total area under the jurisdiction of Jhunjhunu Nagar Parishad spreads is 70.12 sq. km and houses a population of 118,473 (2011 census).

A. Present Situation

10. **Water Supply.** At present, the Jhunjhunu city meets the water demand from 116 tube wells. At present, ground water is available in sufficient quantity for domestic purposes at depth around 45 m throughout the year. The PHED is supplying about 12.1 MLD of water from ground water sources, at the rate of 94 (gross) LPCD daily. There are 15 service reservoirs with total capacity of 4.59 ML and 9 CWRs with a total capacity of 3.19 ML. A distribution network of 265 km with 17820 house connections exists in Jhunjhunu. Water is supplied alternative day for about 30 to 90 minutes. There is no water treatment plant in Jhunjhunu at present. The raw water is being extracting from tube well and supplied without treatment. The ground water in and around Jhunjhunu requires prior treatment for human consumption as Nitrate concentration is exceeding permissible limit in Northern block of Jhunjhunu. Fluoride content ranges from 0.12 to a maximum of 15.3 mg/l in Jhunjhunu.

11. While gross water supply rate is over 94 litres per capita per day (LPCD), the water provided at consumer end is about 55 LPCD only, which is less than standard of 135 LPCD. This is due to heavy losses in the existing distribution network (41%)The water transmission and distribution network consisting AC pipes is old, profusely leaking and is badly in need of rehabilitation and replacement.

12. **Sewerage.** There is no sewerage system is in place in Jhunjhunu. The sewage and sullage are being let into the open drains or on ground, which pollutes the environment and contaminates the ground water. Open defecation is not uncommon. Most of the residential and commercial buildings and educational institutions have on-site septic tanks and soak pits. Though septic tanks is an accepted onsite treatment, as the septic tanks are not designed and maintained properly, the effluent does not confirm to the standards. The effluent from the septic tanks is directly let into the open drains. Wastewater from most part of the town is being disposed into a pond near Khemi Sati Devi Mandir. Wastewater from northern part of the town is being disposed into agricultural fields. The wastewater from kitchens & bathrooms is discharged into storm water drains culminating finally to the Nallah. Since there is no soak pit arrangement, effluent from septic tanks is directly let into open drains. Due to poor maintenance, septic tanks do not function properly and often overflow into drains

B. Infrastructure Improvements Proposed in Jhunjhunu under RUSDP

13. **Water Supply.** The projected water demand of Jhunjhunu for the years of 2016 (base), 2031 (intermediate) and 2046 (ultimate) with a supply rate of 135 lpcd is estimated as 19.82, 24.73 and 30.59 MLD respectively. As the distribution mains consists of about 92% of AC pipes, frequent bursting, leaking occurs, which leads to high percentage of NRW. The water transmission and distribution network is old, profusely leaking and is badly in need of rehabilitation and replacement. Therefore, distribution system improvement and augmentation with NRW management is identified as the focus area for investment in Jhunjhunu under RUSDP.

14. One comprehensive water supply project to draw water from Kummaram lift canal and treat it in a WTP of 156 Mld capacity and supply to Jhunjhunu and other four towns and villages is in progress and is expected to be completed by December, 2015. A quantity of 23 MLD has been allocated To Jhunjhunu Town, which will cater the needs up to year 2031. No provision has been made to improve the distribution network. In RUSDP, it is proposed to replace the AC pipes with PE pipes with electrofusion joints and electrofusion saddles for house connections. Thereby, the NRW will be brought down to 15% and duration of supply will be increased. The

new distribution system will be conveniently divided into District Metering Areas consisting about 500 to 700 connections with flow from one direction to facilitate monitoring of NRW. Project will also provide bulk water meters at entry of each DMA and house service connections with consumer water meters.

15. **Sewerage.** A comprehensive sewerage system is being executed adopting design year as 2039. In Phase – I, 105 km of sewer network and 8.5 MLD capacity STP is under execution, which is likely to be completed by the mid of 2015. At present, 85 percent of work has been executed.

16. It is proposed to provide sewerage network in the remaining areas, which are uncovered by the above project. With this the sewerage system will cover entire town, barring areas with low population density (100 persons/hectare). Of the total base year population (2016) of 1,27,651, the subproject will cover 80% of the population and the rest 20% population, residing in the outer areas with low population density, will continue to depend on individual septic tank and soak pit arrangements. The sewer system will be designed as a separate sewer system that carries only the domestic wastewater, the open drain system that exists in the town will cater to storm runoff. No additional sewage treatment facility is necessary, as the capacity of STP under construction (8.5 MLD) is adequate to meet the immediate demand. As and when the sewage generation increases, the STP capacity can be enhanced gradually to 15, 19 to 24 MLD by 2046 by establishing suitable modules.

17. This subproject complies with the environmental subproject selection criteria agreed between the government and the ADB (Compliance checklist is at Appendix 7). Following Table 2 shows the nature and size of the various components of the subproject. Conceptual layout plans are shown in Figure 1 and Figure 2.

Table 2: Proposed Water Supply & Sewerage Subproject & Components

Infrastructure	Function	Description	Location
1. Water Supply			
Distribution network Improvement	To distribute water from service reservoirs to consumers	<i>Replacement-</i> 265 km 63-600 mm dia DI/PE pipes <i>New</i> 159 km 63-600 mm dia DI/PE pipes	Pipes will be laid underground' along the roads; this work will cover entire town as all the existing pipes is proposed to be replaced, and in currently uncovered areas new pipes will be laid About 92% of exiting pipes are of AC; and therefore existing pipes will be left as it is in the ground untouched.
Bulk Water Meters	Monitor water flow in the improved network	<i>New</i> 46 no,s Bulk Meters	Fixed at strategic locations at source, CWR and network
Domestic Meters	Monitor & regulate water usage by consumers and improve cost recovery	<i>New</i> 30341 Domestic Meters,	Meters will be attached to the water delivery pipe at each house with meter chamber

2. Sewerage			
Sewer network and house connections	Collect wastewater from dwelling units and convey by gravity to the STP	New 171 km; 200 to 900 mm diameter DWC pipes for sewers and MDPE for house connections	Sewers will be laid underground along the roads in the town. The work will extend to the outer areas, where sewers are not laid under the ongoing project

18. Excavation for the pipe/sewer laying works will be undertaken through open trenching, which will be maximum width of 1 m only on one side of the road ROW with maximum length, an average 130 m per day for water supply lines and 60 m for sewers. Excavation, laying of pipes and backfilling will be completed within the day. Subsequent to completion of works, road reinstatement will be undertaken by the contractor as part of the civil works. The same shall be mentioned in the bid document to make it binding on the contractor.

19. The subproject is primarily designed to improve environmental quality and living conditions of Jhunjhunu through provision of water supply and sewerage. The benefits arising from this subproject include: (i) increased availability of potable water at appropriate pressure to all households including urban poor; (ii) reduced time and costs in accessing alternative sources of water. (iii) better public health particularly reduction in waterborne and infectious diseases; (iv) reduced risk of groundwater contamination; (v) reduced risk of contamination of treated water supplies; and, (vi) improvement in quality of water bodies due to disposal of treated effluent meeting disposal standards.

C. Energy Efficiency Measures included in the subproject

20. Both the water supply and sewer network in Jhunjhunu are designed with utmost consideration to energy efficiency. Gravity flow systems adopted. In existing water supply system, water losses (UFW) are very high, reducing the losses and improving the efficiency of the system is identified as the most important component under RUSDP. This is considered as an alternative for source development/augmentation.

21. To make the project energy efficient, as part of this PPTA, "Guidelines for Adopting Eco-Friendly and Energy Efficient Equipment and Facilities in the Design of the Sub-Projects" have been prepared and is being followed in the design of the projects. Accordingly, energy efficiency measures are being considered and incorporated into the subproject designs where appropriate.

D. Investment Program Implementation Schedule

22. The detailed design of this subproject will be completed by June 2015. After the approval, bid will be prepared and tenders invited by September 2015, and the contract will be awarded by February 2016. Construction is likely to start in March 2016, and will take about 36 months, i.e. the construction work is likely to be completed by March 2019.

Figure 1: Proposed Distribution Network Improvement

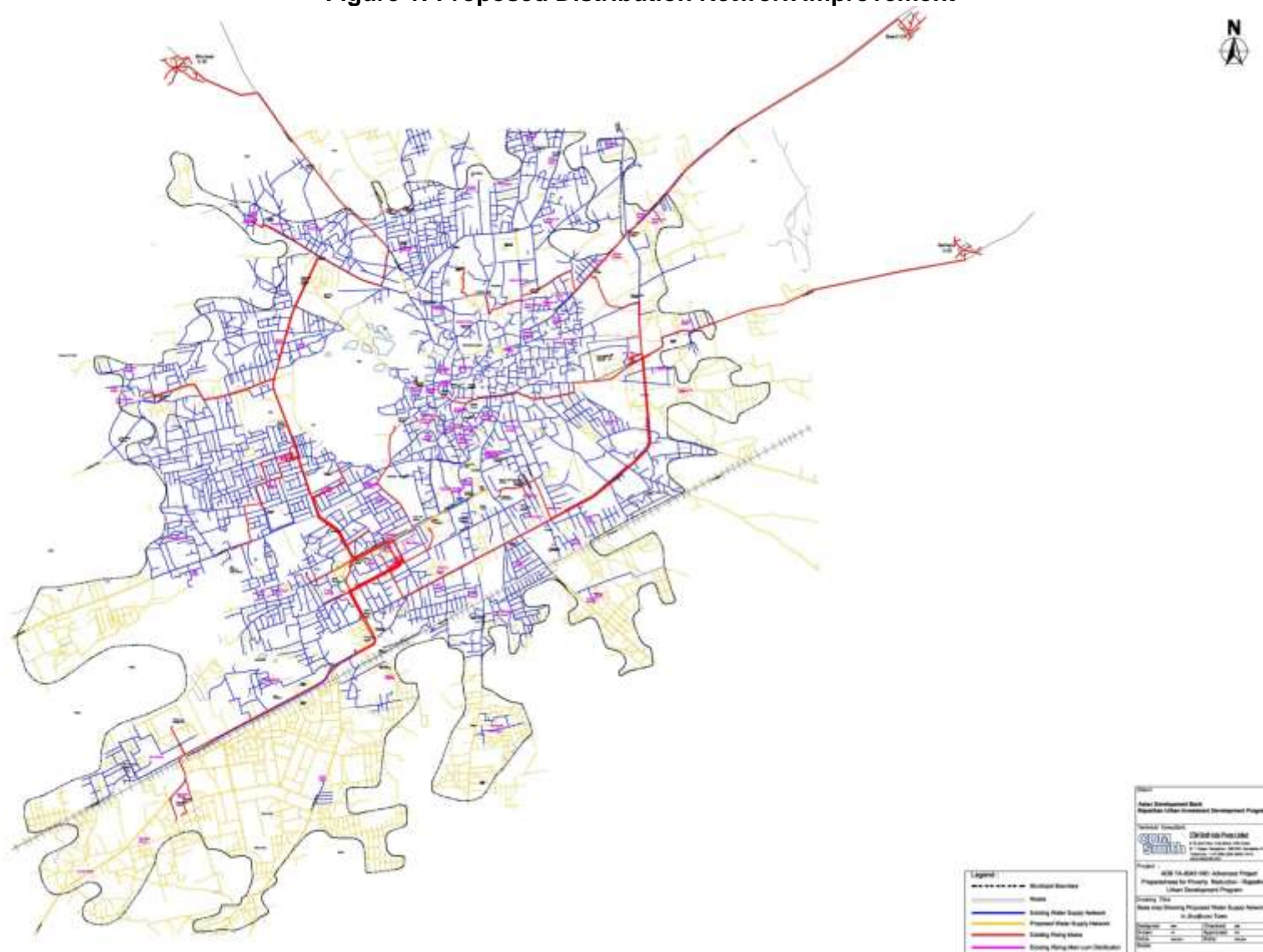
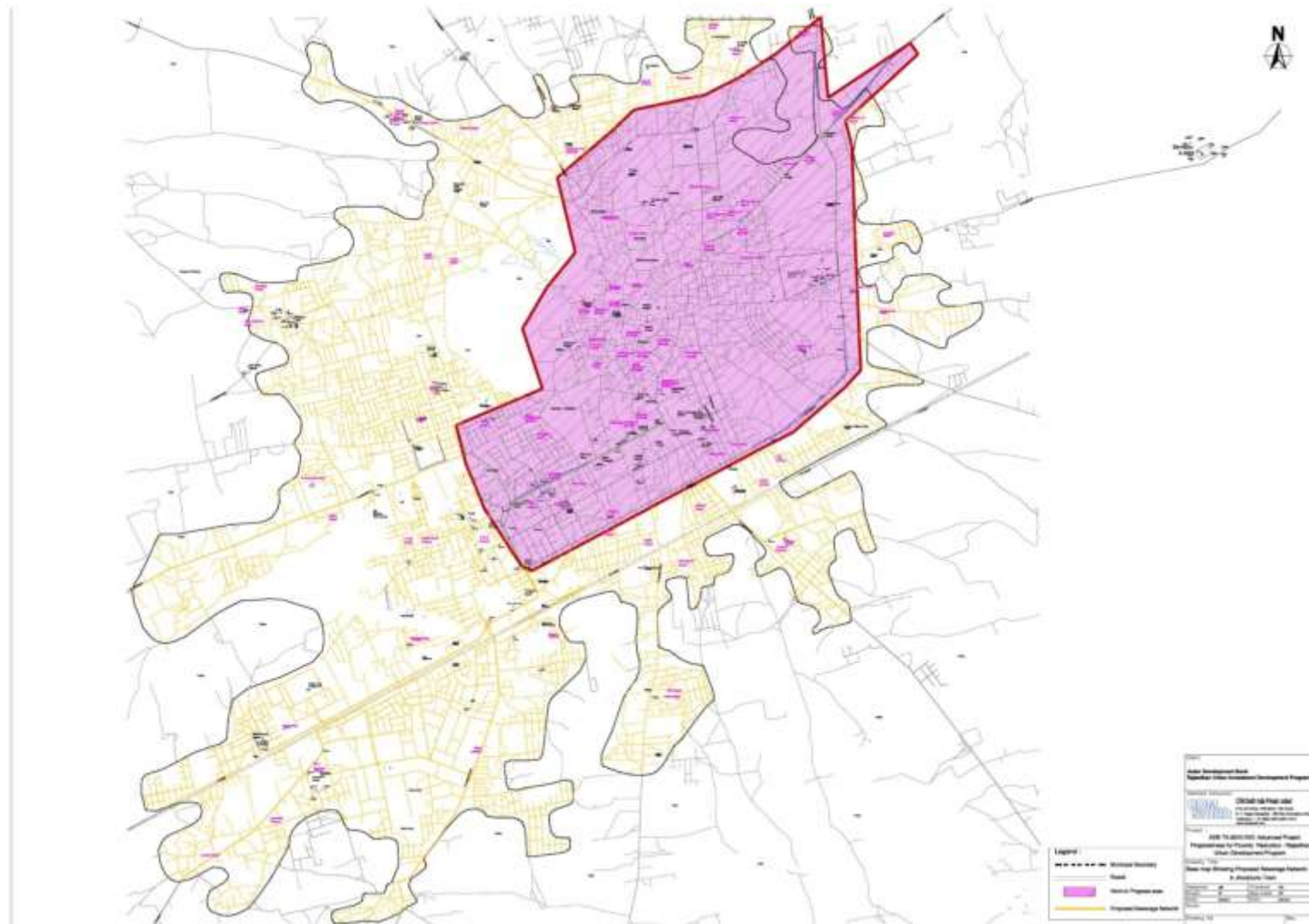


Figure 2: Proposed Sewer Network Coverage



III. DESCRIPTION OF THE ENVIRONMENT

A. Physical Resources

1. Location, Area & Connectivity

23. Jhunjhunu District is situated in the North-Eastern part of Rajasthan State. It is the administrative headquarters of Jhunjhunu District. Geographically, Jhunjhunu is located at 28.13° north latitude and 75.4° east longitude. The district is surrounded by Churu District on the northwestern side, Hissar and Mahendragarh District of Haryana State in the northeastern part and by Sikar District in the west and south. Jhunjhunu Town is well connected by road to Jaipur, and other parts of the state. It is located about 180 km from Jaipur and about 245km from New Delhi. Jhunjhunu is also connected by railway. The nearest airport is at Jaipur.

24. Municipal area, under the jurisdiction of Jhunjhunu Municipal Council (JMC), is 49.60 sq. km, divided into 45 wards for administrative purpose. The population as per 2011 census is 118,473.

2. Topography, Soils and Geology

25. Jhunjhunu falls under the desert plain lying at an altitude of around 300m above the mean sea level (MSL). The general slope of the area is from south to north. Most of the part of the district is characterized by blow sand and dunes which for part of the Great Thar Desert sand, and the shifting and active dunes are main hazards to cultivation. Soil erosion is prevalent resulting from deforestation and high winds. Town is dotted some hilly areas. Nehara Pahar (Nehara Hill) occupies considerable land area in the western part of the town. Due to large scale mining most of the hill is reduced, mostly to open pits. Modiya Pahar (Modiya Hill) is another hilly areas located in the northern outskirts of the town. Rest of the area is plain and mostly covered with sand. Desert soil occurs extensively in the areas covering Jhunjhunu town. Soils are yellowish brown, sandy to sandy loam, loose, structure less, well drained with high permeability. Part of Jhunjhunu district is also covered by red desert soil. These are pale brown to reddish brown, structure less, loose and well drained having texture from sandy loam to sandy clay loam. They are suitable for agriculture but suffer from adverse climatic conditions. As stated above, major part of the district is covered by blow sand. A small area in the eastern part of the district is occupied exclusively by the rocks of Delhi super group and later intrusive. The Delhi super group is represented by quartzite, phyllite/ schist, gneisses and limestone and granites, pegmatite and amphibolite of Post Delhi Intrusive. Jhunjhunu Town is mostly covered with blow sand and alluvium.

3. Seismology

26. As per the seismic zoning map of India, Jhunjhunu falls partly under the Zone II and Zone III. Zone II is the “low damage risk zone” and Zone III is the “moderate damage risk zone”.

4. Climatic Conditions

27. Jhunjhunu experiences semi-arid and dry climate characterized by hot summers, cold winters with low rainfall during south-west monsoon period. The summer seasons are long starting in the month of March and ends in the month of June. Temperatures range from a minimum of 32°C and can rise up to a maximum of 47°C; this couple with the dry weather, the conditions during summers is very harsh. The temperature in winter dips down to as low as 2°C.

Jhunjhunu receives rainfall mainly under the influence of southwest monsoon between July and September. Annual average rainfall is 492 mm. Rainfall in the recent years increased significantly, and the average rainfall for the period of 2008-2013 is 545 mm. However, rainfall also shown large fluctuations year-on-year. In the last six years, 3 years (2008, 2009 & 2012) experienced higher rainfall while the other 3 years (2010, 2011 & 2013) the rainfall was much below the average. Following Table shows the average climate data of Jhunjhunu, both the long-term and short-term.

Table 3: Climate Data of Jhunjhunu

Month	Long Term average (1970-2000)					Short term average (2008-13)		
	Min. Temp (°c)	Max. Temp (°c)	Avg. RH (%)	Wind Speed (kmph)	Rain (mm)	Min. Temp (°c)	Max. Temp (°c)	Rain (mm)
Jan	5.0	22.0	60.6	4.1	9.2	1.9	27.7	5.1
Feb	8.0	24.8	52.9	4.8	10.1	4.3	33.9	9.1
Mar	13.6	31.1	44.9	5.2	7.3	10.6	40.2	6.7
Apr	19.5	37.2	34.4	5.8	5.4	15.8	44.9	12.9
May	24.5	40.8	35.6	6.9	22.2	22.0	46.6	26.0
Jun	27.1	40.3	65.2	7.7	47.2	19.5	46.4	60.5
Jul	26.2	36.2	68.0	6.9	155	24.2	44.0	120.2
Aug	25.2	34.8	73.2	5.6	147.7	24.4	38.3	169.0
Sep	23.0	35.5	64.1	5.3	67.3	21.4	39.4	117.7
Oct	17.6	34.9	48.5	4.0	10.9	15.3	38.8	3.1
Nov	11.3	29.9	48.8	3.4	3.7	9.7	34.4	8.5
Dec	6.2	24.5	56.8	3.5	6.6	3.7	29.8	6.6
	17.3	31.7	54.4	5.3	492.6	1.9	46.6	545.4

5. Surface Water

28. Owing to its location in desert region, with dry and low rainfall climate, there are no notable natural water bodies in the town or region. Jhunjhunu District falls under Sekhawati basin and north western part falls outside the basin and has inland drainage. Most of the district is drained by Kantli River, while south eastern part is drained by Singhana River and a small area in south western corner of district is drained by Budhi nala. The south and east of hill ranges in Khetri area is drained by Dohana River. All the rivers/nalas are ephemeral in nature and flow in response to heavy precipitation during monsoon. Being mostly desertic terrain, Northern part of the district, where Jhunjhunu Town is located, has inland drainage and rainwater is mostly collected in depressions. Due to lack of sewerage system, wastewater from the town flows in open drains and accumulates in these depressions at several places.

6. Groundwater

29. Quaternary alluvium is the principal water bearing formation in Jhunjhunu District. Besides, hard rocks of Delhi Super Group including post Delhi Intrusive form ancillary aquifers in Jhunjhunu. Alluvium (composed of sand, silt, clay, kankar and gravel) forms the principal and potential aquifer in the area. Area and thickness of sediments varies widely from 15 to 140 m whereas saturated thickness varies from 30 to 70m .Ground water occurs under unconfined to semi-confined conditions in the primary porosity i.e. pore spaces. Aquifer system is present to a depth of 100 m in general. The depth to water level varies from 7.53 to 75 m below ground level. In Jhunujhunu town, groundwater occurs under alluvial conditions and thickness of alluvium ranges from 80 to 100 m. Groundwater table is very deep in the town, and ranges between 70 to 80 m.

30. According to Central Ground Water Board (CGWB) Report of Jhunjhunu District (2008), ground water is alkaline in nature. The electrical conductivity ranges between 450 and 3000 ms/cm. Fluoride and Nitrate concentration is more than permissible limit (1.5 mg/l and 45 mg/l respectively) in some of parts of Jhunjhunu Town and also in some other parts of the district..

7. Air Quality

31. Ambient air quality in Rajasthan is monitored by Rajasthan Pollution Control Board. However, there is no at present there is no monitoring station in Jhunjhunu, and therefore no data on ambient air quality available. Due to the location in dry semi-arid zone coupled with dust storms, especially during summer the months, the particulate matter in ambient air is likely to be high. The roads are not in good condition, traffic on these roads and winds are the main source of dust generation. Industrial development in the town is limited few small scale industries, and therefore air pollution from industrial activity is negligible.

B. Ecological Resources

32. Due to harsh physiographic and climatic condition, the forest and other ecological resources in Jhunjhunu District is limited. About 6.8% of total area of district is under forest cover. These are open forests with very less tree cover and the vegetation is characterized by tropical thorn species and tropical dry-deciduous species represented by *Prosopis cineraria*, *Acacia leucophloea*, *Acacia nilotica*, *Salvadora oleoides*, *Capparis decidua*, *Opuntia* species, *Tephrosia purpuria*, *Aerva persica*, *Cenchrus ciliaris* etc. Having the blend of varied habitat types, there is rich diversity of bird species in Jhunjhunu district. Some of the most common birds found in Jhunjhunu are Grey Francolin, Black Francolin, Indian Peacock, Yellow-Crowned Woodpecker, Asian Koel, Spotted Owlet, Spotted Dove, Black Kite, and White-Throated Kingfisher.

33. One such open forest is situated in northeastern outskirts of Jhunjhunu Town. This forest is spread on the both sides of State Highway 8 (SH8). This is open forest is covered mostly with tree species of Jaal (*Salvadora oleoides*), Babul (*Acacia nilotica*) and Khair (*Acasia catechu*), which are suitable for this kind of sandy regions with dry climate during the most part of the year. Wildlife includes nilgai antelope (Indian blue bull), deer, rabbit, peacock etc. None of the subproject components are located in or close to the forest area.

34. Proposed subproject components are located in the Jhunjhunu town area, an urban area located in arid dry desertic zone covered mostly with sand and, surrounded by a harsh desert environment of wind-blown sand and dunes. The municipal area includes large swathes of uninhabited rocky hills and sand dunes, with alluvial soil and sand in the intervening valleys, which are cultivated where there is enough rain. Natural vegetation is very limited, and consists of mainly sparse, scattered shrubs and grasses. The fauna of the town comprises mainly domesticated animals. Within the town, tree cover is very limited.

C. Economic Development

1. Land use

35. According to the existing land use data, of the total 1628 ha area, 70.7% is developed area and the remaining undeveloped area consists of forest area, water bodies, vacant land and agricultural land. Predominant land use is residential (41.8%).

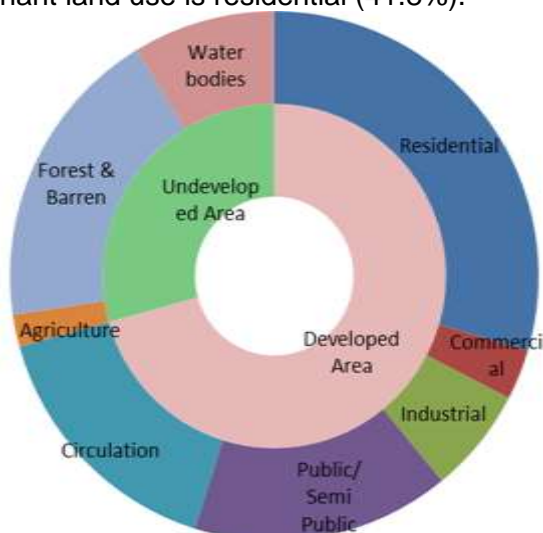


Table 5: Existing Land Use of Jhunjhunu Town (2011)

S. No	Land use	Area	Developed Area	Urbanizable Area
		Ha	%	%
1	Residential	481	41.8	29.5
2	Commercial	50	4.3	3.1
3	Industrial	105	9.1	6.4
4	Recreation	22	1.9	1.4
5	Public & Semi-public	235	20.4	14.4
6	Circulation	258	22.4	15.8
	Sub Total (Developed Area)	1,151	100.0	70.7
8	Forest Land & Barren	303		18.6
9	Agriculture	32		2.0
10	Water Bodies	142		8.7
	Total (Urbanizable Area)	1,628		100.0

2. Industry & Agriculture

36. Industrial development in Jhunjhunu is limited. Availability of mineral resources, which includes both metallic and non-metallic, in the district has led to development of mineral based industries. The metallic minerals include copper and iron ore whereas the non-metallic minerals include calcite, dolomite, soapstone and fireclay. In Jhunjhunu district Rajasthan State Industrial Development and Investment Corporation (RIICO) has developed four industrial areas viz., Jhunjhunu, Chirawa, Pilani and Singhana. In Jhunjhunu city RIICO has established industrial estates in three phases. The district houses about 394 industrial units of which about 225 small and micro industrial units are located in and around Jhunjhunu city. Out of these 394 units, two are large-scale units, which are mainly into copper related production and oxygen cylinders

manufacturing units.

37. On the basis of climatic conditions and prevailing agricultural practices, Jhunjhun district falls under Internal Drainage Dry Zone as per the agro-climatic classification. The area is covered in sand dunes and inter-dunal sandy plains. Climatically, this zone is slightly wetter as compared to the western arid zone. Kharif (April to September) season cultivation is rain-fed and Rabi (October to March) cultivation is mostly based on ground water. The main kharif crops grown in the area are Bajra, Guar, Cow Pea (Chola), Moong, Moth whereas principal rabi crops are Wheat, Gram, Mustard etc. In the town, about 2% of the land is under cultivation.

3. Infrastructure

38. **Water Supply.** Ground water is the only source available for serving drinking water needs to Jhunjhunu town. Currently, the PHED is extracting ground water of around 12 MLD from 116 tube wells. There is no water treatment plant in Jhunjhunu at present. The raw water is being extracting from tube well and supplied. As per the Census 2011 population, PHED is supplying water at a rate of (gross) 94 LPCD to the town. Jhunjhunu has 64 percent of storage capacity over daily supply of water with distribution network of 265 km (transmission/rising main is around 51 km) and 17,820 house service connections.

39. **Sewerage.** Presently, the town lacks a comprehensive sewerage system. The sewage is either drained in roadside open drains/nallas or soak pit outside houses or ponds. Wastewater from most part of the town is disposed into either road side drains or in a pond near Khemi Sati Devi Mandir .Wastewater from northern part of the town is disposed into agricultural fields. The number of household having access to individual sanitation facilities is 18,225. Nagar Parishad has constructed 4 public conveniences with a total capacity of 35 seats but due to lack of maintenance, most of these public conveniences are in unhygienic condition. Jhunjhunu Nagar Parishad prepared DPR for Sewerage system in Jhunjhunu. Sewer network of 315 km and a STP capacity of 8.5 MLD have been proposed. This is presently under implementation.

40. **Solid Waste Management.** The total solid waste generation in the town is about 43 tons per day. The rate of door-to-door collection of SWM in Jhunjhunu town is very poor and only about 6% households are being served by this system. Waste is mostly collected through roadside bins and street sweeping. From secondary collection point, wastes are transported to existing open disposal sites on the city outskirts near bypass road. There is sanitary landfill facility in the town.

41. **Storm Water Drainage.** Drains have been provided in piecemeal approach. There are four major natural drains measuring about 3.01 km in length flowing through the town. The drains primarily carry sullage and sewerage let out by the households and finally discharges them into natural streams. The total length of roadside drains in the town is 111.2 km, which is about 67 percent of the total length of roads. It is proposed to rehabilitate existing pucca drains; construction of primary, secondary and major drains totaling to 400 km; and provide rainwater harvesting structures at places of flooding. The total investment estimated for drainage improvements is INR 2,434.78 million (including physical contingency and excludes price contingency).

42. **Power Supply.** Thermal power is the main source of energy in Rajasthan, contributing nearly 90% of the electricity, compared to hydropower, which produces the remainder. State-level companies (Rajya Vidyut Utpadan Nigam Ltd, RVUN; and Rajya Vidyut Prasaran Nigam Ltd, RVPN) are responsible for power generation and transmission respectively, and distribution

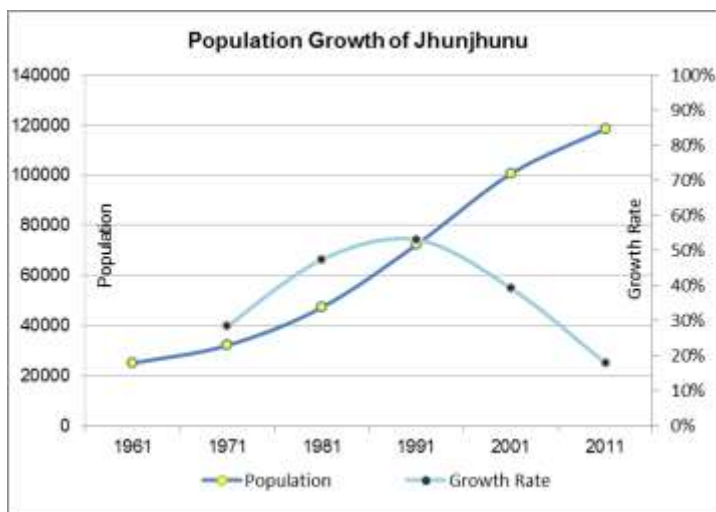
is provided by a regional company, the Jaipur Vidyut Vitaran Nigam Limited (JVVNL). Power is supplied from the central grid by overhead cables carried on metal and concrete poles, mainly located in public areas alongside roads. The power supply in the state is continuous and reliable, except in warmer months with periodic outages in warmer months, and large fluctuations in voltage.

43. **Transport.** Total length of roads in Jhunjhunu is 394 km consisting of BT road, cement concrete and WBM roads. Jhunjhunu is broadly radial in its urban form with Jaipur Road (SH-08), Udaipurwati Road (SH-37), Loharu Road (SH-08), Rajgarh Road (SH-41), Bissau Road (SH-37) and Mandawa Road (SH-41) being the six major radial roads passing through the City. Other roads radiating from the City are Mandrella Road, Bajla Road, Derwala Road, Bakara Road and Bharonda Kalan Road. The total length of roads in Jhunjhunu is 394 km. Panch Dev Road, Modi Road, Station Road and Bus Stand Road are the main hubs of the commercial activities with retail shops on both sides and are usually congested due to large volume of traffic. Collectorate Circle, busiest junction in the city, is the hub of the city. Old State Highway. 8 provides access to both Bus Stand and Railway Station. Two-wheelers, cycles and shared auto rickshaw form the major motorized modes of transport in the city. There is no dedicated off-street parking facility in the city. Of the total length of the road network in Jhunjhunu, 41% are black topped roads, 8% cement concrete roads, 37% WBM roads and 14% Kutcha roads. The roads in the centre of the town including near the bus stand, are very narrow and congested with traffic, pedestrian and various activities, while the roads on outer areas are very wide and carry less traffic.

D. Socio Cultural Resources

1. Demography

44. Jhunjhunu population, as per 2011 census, is 118,473, grown from 100,476 in 2001, registering a compounded annual growth rate of 1.66% (decadal growth of 17.9%), which is lower than the state compounded annual growth rate of 2.60% during the same decade. As presented in the Chart below, the rate of decadal growth rate and compounded annual growth rate over the last two decades has shown a decreasing trend. Gross population density of the town is 2,389 persons per sq.km.



Population density varies widely across the town – JMC area is divided in to 45 wards, out of which 12 wards are experiencing high densities, 7 wards are experiencing medium density and rest of them are low dense area wards (i.e. 26 wards). Highest population density is in ward no. 29 (680person/ha) and the lowest is in wards 41 and 45 (5 persons/ha). Average household size of Jhunjhunu is 5.9.

45. Sex ratio of the town is 925 females per 1000 males. This is lower than Jhunjhunu district's sex ratio (950), and the state-level figure of 928. Literacy rate is 63.2% (Census 2011), which is slighter lower than the state literacy rate of 66.11%. In Jhunjhunu, male and female

literacy rate is recorded at 71.39% and 54.35% respectively. Scheduled Caste (SC) and Scheduled Tribe (ST) population comprises 10.98 percent and 0.39 percent of the total population respectively. Workforce participation rate in Jhunjhunu is 27.39 percent, which is lesser than the State level WPR of 29.6%.

46. Largest proportion of population comprises Hindus, Muslims and Jains. Main languages spoken are Ahirwati, Bagri and Hindi.

2. History, Culture and Tourism

47. Jhunjhunu falls under the Shekhawati Region. This area was ruled by Chauhan Dynasty in 1045 AD. In the year 1450, Mohammed Khan defeated the Chauhans and conquered Jhunjhunu and became the first Nawab of Jhunjhunu. Then his son Samas Khan ascended the throne in the year 1459. Samas Khan founded the village Samaspur and constructed Samas Talab. Rohilla Khan was the last Nawab of Jhunjhunu. Subsequently, Jujhar Singh Nehra, a Jat chieftain, who worked at high positions in the Nawab's Army, fought against Nawabs with the help of Rajputs and defeated Nawabs. The Hindu rulers constructed several temples in and around Jhunjhunu. People of the region are considered to be warriors and brave; huge numbers of people from this area serve in Armed Forces.

48. **Tourism:** Shekhawati region is known as the "land of Kings and Queens". There are various tourist attractions in and around Jhunjhunu and the district is famous for its Havelis and Temples. There are however no state or central protected monuments or archeological sites in Jhunjhunu Town, and tourist flow into the town is limited. Following are the tourist attractions located within the town. None of the subproject components interfere with these places.

- (i) **The Rani Sati Temple:** This historic temple is one of the most popular temples in Rajasthan state. It was established in early nineteenth century and has become a major tourist attraction.
- (ii) **Bihariji Temple:** It is another major tourist attraction in Jhunjhunu. The Bihariji temple is quite famous for its antique and historic paintings. The temple has some artistic wall paintings on display which draw the attention of tourists. The temple is dedicated to Bihariji and huge numbers of devotees visit this temple every day.
- (iii) **Seth Ishwardad Mohandal Modi Haveli:** Situated in the heart of the town, it is an ornamental mansion of the erstwhile rich, and is covered with murals.

E. Environmental Settings of Investment Program Component Sites

49. The subproject includes laying of water supply pipes and sewer network in the municipal area of Jhunjhunu. Pipes and sewers will be laid along the roads/streets in the town within the road right of way (ROW). In wider roads pipes/sewers will be laid in the road shoulder beside the tarmac, and in narrow roads, where there is no space, pipes/sewers will be laid in the road carriage way by break opening the tarmac. Roads in some part of the town are narrow. Roads are lined both sides with open drains. In narrow roads pipes/sewers will be laid in the middle of the road, which may affect the traffic. Bigger diameter strategic water mains and trunk sewers will be laid along the main roads, which are wide and have adequate space. No tree cutting is anticipated as there is adequate space to lay the sewer/pipelines in those roads.

IV. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Introduction

50. Potential environmental impacts of the proposed infrastructure components are presented in this section. Mitigation measures to minimize/mitigate negative impacts, if any, are recommended along with the agency responsible for implementation. Monitoring actions to be conducted during the implementation phase is also recommended to reduce the impact.

51. Screening of potential environmental impacts are categorized into four categories considering subproject phases: location impacts and design impacts (pre-construction phase), construction phase impacts and operations and maintenance phase impacts.

- a. **Location impacts** include impacts associated with site selection and include loss of on-site biophysical array and encroachment either directly or indirectly on adjacent environments. It also includes impacts on people who will lose their livelihood or any other structures by the development of that site.
- b. **Design impacts** include impacts arising from Investment Program design, including technology used, scale of operation/throughput, waste production, discharge specifications, pollution sources and ancillary services.
- c. **Construction impacts** include impacts caused by site clearing, earthworks, machinery, vehicles and workers. Construction site impacts include erosion, dust, noise, traffic congestion and waste production.
- d. **O&M impacts** include impacts arising from the operation and maintenance activities of the infrastructure facility. These include routine management of operational waste streams, and occupational health and safety issues.

52. Screening of environmental impacts has been based on the impact magnitude (negligible/moderate/severe – in the order of increasing degree) and impact duration (temporary/permanent).

53. This section of the IEE reviews possible project-related impacts, in order to identify issues requiring further attention and screen out issues of no relevance. ADB SPS (2009) require that impacts and risks will be analyzed during pre-construction, construction, and operational stages in the context of the project's area of influence.

54. The ADB Rapid Environmental Assessment Checklist in http://www.adb.org/documents/guidelines/environmental_assessment/eaguidelines002.asp has been used to screen the project for environmental impacts and to determine the scope of the IEE.

55. In the case of this project (i) most of the individual elements are relatively small and involve straight forward construction and operation, so impacts will be mainly localized and not greatly significant; (ii) most of the predicted impacts are associated with the construction process, and are produced because that process is invasive, involving excavation and earth movements; and (iii) being located in an urban area, will not cause direct impact on biodiversity values. The project will be in properties held by the local government and access to the project location is through public rights-of-way and existing roads hence, land acquisition and encroachment on private property will not occur.

B. Pre-Construction Impacts

56. **Design of the Proposed Components.** The Central Public Health and Environmental Engineering Organization (CPHEEO) manual suggests a design period of 15/30 years³ in general while designing the systems for water supply and sewerage components. It is proposed to consider 2046 as the design year for all the components in order to maintain unanimity in the design period and design population. Accordingly, 2016 shall be the base year and 2031 the intermediate year to cross check the designs pertaining to intermediate demand.

57. One of the critical aspects in sewerage system operation is, change in raw sewage characteristics at inlet of sewage treatment plant may affect the process and output quality. STPs are designed for municipal wastewater, which does not include industrial effluent. Characteristics of industrial effluent widely vary depending on the type of industry, and therefore disposal of effluent into sewers may greatly vary the inlet quality at STP, and will upset process and affect the efficiency. Although legally the disposal of effluent meeting certain standards is allowed into municipal sewers (refer **Appendix 4**), the monitoring of the same is not-practical. Industrial development in Jhunjhunu is very limited; there are no notable industries in town with problematic water discharges. However considering the future development potential, following measures should be incorporated:

- (i) No industrial wastewater shall be allowed to dispose into municipal sewers
- (ii) No domestic wastewater from industrial units shall be allowed into municipal sewers
- (iii) Ensure that there is no illegal discharge through manholes or inspection chambers
- (iv) Conduct public awareness programs; in coordination with RPCB, issue notice to all industries for compliance
- (v) Conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated effluent quality complies with the standards

58. **Sewer system – collection & conveyance.** The sewerage system is designed as a separate system of sewage collection (i.e. caters only to wastewater). There is considerable length of existing surface drains in the project area that can be used for disposal of storm runoff. The underground gravity sewers will carry sewage from households to trunk sewers and further to STPs. To maximize the benefits as intended, Jhunjhunu Nagar Parishad should ensure that all existing septic tanks are phased out by bypassing the inlet and connecting the toilet discharge from each house directly to sewerage system.

59. Accumulation of silt in sewers in areas of low over time, overflows, blockages, power outages, harmful working conditions for the workers cleaning sewers etc. are some of the issues that needs to be critically looked into during the sewer system design. A properly designed system is a must for system sustainability.

60. Measures such as the following shall be included in sewer system design to ensure that the system provides the benefits as intended:

- (i) Limit the sewer depth where possible
- (ii) Sewers shall be laid away from water supply lines and drains (at least 1 m, wherever possible);

³ As per CPHEEO, pumps, motors, STP, storage reservoirs are to be designed for a life of 15 years.

- (iii) In all cases, the sewer line should be laid deeper than the water pipeline (the difference between top of the sewer and bottom of water pipeline should be at least 300 mm)
- (iv) In unavoidable, where sewers are to be laid close to storm water drains, appropriate pipe material shall be selected (stoneware pipes shall be avoided)
- (v) For shallower sewers and especially in narrow roads , use small inspection chambers in lieu of manholes;
- (vi) Design manhole covers to withstand anticipated loads & ensure that the covers can be readily replace if broken to minimize silt/garbage entry
- (vii) Ensure sufficient hydraulic capacity to accommodate peak flows & adequate slope in gravity mains to prevent buildup of solids and hydrogen sulfide generation
- (viii) Equip pumping stations with a backup power supply, such as a diesel generator, to ensure uninterrupted operation during power outages, and conduct regular maintenance to minimize service interruptions. Consider redundant pump capacity in critical areas

61. **Utilities.** Telephone lines, electric poles and wires, water lines within the proposed project locations may require to be shifted in few cases. To mitigate the adverse impacts due to relocation of the utilities, the contractor, in collaboration with ULB will (i) identify the locations and operators of these utilities to prevent unnecessary disruption of services during construction phase; and (ii) instruct construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.

62. **Social and Cultural Resources.** Any work involving ground disturbance can uncover and damage archaeological and historical remains. For this project, excavation will occur in project sites, so it could make medium risk of such impacts if the site contains any archeological and historical remains. Nevertheless, PIU will:

- (i) consult Department of Archaeology and Museums to obtain an expert assessment of the archaeological potential of the site;
- (ii) consider alternatives if the site is found to be of high risk;
- (iii) include state and local archaeological, cultural and historical authorities, and interest groups in consultation forums as project stakeholders so that their expertise can be made available; and
- (iv) develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognised and measures are taken to ensure they are protected and conserved.

63. **Site selection of construction work camps, stockpile areas, storage areas, and disposal areas.** Priority is to locate these near the project location. However, if it is deemed necessary to locate elsewhere, sites to be considered will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems. Residential areas will not be considered for setting up construction camps to protect the human environment (i.e., to curb accident risks, health risks due to air and water pollution and dust, and noise, and to prevent social conflicts, shortages of amenities, and crime). Extreme care will be taken to avoid disposals near forest areas, water bodies, swamps, or in areas which will inconvenience the community.

64. **Site selection of sources of materials.** Extraction of materials can disrupt natural land

contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution. To mitigate the potential environmental impacts, locations of quarry site/s and borrow pit/s (for loose material other than stones) would be assessed by PIU. Priority would be sites already permitted by Mines and Geology Department. If new sites are necessary, these would be located away from population centers, drinking water intakes and streams, cultivable lands, and natural drainage systems; and in structurally stable areas. It will be the construction contractor's responsibility to verify the suitability of all material sources and to obtain the approval of Department of Mines & Geology and local revenue administration. If additional quarries will be required after construction is started, then the construction contractor shall use the mentioned criteria to select new quarry sites, with written approval of PIU.

C. Construction Impacts

65. The civil works for the subproject include earth work excavation for pipeline/sewer trenches, pipe/sewer laying, installing valves, flow meters and data loggers, shifting of public utilities and providing house service connections. Earth work excavation will be undertaken by machine (backhoe excavator) and include danger lighting and using sight rails and barricades at every 100 m., while pipe/sewer laying works will include laying pipes/sewer at required gradient, fixing collars, elbows, tees, bends and other fittings including conveying the material to work spot and testing for water tightness.

66. The excavation is done in such a way that there will be a minimum depth of 1.2 m above the water pipe line, and in narrow streets the cover above the will be 0.7 m only. The maximum depth for sewers depends on the design, and in Jhunjhunu most of the sewers will be laid 1.2 to 2 m below the ground, and some sewers will be laid deeper (> 2m) and maximum depth will be 4m. Sufficient care will be taken while laying so that existing utilities and cables are not damaged and pipes are not thrown into the trenches or dragged, but carefully laid in the trenches. Trenches deeper than 2 m will be protected by bracings to avoid collapse of trenches, and also to avoid any risk to surrounding buildings. Once they are laid, pipes will be joined as per specification and then tested for any cracks or leakages. The minimum working hours will be 8 hours daily, the total duration of each stage depends on the soil condition and other local features. The excavation of trenches for water pipes is estimated to generate 346,964 cubic meters of soil, about 97% of this soil will be used for refilling the trench after placing the pipe and therefore residual soil after pipe laying and refilling is expected to be only 10,274 cubic meters. In case of sewers, estimated soil generation is 271,634 cubic meters, of which about 83% will be used for refilling, and the remaining 45,956 cubic meters needs to be disposed. This soil shall be used for filling low lying area or stored/ dumped in approved debris disposal sites. The beneath and sides of sewers in trench will be filled with sand to form cushion/bed for sewer, and the sand requirement is estimated as 36,532 cubic meter.

67. Although construction of these project components involves quite simple techniques of civil work, the invasive nature of excavation and the project locations in the built-up areas of the town where there are a variety of human activities, will result in impacts to the environment and sensitive receptors such as residents, businesses, and the community in general. These anticipated impacts are temporary and for short duration. Water and sewer lines will be laid on either side of the roads/streets.

68. Physical impacts will be reduced by the method of working and scheduling of work, whereby the project components will be (i) constructed by small teams working at a time; (ii) any excavation done near sensitive area like school, religious places and house will be protected as

per standard norms etc.

69. **Sources of Materials.** Significant amount of gravel, sand, coarse aggregate, and cement will be required for this project. The construction contractor will be required to:

- (i) Use material sources permitted by government;
- (ii) Verify suitability of all material sources and obtain approval of PIU; and
- (iii) Submit to PIU on a monthly basis documentation of sources of materials.

70. **Air Quality.** Emissions from construction vehicles, equipment, and machinery used for excavation and construction will induce impacts on the air quality in the construction sites. Anticipated impacts include dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons. These however will be temporary limiting to construction activities only. To mitigate the impacts, construction contractors will be required to:

- (i) Consult with PIU/ on the designated areas for stockpiling of, soils, gravel, and other construction materials;
- (ii) Damp down exposed soil and any stockpiled material on site by water sprinkling;
- (iii) Use tarpaulins to cover sand and other loose material when transported by trucks;
- (iv) Clean wheels and undercarriage of haul trucks prior to leaving construction site
- (v) Don't allow access in the work area except workers to limit soil disturbance and prevent access by barricading and security personnel
- (vi) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly

71. **Surface Water Quality.** Run-off from stockpiled materials, and chemical contamination from fuels and lubricants during construction works can contaminate downstream surface water quality of the streams. These potential impacts are temporary and short-term duration only. However, to ensure that these are mitigated, construction contractor will be required to:

- (i) Prepare and implement a spoils management plan (**Appendix 8**);
- (ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
- (iii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with PIU on designated disposal areas;
- (iv) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
- (v) Place storage areas for fuels and lubricants away from any drainage leading to water bodies;
- (vi) Dispose any wastes generated by construction activities in designated sites; and
- (vii) Conduct surface quality inspection according to the Environmental Management Plan (EMP).

72. **Noise and Vibration Levels.** Construction works will be conducted along the roads in Jhunjhunu urban area, where there are houses, schools and hospitals, religious places and small-scale businesses. The sensitive receptors are the general population in these areas. Increase in noise level may be caused by excavation, particularly breaking of cement concrete or bitumen roads, operation of construction equipment like concrete mixers, and the transportation of equipment, materials, and people. Vibration generated from construction

activity, for instance from the use of pneumatic drills, will have impact on nearby buildings. This impact is negative but short-term, and reversible by mitigation measures. The construction contractor will be required to:

- (i) Plan activities in consultation with PIU so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance;
- (ii) Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach;
- (iii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and use portable street barriers to minimise sound impact to surrounding sensitive receptor; and
- (iv) Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s.
- (v) Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity;
- (vi) Consult the custodians of important buildings, cultural and tourism authorities and local communities in advance of the work to identify and address key issues, and avoid working at sensitive times, such as religious and cultural festivals.

73. Landscape and Aesthetics. The construction works does not envisage any cutting of trees, but it will produce excess excavated earth, excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, and other similar items. Haphazard disposal of these will have negative impacts on landscape and overall aesthetics. These impacts are negative but are of short-term and reversible by mitigation measures. The construction contractor will be required to:

- (i) Prepare and implement spoils management plan;
- (ii) Avoid stockpiling of excess excavated soils;
- (iii) Coordinate with ULB for beneficial uses of excess excavated soils or immediately dispose to designated areas;
- (iv) Recover used oil and lubricants and reuse or remove from the sites;
- (v) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- (vi) Remove all wreckage, rubbish, or temporary structures which are no longer required; and
- (vii) Request PIU to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.

74. Surface and Groundwater Quality. Another physical impact that is often associated with excavation is the effect on drainage and the local water table if groundwater and surface water collect in the voids. In Jhunjhunu groundwater is much deeper than the proposed trenching depth, and rains are scarce and limited to very short duration during monsoon. However, to ensure that water will not pond in pits and voids near project location, the construction contractor will be required to conduct excavation works in non-monsoon season to the maximum extent possible.

75. Accessibility. Excavation along the roads, hauling of construction materials and operation of equipment on-site can cause traffic problems. Potential impact is negative but short term and reversible by mitigation measures. The construction contractor will be required to:

- (i) Prepare and implement a Traffic Management Plan (**Appendix 9**)
- (ii) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
- (iii) Schedule transport and hauling activities during non-peak hours;
- (iv) Locate entry and exit points in areas where there is low potential for traffic congestion;
- (v) Keep the site free from all unnecessary obstructions;
- (vi) Drive vehicles in a considerate manner;
- (vii) Coordinate with Traffic Police for temporary road diversions and for provision of traffic aids if transportation activities cannot be avoided during peak hours; and
- (viii) Notify affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.

76. Wherever road width is minimal, there will be temporary loss of access to restrains and vehicular traffic (including 2-wheelers) during the laying of pipes. Under those circumstances, contractor shall adopt following measures:

- (i) Inform the affected local population 1-week in advance about the work schedule
- (ii) Plan and execute the work in such a way that the period of disturbance/ loss of access is minimum.
- (iii) Provide pedestrian access in all the locations until normalcy is restored. Provide wooden/metal planks over the open trenches at each house to maintain the access.

77. **Socio-Economic – Income.** The project components will be located in government land and there is no requirement for land acquisition or any resettlement. Construction works will impede the access of residents to specific site in limited cases. The potential impacts are negative and moderate but short-term and temporary. The construction contractor will be required to:

- (i) Prepare and implement spoils management plan (**Appendix 8**);
- (ii) Leave spaces for access between mounds of soil;
- (iii) Provide walkways and metal sheets where required to maintain access across for people and vehicles;
- (iv) Increase workforce in the areas with predominantly institutions, place of worship, business establishment, hospitals, and schools;
- (v) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and
- (vi) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.
- (vii) Notify community/ water users in advance about likely interruptions in water supply.
- (viii) Provide alternate sources of clean water until water supply is restored.

78. **Socio-Economic – Employment.** Manpower will be required during the 36-months construction stage. This can result in generation of temporary employment and increase in local revenue. Thus potential impact is positive and long-term. The construction contractor will be required to:

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

- (ii) Secure construction materials from local market.

79. **Occupational Health and Safety.** Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures. The construction contractor will be required to:

- (i) Comply with all national, state and local labor laws (see **Appendix 7**);
- (ii) Develop and implement site-specific occupational health and safety (OH&S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use personal protective equipment; (c) OH&S Training⁴ for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;
- (iii) Ensure that qualified first-aid is provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;
- (iv) Provide medical insurance coverage for workers;
- (v) Secure all installations from unauthorized intrusion and accident risks;
- (vi) The project area experiences extreme temperature during summer months of April and May, which may affect the health of workers engaged in construction work. Contractor should take necessary measures during summers including the following:
 - a. Work schedule should be adjusted to avoid peak temperature hours (12 – 3 PM)
 - b. Provide appropriate shade near the work place; allow periodic resting and provide adequate water
 - c. Provide necessary medicine and facilities to take care of dehydration related health issues
- (vii) Provide supplies of potable drinking water;
- (viii) Provide clean eating areas where workers are not exposed to hazardous or noxious substances;
- (ix) Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers;
- (x) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted;
- (xi) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
- (xii) Ensure moving equipment is outfitted with audible back-up alarms;
- (xiii) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for

⁴ Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and

- (xiv) Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.

80. **Asbestos Materials.** Existing water distribution network is mostly asbestos cement (AC) pipes, and because of the health risks these will be left in situ and replaced by new pipes. Details will be obtained from the PHED of the nature and location of all water supply infrastructure, and planning pipeline alignments carefully to avoid any conflict or damage. Given the dangerous nature of this material for both workers and citizens, additional measure should be taken to protect the health of all parties in the event (however unlikely) that AC pipes are encountered. This is that, prior to start of construction works of water supply system, PIU will develop a protocol to be applied in any instance that AC pipes are encountered, to ensure that appropriate action is taken. This should be based on the approach recommended by the United States Environmental Protection Agency (USEPA),⁵ and amongst other things, should involve:

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

81. **Community Health and Safety.** Hazards posed to the public, specifically in high-pedestrian areas may include traffic accidents and vehicle collision with pedestrians. Potential impact is negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

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

82. Central part of the town is characterized by narrow roads. Particularly, the areas located on hill slopes have very narrow roads with sharp turns and are accessible only to pedestrians. Besides impeding the access, the trench excavation and pipe laying will pose safety risks to pedestrians, and the people living in these areas. Though the width (<500 mm) and depth (<750 mm) of trench is minimal, it will pose safety risk, especially for children and elders. The construction contractor will be required to:

⁵ 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>

- (i) Provide prior information to the local people about the nature and duration of work
- (ii) Conduct awareness program on safety during the construction work
- (iii) Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day
- (iv) Provide barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches

83. **Work Camps.** Operation of work camps can cause temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants. Potential impacts are negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

- (i) Consult PIU before locating project offices, sheds, and construction plants;
- (ii) No worker camps/construction plants should be loaded on the northwest outskirts of the town, which is close to Jhujhunu Bid Forest.
- (iii) The Contractor shall take all necessary precautions to prevent his workmen entering forests and removing and damaging any trees (for firewood)/hunting animals; contractor will be severely penalized for these activities
- (iv) Minimize removal of vegetation and disallow cutting of trees;
- (v) Provide drinking water, water for other uses, and sanitation facilities for employees;
- (vi) Ensure conditions of liveability at work camps are maintained at the highest standards possible at all times;
- (vii) Prohibit employees from poaching wildlife and cutting of trees for firewood;
- (viii) Train employees in the storage and handling of materials which can potentially cause soil contamination;
- (ix) Recover used oil and lubricants and reuse or remove from the site;
- (x) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- (xi) Remove all wreckage, rubbish, or temporary structures which are no longer required; and
- (xii) Request PMU to report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.

84. **Social and Cultural Resources.** For this project, excavation will occur at locations known not to have archaeological values, so it could be that there is a low risk of such impacts. Nevertheless, the construction contractor will be required to:

- (i) Strictly follow the protocol for chance finds in any excavation work;
- (ii) Request PIU or any authorized person with archaeological/historical field training to observe excavation;
- (iii) Stop work immediately to allow further investigation if any finds are suspected;
- (iv) Inform PIU/ACM if a find is suspected, and take any action they require ensuring its removal or protection in situ.
- (v) Adjacent to religious/historic sites, undertake excavation and construction work in such a way that no structural damage is caused to the building.

85. **Debris disposal.** Prior to the commencement of works, contractor shall identify a debris disposal site in consultation with the PIU and adhering to following criteria:

- (i) The site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, top-soil stripping, stacking and preservation should be undertaken prior to initiation of any activities.
- (ii) Debris disposal site shall be at least 200 m away from surface water bodies⁶.
- (iii) No residential areas shall be located within 100 m downwind side of the site.
- (iv) The site is minimum 250 m. away from sensitive locations like hospitals, religious places, ponds/lakes or other water bodies.
- (vi) The local governing body and community shall be consulted while selecting the site.

D. Operation and Maintenance Impacts

86. Operation and Maintenance of the water supply system will be carried out by Jhunjhunu Nagar Parishad (JNP) directly or through an external operator. The system have a design life of 15/30 years, during which shall not require major repairs or refurbishments and should operate with little maintenance beyond routine actions required to keep the equipment in working order. The stability and integrity of the system will be monitored periodically to detect any problems and allow remedial action if required. Any repairs will be small-scale involving manual, temporary, and short-term works involving regular checking and recording of performance for signs of deterioration, servicing and replacement of parts.

87. Recurrence of pipe bursting and leakage problems can be managed by the leak detection and water auditing surveys. The JNP will be required to ensure that the leak detection and rectification time is minimized.

88. Improper disposal of silt and debris removed from trenches could cause inconvenience to public. Silt and debris shall be collected in trucks and transported to the approved disposal site and or can be used as covering material for wastes being landfilled.

89. Repair works could cause some temporary disruption of activities at locations of social and cultural importance such as schools, hospitals, churches, tourist sites etc., so the same precautions as employed during the construction period should be adopted. ULB needs to:

- (i) Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity;
- (ii) Complete work in these areas quickly;
- (iii) Consult the custodians of important buildings, cultural and tourism authorities and local communities in advance of the work to identify and address key issues, and avoid working at sensitive times, such as religious and cultural festivals.

90. There are also certain environmental risks from the operation of the sewer 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 operating agency

⁶ In the absence of site meeting the stipulated criteria, an alternate site can be selected specifying the reasons. In such a case, the construction camp management plan should incorporate additional measures specific to the site as suggested by the Construction Manager.

establishes a procedure to routinely check the operation and integrity of the sewers, and to implement rapid and effective repairs where necessary. There is an occupation health risk to workers engaged in sewer maintenance activities. Following measures should be followed:

- (i) Establish regular maintenance program, including:
 - Regular cleaning of grit chambers and sewer lines to remove grease, grit, and other debris that may lead to sewer backups. Cleaning should be conducted more frequently for problem areas.
 - Inspection of the condition of sanitary sewer structures and identifying areas that need repair or maintenance. Items to note may include cracked/deteriorating pipes; leaking joints or seals at manhole; frequent line blockages; lines that generally flow at or near capacity; and suspected infiltration or exfiltration; and
 - Monitoring of sewer flow to identify potential inflows and outflows
 - Conduct repairs on priority based on the nature and severity of the problem. Immediate clearing of blockage or repair is warranted where an overflow is currently occurring or for urgent problems that may cause an imminent overflow (e.g. pump station failures, sewer line ruptures, or sewer line blockages);
- (ii) Review previous sewer maintenance records to help identify “hot spots” or areas with frequent maintenance problems and locations of potential system failure, and conduct preventative maintenance, rehabilitation, or replacement of lines as needed;
- (iii) When a spill, leak, and/or overflow occurs, keep sewage from entering the storm drain system by covering or blocking storm drain inlets or by containing and diverting the sewage away from open channels and other storm drain facilities (using sandbags, inflatable dams, etc.). Remove the sewage using vacuum equipment or use other measures to divert it back to the sanitary sewer system.
- (iv) Prohibit/prevent disposal of wastewater/effluent from industrial units in the sewers; ensure regular checking to ensure no illegal entry of industrial wastewater into sewers
- (v) Develop an Emergency Response System for the sewerage system leaks, burst and overflows, etc.
- (vi) Provide necessary health & safety training to the staff in sewer cleaning & maintenance
- (vii) Provide all necessary personnel protection equipment
- (viii) For personnel cleaning underground sewers there is a risk due to oxygen deficiency and harmful gaseous emissions (hydrogen sulphide, carbon monoxide, methane, etc.); provide for adequate equipment (including oxygen masks) for emergency use

91. The citizens of the Jhunjhunu will be the major beneficiaries of the improved water supply and sewerage, as they will be provided with a constant supply of better quality water, piped into their homes and the human waste from the homes will be removed rapidly, which otherwise would flow in open drains. In addition to improved environmental conditions, the project will improve the over-all health condition of the town as diseases of poor sanitation will be reduced. This should improve the environment, 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.

V. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Overview

92. The active participation of stakeholders including local community, NGOs/CBOs, and the media in all stages of project preparation and implementation is essential for successful implementation and as well as operation of the project. It will ensure that the subprojects are designed, constructed, and operated with utmost consideration to local needs, ensures community acceptance, and will bring maximum benefits to the people. Public consultation and information disclosure is a must as per the ADB policy.

93. A three tier consultation process has been adopted for RUSDP: focus group discussions, primary household sample surveys and a town-level public consultation workshop. Most of the main stakeholders have already been identified and consulted during preparation of this IEE, and any others that are identified during project implementation will be brought into the process in the future. Primary stakeholders of the subproject are: residents, shopkeepers and businesspeople who live and work alongside the roads in which network improvements will be provided, and government and utility agencies responsible for provision of services, Jhunjhunu Nagar Parishad, Public Health Engineering Department, Department of Archeology and Museums, Forest Department and Rajasthan Pollution Control Board. Secondary stakeholder are: NGOs and CBOs working in the area, community representatives, beneficiary community in general, government agencies, the executing and implementing agencies (LSGD and RUIDP), Government of India and the ADB.

B. Public Consultation

94. The public consultation and disclosure program is a continuous process throughout the project implementation, including project planning, design and construction. Socio economic surveys were conducted in June-August, 2013. Women groups were consulted in April and May, 2014. Information consultation at sites were conducted in April and May in Jhunjhunu (Appendix 11).

1. Consultation during Project Preparation

95. Institutional consultations were conducted with the Governmental Departments such as Local Self Government Department, Public Works Department, Pollution Control Board, Public Health Engineering Department, Jhunjhunu Nagar Parishad, etc. The project proposals are formulated in consultation with PHED and Jhunjhunu Nagar Parishad and the proposals will be finalized only after certification of Commissioner Jhunjhunu NP that the proposals suit the requirements of the ULB.

96. Focus-group discussions with affected persons and other stakeholders were conducted to learn their views and concerns. A socio economic household survey has been conducted in the town, covering sample households, to understand the household characteristics, health status, and the infrastructure service levels, and also the demand for infrastructure services. General public and the people residing along the project activity areas were also consulted during visits to the project sites.

97. It was observed that people are willing to extend their cooperation as the proposed

activities are proposed to enhance the infrastructure service levels and the living standard of the public. The public expressed their concern regarding the nuisance and disturbance (dust, road closure and traffic management activities) during the construction stage which can have impact on their day to day activities. Public demanded for advance notice before construction and proper warning signs along the construction area to avoid accidents and inconvenience. Public opined that an appropriate operation and maintenance system should be in place, especially for sewerage system, for its best functioning and to have the maximum health and aesthetic benefits.

98. A town-level stakeholder consultation meeting will be conducted in Jhunjhunu Town during the detailed design stage to which representatives of primary and secondary stakeholders will be invited. The feedback and concerns of the stakeholders will be taken into consideration.

2. Consultation during construction

99. Prior to start of construction, JNP and PIU with the assistance of PMDSC will conduct information dissemination sessions at major intersections and solicit the help of the local community leaders/prominent citizens to encourage the participation of the people to discuss various environmental issues. At each ward/neighborhood level, focus group meetings will be conducted to discuss and plan construction work with local communities to reduce disturbance and other impacts, and provide a mechanism through which stakeholders can participate in project monitoring and evaluation.

100. A constant communication will be established with the affected communities to redress the environmental issues likely to surface during construction and operational phases and also regarding the grievance redress mechanism. JNP/PIU with the help of Community Awareness and Participation Consultant (CAPC) will organize public meetings and will appraise the communities about the progress on the implementation of EMP. Meeting will also be organized at the potential hotspots/sensitive locations before and during the construction.

C. Information Disclosure

101. Executive summary of the IEE will be translated in the local language and made available at the offices of JNP, RUIDP PMU and PIU. Copies of summary will be provided to participants of city level workshop to be organized in Jhunjhunu. Hard copies of the IEE will be accessible to citizens as a means to disclose the document and at the same time creating wider public awareness. Electronic version of the IEE in English and Executive Summary in Hindi will be placed in the official website of the JNP/RUIDP/PMU after approval of the IEE by Government and ADB. Stakeholders will also be made aware of grievance register and redress mechanism.

102. Public information campaigns via newspaper/radio/TV, to explain the project details to a wider population will be conducted. Public disclosure meetings will be conducted at key project stages to inform the public of progress and future plans. Prior to start of construction, the PIU will issue Notification on the start date of implementation in local newspapers. A board showing the details of the project will be displayed at the construction site for the information of general public.

103. Local communities will be continuously consulted regarding location of construction camps, access and hauling routes and other likely disturbances during construction. The road

closure together with the proposed detours will be communicated via advertising, pamphlets, radio broadcasts, road signage, etc.

VI. GRIEVANCE REDRESS MECHANISM

A. Project Specific Grievance Redress Mechanism

104. A project-specific grievance redress mechanism (GRM) will be established to receive, evaluate, and facilitate the resolution of AP's concerns, complaints, and grievances about the social and environmental performance at the level of the project. The GRM will aim to provide a time-bound and transparent mechanism to record and resolve social and environmental concerns linked to the project.

105. **Common GRM.** A common GRM will be in place for social, environmental, or any other grievances related to the project; the resettlement plans (RPs) and IEEs will follow the GRM described below. The GRM will provide an accessible and trusted platform for receiving and facilitating resolution of affected persons' grievances related to the project. The multi-tier GRM for the project is outlined below, each tier having time-bound schedules and with responsible persons identified to address grievances and seek appropriate persons' advice at each stage, as required.

106. ULB-wide public awareness campaigns will ensure that awareness on grievance redress procedures is generated through the campaign. PIU Assistant Safeguards Officer (ASO) through Community Awareness and Public Participation NGO (CAPP-NGO) will conduct ULB-wide awareness campaigns to ensure that poor and vulnerable households are made aware of grievance redress procedures and entitlements.

107. APs will have the flexibility of conveying grievances/suggestions by dropping grievance redress/suggestion forms in complaints/suggestion boxes will be installed by project ULBs or by e-mail, by post, or by writing in a complaints register in ULB/PIU offices. **Appendix 11** has the sample grievance registration form. Careful documentation of the name of the complainant, date of receipt of the complaint, address/contact details of the person, location of the problem area, and how the problem was resolved will be undertaken. The PMU Project Officers (Environment & Social) will have the overall responsibility for timely grievance redressal respectively on environmental and social safeguards issues and for registration of grievances, related disclosure, and communication with the aggrieved party through the PIU ASO.

B. Grievance Redress Process

108. In case of grievances that are immediate and urgent in the perception of the complainant, the contractor, and supervision personnel from PIU and PMDSC on-site will provide the most easily accessible or first level of contact for quick resolution of grievances. Contact phone numbers and names of the concerned PIU Assistant Safeguards Officer, contractors, will be posted at all construction sites at visible locations.

- (i) **1st level grievance.** The contractors, PIU supervision personnel, PIU Assistant Safeguards Officer and implementing NGO/CAPC⁷ can immediately resolve

⁷ Community Awareness and Public Participation (CAPC) will oversee the matters if there is no Resettlement Plan (RP) Implementing NGO

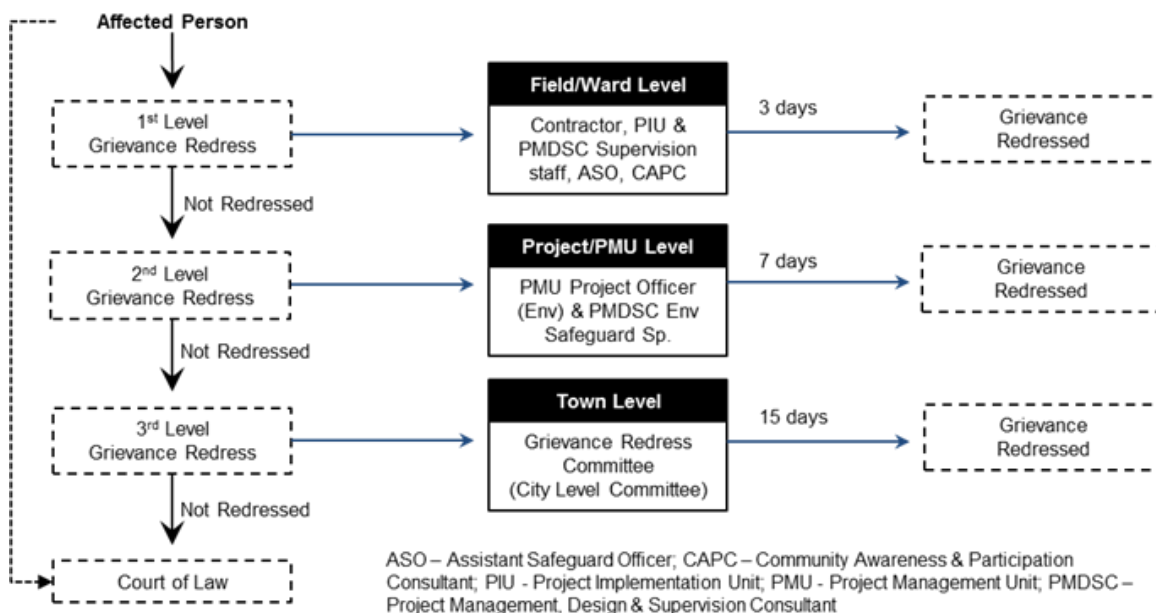
- issues on-site in consultation with each other, and will be required to do so within 3 days of receipt of a complaint/grievance.
- (ii) **2nd level grievance.** All grievances that cannot be redressed within 3 days at field/ward level will be brought to the notice of respective Project Officers (Environment/Social) of PMU. PMU POs will resolve the grievance within 7 days of receipt of compliance/grievance in discussion with the PIU, CAPC and the Contractor. PMDSC will assist POs in resolving the issue.
 - (iii) **3rd level grievance.** All the grievances that are not addressed by PMU within 7 days of receipt will be brought to the notice of the Grievance Redressal Committee (GRC). The City Level Committee (CLC) that will be established in every project town will act as GRC⁸. GRC will meet twice a month and determine the merit of each grievance brought to the committee. The PIU ASO will be responsible to see through the process of redressal of each grievance. The GRC will resolve the grievance within 15 days of receiving the complaint.
 - (iv) **4th level grievance.** Very major issues that are beyond the jurisdictional authority of the CLC or those that have the potential to cause social conflicts or environmental damage or those that remain unresolved at PMU/CLC level, will be referred to the Empowered Committee (EC)⁹. All decisions taken by the GRC and PSC will be communicated to the APs by the PIU ASO.

109. The project GRM notwithstanding, an aggrieved person shall have access to the country's legal system at any stage, and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM. Alternatively, if the grievance is related to land acquisition, resettlement & rehabilitation, the APs can approach the Land Acquisition, Rehabilitation and Resettlement Authority (LARRA). As per the latest Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation, and Resettlement Act, 2013, the state government will have to establish the LARRA to address grievances in implementation of LARRA.

110. In the event that the established GRM is not in a position to resolve the issue, the affected person also can use the ADB Accountability Mechanism through directly contacting (in writing) the Complaint Receiving Officer (CRO) at ADB headquarters or the ADB India Resident Mission (INRM). The complaint can be submitted in any of the official languages of ADB's DMCs. The ADB Accountability Mechanism information will be included in the PID to be distributed to the affected communities, as part of the project GRM.

⁸ City Level Committees (CLC) will be formed at town-level with members composed of: District Collector (DC) as Chairperson, and following as members: ULB Commissioner; Assistant Safeguards Officer PIU; representative from RPCB regional office; and one representative each from relevant government departments as appropriate (PWD / PHED / DAM etc). All town-level GRCs will have at least one woman member/chairperson. In addition, for project-related grievances, representatives of APs, community-based organizations (CBOs), and eminent citizens will be invited as observers in GRC meetings

⁹ The Empowered Committee (EC) will be chaired by the Minister of Urban Development and Housing, and members will include Ministers, Directors and/or representatives of other relevant Government Ministries and Departments

Figure 3: Grievance Redressal Process

VII. ENVIRONMENTAL MANAGEMENT PLAN

A. Environmental Management Plan

111. The following tables show the potential environmental impacts, proposed mitigation measures and responsible agencies for implementation and monitoring.

112. The purpose of the environmental management plan (EMP) is to ensure that the activities are undertaken in a responsible, non-detrimental manner with the objectives of: (i) providing a proactive, feasible, and practical working tool to enable the measurement and monitoring of environmental performance on-site; (ii) guiding and controlling the implementation of findings and recommendations of the environmental assessment conducted for the project; (iii) detailing specific actions deemed necessary to assist in mitigating the environmental impact of the project; and (iv) ensuring that safety recommendations are complied with.

113. A copy of the EMP must be kept at work sites at all times. This EMP will be included in the bid documents and will be further reviewed and updated during implementation. The EMP will be made binding on all contractors operating on the site and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

114. For civil works, the contractor will be required to (i) establish an operational system for managing environmental impacts (ii) carry out all of the monitoring and mitigation measures set forth in the EMP; and (iii) implement any corrective or preventative actions set out in safeguards monitoring reports that the employer will prepare from time to time to monitor implementation of this IEE and EMP. The contractor shall allocate budget for compliance with these EMP measures, requirements and actions.

Table 6: Design Stage Environmental Management Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Cost and Source of Funds
Change in raw sewage quality	Mixing of industrial effluent with sewage	(i) No industrial wastewater shall be allowed to dispose into municipal sewers (ii) No domestic wastewater from industrial units shall be allowed into municipal sewers (iii) Ensure that there is no illegal discharge through manholes or inspection chambers (iv) Conduct public awareness programs; in coordination with RPCB, issue notice to all industries for compliance	PIU / PMU	Project Costs

Table 7: Environmental Management Plan of Anticipated Impacts during Pre-Construction

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Compliance with environmental subproject selection criteria	Environmental impacts due to subproject	Compliance with environmental subproject selection criteria A compliance checklist is appended to this report (Appendix 8)	PIU and Jhunjhunu Nagar Parishad	PMU	No costs required
Utilities	Telephone lines, electric poles and wires, water lines within proposed project area	(i) Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and (ii) Require construction contractors to prepare a contingency plan to include actions to be taken in case of unintentional interruption of services. (iii) Require contractors to prepare spoils management plan (Appendix 8) and	Contractor in collaboration with PIU and with approval of PMU	(i) List of affected utilities and operators; (ii) Bid document to include requirement for a contingency plan for service interruptions (example provision of water if disruption is more than 24 hours), spoil management plan (Appendix 8), and traffic management	No cost required. Mitigation measures are part of TOR of PMU, PIU and PMDSC

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		traffic management plan (Appendix 9)		plan (Appendix 9)	
Social and Cultural Resources	Ground disturbance can uncover and damage archaeological and historical remains	(i) Consult Dept. of Archeology and museums, Government of Rajasthan to obtain an expert assessment of the archaeological potential of the site; (ii) Consider alternatives if the site is found to be of medium or high risk; (iii) Develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognized and measures are taken to ensure they are protected and conserved.	PIU	Chance Finds Protocol	No cost required. Mitigation measures are part of TOR of PIU and PMDSC
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Disruption to traffic flow and sensitive receptors	(i) Prioritize areas within or nearest possible vacant space in the project location; (ii) No worker camps/construction plants should be located on the northwest outskirts of the town, which is close to Jhujhunu Bid Forest. (iii) The Contractor shall take all necessary precautions to prevent his workmen entering forests and removing and damaging any trees (for firewood)/vegetation/hunting	Contractor to finalize locations in consultation and approval of PIU	(i) List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas. (ii) Written consent of landowner/s (not lessee/s) for reuse of excess spoils to agricultural land	No cost required. Mitigation measures are part of TOR of PIU and PMDSC and also part of contractual terms

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		<p>animals; contractor will be severely penalized for these activities</p> <p>(iv) If it is deemed necessary to locate elsewhere, consider sites that will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems;</p> <p>(v) Do not consider residential areas;</p> <p>(vi) Take extreme care in selecting sites to avoid direct disposal to water body which will inconvenience the community.</p> <p>(vii) For excess spoil disposal, ensure (a) site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, written consent from landowners (not lessees) will be obtained; (b) debris disposal site shall be at least 200 m away from surface water bodies; (c) no residential areas shall be located within 50 m downwind side of the site; and (d) site is minimum 250 m away from sensitive locations like settlements,</p>			

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		ponds/lakes or other water bodies.			
Sources of Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution.	(i) Prioritize sites already permitted by the Department of Mines and Geology (ii) If other sites are necessary, inform construction contractor that it is their responsibility to verify the suitability of all material sources and to obtain the approval of PMU and (iii) If additional quarries will be required after construction is started, inform construction contractor to obtain a written approval from PIU.	Contractor to prepare list of approved quarry sites and sources of materials with the approval of PIU	(i) List of approved quarry sites and sources of materials; (ii) Bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.	No cost required. Mitigation measures are part of TOR of PIU and PMDSC and also part of contractual terms
Consents, permits, clearances, NOCs, etc.	Failure to obtain necessary consents, permits, NOCs, etc. can result to design revisions and/or stoppage of works	(i) Obtain all necessary consents, permits, clearance, NOCs, etc. prior to award of civil works. (ii) Ensure that all necessary approvals for construction to be obtained by contractor are in place before start of construction (iii) Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc. (iv) Include in detailed design drawings and documents all conditions and provisions if necessary	PIU and PMDSC	Incorporated in final design and communicated to contractors.	No cost required. Cost of obtaining all consents, permits, clearance, NOCs, etc. prior to start of civil works responsibility of PIU. Mitigation measures are part of TOR of PIU and PMDSC

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Asbestos Cement Pipes	Health risk due to exposure to asbestos materials	(i) Obtain details from PHED on location of underground AC pipes (ii) Locate the new pipe/sewer carefully to avoid encountering AC pipes (ii) Leave the AC pipes undisturbed in the ground.	PIU and PMDSC	(i) Detailed construction drawings showing alignment of AC pipes	No cost required. Mitigation measures are part of TOR of PIU and PMDSC

Table 8: Environmental Management Plan of Anticipated Impacts during Construction

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
EMP Implementation Training	Irreversible impact to the environment, workers, and community	(i) Project manager and all key workers will be required to undergo EMP implementation including spoils management, Standard operating procedures (SOP) for construction works; occupational health and safety (OH&S), core labor laws, applicable environmental laws, etc.	Construction Contractor	(i) Certificate of Completion (Safeguards Compliance Orientation) (ii) Posting of Certification of Completion at worksites (iii) Posting of EMP at worksites	Cost of EMP Implementation Orientation Training to contractor is responsibility of PMU. Other costs responsibility of contractor.
Air Quality	Emissions from construction vehicles, equipment, and machinery used for installation of pipelines resulting to dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides,	(i) Consult with PIU on the designated areas for stockpiling of clay, soils, gravel, and other construction materials; (iii) Damp down exposed soil and any stockpiled material on site by water sprinkling necessary during dry weather; (iv) Use tarpaulins to cover sand and other loose material when transported by trucks; and (v) Fit all heavy equipment and	Construction Contractor	(i) Location of stockpiles; (ii) Complaints from sensitive receptors; (iii) Heavy equipment and machinery with air pollution control devices; (iv) Certification that vehicles are compliant with Air Act	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
	particulate matter, nitrous oxides, and hydrocarbons.	machinery with air pollution control devices which are operating correctly.			
Surface water quality	Mobilization of settled silt materials, and chemical contamination from fuels and lubricants during installation of pipelines can contaminate nearby surface water quality.	(i) Prepare and implement a spoils management plan (Appendix 4) (ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets; (ii) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; (iii) Place storage areas for fuels and lubricants away from any drainage leading to water bodies; (iv) Dispose any wastes generated by work in designated sites; and (v) Conduct surface quality inspection according to the Environmental Management Plan (EMP).	Construction Contractor	(i) Areas for stockpiles, storage of fuels and lubricants and waste materials; (ii) Number of silt traps installed along trenches leading to water bodies; (iii) Records of surface water quality inspection; (iv) Effectiveness of water management measures; (v) No visible degradation to nearby drainages, nallahs or water bodies due to civil works	Cost for implementation of mitigation measures responsibility of contractor.
Noise Levels	Increase in noise level due to earth-moving and excavation equipment, and the transportation of equipment, materials, and people	(i) Plan activities in consultation with PIU/PMDSC so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance; (ii) Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; (iii) Minimize noise from construction equipment by using vehicle silencers, fitting	Construction Contractor	(i) Complaints from sensitive receptors; (ii) Use of silencers in noise-producing equipment and sound barriers; (iii) Equivalent day and night time noise levels (see Appendix 3 of this IEE)	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and (iv) Maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at a distance of 10 m or more from the vehicle/s.			
Landscape and aesthetics	Impacts due to excess excavated earth, excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, and other similar items.	(i) Prepare and implement spoils management plan (Appendix 8); (ii) Avoid stockpiling of excess excavated soils; (iii) Coordinate with ULB/PIU for beneficial uses of excess excavated soils or immediately dispose to designated areas; (iv) Recover used oil and lubricants and reuse or remove from the sites; (v) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; (vi) Remove all wreckage, rubbish, or temporary structures which are no longer required; and (vii) Request PIU to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.	Construction Contractor	(i) Complaints from sensitive receptors; (ii) Worksite clear of hazardous wastes such as oil/fuel (iv) Worksite clear of any excess excavated earth, excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers	Cost for implementation of mitigation measures responsibility of contractor.
Existing Infrastructure and Facilities	Disruption of service and damage to existing infrastructure at	(i) Obtain from PIU the list of affected utilities and operators if any; (ii) Prepare a contingency plan to	Construction Contractor	Existing Utilities Contingency Plan	Cost for implementation of mitigation measures responsibility of

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
	specified project location	include actions to be done in case of unintentional interruption of service			contractor.
Ecological Resources – Terrestrial	Loss of vegetation and tree cover	(i) Minimize removal of vegetation and disallow cutting of trees; (ii) If tree-removal will be required, obtain tree-cutting permit from the Revenue Department; and (iii) Plant two native trees for every one that is removed.	Construction Contractor	PIU to report in writing the no of trees cut and planted.	Cost for implementation of mitigation measures responsibility of contractor.
Land use	Environmental Issues due to land use change	The impact due to change in land use will be negligible due to this project.	Not applicable	Not applicable	Not applicable
Accessibility	Traffic problems and conflicts near project locations and haul road	(i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites; (ii) Schedule transport and hauling activities during non-peak hours; (iii) Locate entry and exit points in areas where there is low potential for traffic congestion; (iv) Keep the site free from all unnecessary obstructions; (v) Drive vehicles in a considerate manner; (vi) Coordinate with Traffic Police for temporary road diversions and with for provision of traffic aids if transportation activities cannot be avoided during peak hours; (vii) Notify affected sensitive receptors 1-week in advance by providing sign boards informing	Construction Contractor	(i) Traffic route during construction works including number of permanent signages, barricades and flagmen on worksite (Appendix 9) ; (ii) Complaints from sensitive receptors; (iii) Number of signages placed at project location.	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		nature and duration of construction works and contact numbers for concerns/complaints. (viii) Plan and execute the work in such a way that the period of disturbance/ loss of access is minimum. (ix) Provide pedestrian access in all the locations until normalcy is restored.			
Socio-Economic – Income.	Impede the access of residents and customers to nearby shops	(i) Prepare and implement spoils management plan (Appendix 8) (ii) Leave spaces for access between mounds of soil; (ii) Provide walkways and metal sheets where required for people; (iii) Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools; (iv) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and (v) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.	Construction Contractor	(i) Complaints from sensitive receptors; (ii) Spoils management plan (iii) Number of walkways, signages, and metal sheets placed at project location.	Cost for implementation of mitigation measures responsibility of contractor.
Socio-Economic - Employment	Generation of temporary employment and increase in local revenue	(i) Employ at least 50% of the labour force, or to the maximum extent, local persons within the 2-km immediate area if manpower is available; (ii) Secure construction materials from local market.	Construction Contractor	(i) Employment records; (ii) Records of sources of materials (iii) Compliance to labor laws (see Appendix 7 of this	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Occupational Health and Safety	Occupational hazards which can arise during work	<p>(iii) Comply with labor laws</p> <p>(i) Comply with all national, state and local core labor laws (see Appendix 7 of this IEE)</p> <p>(ii) Develop and implement site-specific occupational health and safety (OH&S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use personal protective equipment like helmet, gumboot, safety belt, gloves, nose musk and ear plugs; (c) OH&S Training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;</p> <p>(ii) Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;</p> <p>(iii) Provide medical insurance coverage for workers;</p> <p>(iv) Secure all installations from unauthorized intrusion and accident risks;</p> <p>(v) The project area experiences extreme temperature during summer months of April and May, which may affect the health of workers engaged in construction work. Contractor should take necessary measures during summers including the following:</p>	Construction Contractor	<p>IEE)</p> <p>(i) Site-specific OH&S Plan;</p> <p>(ii) Equipped first-aid stations;</p> <p>(iii) Medical insurance coverage for workers;</p> <p>(iv) Number of accidents;</p> <p>(v) Supplies of potable drinking water;</p> <p>(vi) Clean eating areas where workers are not exposed to hazardous or noxious substances;</p> <p>(vii) record of H&S orientation trainings</p> <p>(viii) personal protective equipment;</p> <p>(ix) % of moving equipment outfitted with audible back-up alarms;</p> <p>(xi) permanent sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal.</p> <p>(xii) Compliance to core labor laws (see Appendix 7 of this IEE)</p>	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		<p>(a) work schedule should be adjusted to avoid peak temperature hours (12 – 3 PM);</p> <p>(b) provide appropriate shade near the work place; allow periodic resting and provide adequate water, and (c) provide necessary medicine and facilities to take care of dehydration related health issues</p> <p>(v) Provide supplies of potable drinking water;</p> <p>(vi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances;</p> <p>(vii) Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers;</p> <p>(viii) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted;</p> <p>(ix) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;</p> <p>(x) Ensure moving equipment is outfitted with audible back-up</p>			

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		alarms; (xi) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; (xii) Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively; and (xiii) Provide proper solid and liquid waste management program in the workers' campsites, separate from spoils and debris disposal, as their presence can add to existing waste volume at the project sites			
Asbestos Cement (AC) Materials	Health risks associated with AC pipes	(i) Left AC pipes in-situ. (ii) 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; (iii) Reporting procedures to inform management immediately if AC pipes are encountered; (iv) Development and application	Construction Contractor	(i) Site-specific OH&S Plan including AC pipe protocol (iii) record of OH&S orientation on AC Cement Materials Protocol (iv) personal protective equipment for AC materials	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		of a detailed OH&S procedure to protect both workers and citizens. This should comply with national and international standards for dealing with asbestos, and should include: (a) removal of all persons to a safe distance; (b) usage of appropriate breathing apparatus and protective equipment by persons delegated to deal with the AC material; and (c) Procedures for the safe removal and long-term disposal of all asbestos- containing material encountered.		(v) sign boards for pipe alignment identified as AC pipes.	
Community Health and Safety.	Traffic accidents and vehicle collision with pedestrians during material and waste transportation	(i) Plan routes to avoid times of peak-pedestrian activities. (ii) Liaise with PIU/ULB in identifying high-risk areas on route cards/maps. (iii) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure. (iv) Provide road signs and flag persons to warn of on-going trenching activities.	Construction Contractor	(i) Traffic Management Plan; (ii) Complaints from sensitive receptors	Cost for implementation of mitigation measures responsibility of contractor.
Safety of sensitive groups (children, elders etc.) and others pedestrians in narrow streets	Trench excavation in in narrow streets will pose high risk to children and elders in the locality	(i) Provide prior information to the local people about the nature and duration of work (ii) Conduct awareness program on safety during the construction work (iii) Undertake the construction work stretch-wise;	Construction Contractor	Complaints from neighborhood and monitoring of accidents	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		excavation, pipe laying and trench refilling should be completed on the same day (iv) Provide barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches			
Work Camps and worksites	Temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants Unsanitary and poor living conditions for workers	(i) Consult with PIU before locating project offices, sheds, and construction plants; (ii) Minimize removal of vegetation and disallow cutting of trees; (iii) Provide drinking water, water for other uses, and sanitation facilities for employees; (iv) Ensure conditions of livability at work camps are maintained at the highest standards possible at all times; Prohibit employees from poaching wildlife and cutting of trees for firewood; (v) Train employees in the storage and handling of materials which can potentially cause soil contamination; (vi) Recover used oil and lubricants and reuse or remove from the site; (vii) Manage solid waste according to the preference hierarchy: reuse, recycling and disposal to designated areas; (viii) Ensure unauthorized	Construction Contractor	(i) Complaints from sensitive receptors; (ii) Drinking water and sanitation facilities for employees	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		persons specially children are not allowed in any worksite at any given time.			
Social and Cultural Resources	Risk of archaeological chance finds	(i) Strictly follow the protocol for chance finds in any excavation work; (ii) Request PIU or any authorized person with archaeological field training to observe excavation; (iii) Stop work immediately to allow further investigation if any finds are suspected; (iv) Inform PIU if a find is suspected, and take any action they require ensuring its removal or protection in situ.	Construction Contractor	Records of chance finds	Cost for implementation of mitigation measures responsibility of contractor.
Submission of EMP implementation report	Unsatisfactory compliance to EMP	(i) Appointment of supervisor to ensure EMP implementation (ii) Timely submission of monitoring reports including pictures	Construction contractor	Availability and competency of appointed supervisor Monthly report	Cost for implementation of mitigation measures responsibility of contractor.
Post-construction clean-up	Damage due to debris, spoils, excess construction materials	(i) Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and (ii) All excavated roads shall be reinstated to original condition. (iii) All disrupted utilities restored (iv) All affected structures rehabilitated/compensated (v) The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up.	Construction Contractor	PIU/PMDSC report in writing that (i) worksite is restored to original conditions; (ii) camp has been vacated and restored to pre-project conditions; (iii) all construction related structures not relevant to O&M are removed; and (iv) worksite clean-up is satisfactory.	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		(vi) All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be top soiled and regrassed using the guidelines set out in the revegetation specification that forms part of this document. (vii) The contractor must arrange the cancellation of all temporary services. (viii) Request PIU to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.			

Table 9: Environmental Management Plan of Anticipated Impacts during Operation

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Construction disturbances, nuisances, public & worker safety,	All work sites	Implementation of dust control, noise control, traffic management, & safety measures. Site inspection checklist to review implementation is appended at Appendix 12	Weekly during construction	Supervising staff and safeguards specialists	No costs required
Check for blockage and leakage problems reducing the water losses	It may affect the water supply system	Effectiveness of leak detection and water auditing to reduce the water losses Implementation of regular O&M schedules	Jhunjhunu Nagar Parishad/Operator	Jhunjhunu Nagar Parishad	JNP Cost
Check the leakages blockages, overflow problem in sewers	It may affect the sewer system, contaminate land, water and create public health issues	Effective operation to avoid and/or immediate clearance of such leaks, blockages Implementation of regular O&M schedules	Jhunjhunu Nagar Parishad/Operator	Jhunjhunu Nagar Parishad	JNP Cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Check the leakages blockages, overflow problem in sewers	Occupational health & safety: for personnel cleaning underground sewers there is a risk due to oxygen deficiency and harmful gaseous emissions (hydrogen sulphide, carbon monoxide, methane, etc.);	(i) Provide necessary health & safety training to the staff engaged sewer cleaning & maintenance (ii) provide appropriate personal protection equipment (including oxygen masks)	Jhunjhunu Nagar Parishad/Operator	Jhunjhunu Nagar Parishad	JNP Cost
Asset management	Reduction in NRW Increased efficiency of the system	Preparation of O & M Manual	Jhunjhunu Nagar Parishad	Jhunjhunu Nagar Parishad	JNP cost

Table 10: Environmental Monitoring Plan of Anticipated Impacts during Construction

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Construction disturbances, nuisances, public & worker safety,	All work sites	Implementation of dust control, noise control, traffic management, & safety measures. Site inspection checklist to review implementation is appended at Appendix 12	Weekly during construction	Supervising staff and safeguards specialists	No costs required
Ambient air quality	3 locations (STP site, and centre of the town, and at construction)	<ul style="list-style-type: none"> PM10, PM2.5, NO2, SO2, CO 	Once before start of construction Quarterly (yearly 4-times) during construction	Contractor	Cost for implementation of monitoring measures responsibility of contractor (51 samples x 4000 per sample = 204,000)
Ambient noise	3 locations (STP site, and centre of the town, and at construction)	<ul style="list-style-type: none"> Day time and night time noise levels 	Once before start of construction Quarterly (yearly 4-times) during construction	Contractor	Cost for implementation of monitoring measures responsibility of contractor (51 samples x 1500 per sample = 76,500)

Table 11: Environmental Monitoring Plan of Anticipated Impacts during Operation

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Monitoring of quality of water supplied to consumers	Consumer end-random sampling in all zones	pH, Nitrite, Nitrate, Turbidity BOD, Total Alkalinity, Total coliform and Faecal coliform	Monthly once	JNP	JNP Cost
Pipeline network to sustain operational efficiency and avoid clogging and early occurrence of leakages	Pipeline network	to be included in O&M plan prepared under the project	as per O&M plan	JNP	JNP Cost
De-sludging of sludge beds to avoid sedimentation and ensure efficient collection and storage of wastewater	Sludge beds	to be included in O&M plan prepared under the project	as per O&M plan	JNP	JNP Cost

B. Institutional Requirements

115. **Government.** The Local Self Government Department (LSGD) of Government of Rajasthan will be the Executing Agency (EA) and existing RUIDP will be the Implementing Agency (IA). The LSGD will be responsible for overall strategic planning, guidance and management of the RUSDP, and for ensuring compliance with tranche release conditions and loan covenants. A policy support unit will be established in the LSGD to support the government for implementation of the tranche release policy actions under the program loan. The RUIDP will be responsible for planning, implementation, monitoring and supervision, and coordination of all activities under the RUSDP. The RUIDP will recruit two consulting firms – (i) project management, design and supervision consultant (PMDSC), and (ii) community awareness and participation consultant (CAPC) to provide support in implementation of RUSDP. Six Project Implementation Units (PIUs), one each of in six project towns, shall be set up directly to assist in implementation. PMU will support PIUs in implementation, management and monitoring of the project. PMU and PIUs will be assisted by PMDSC and CAPC. PIUs will appoint construction contractors to build infrastructure. Once the infrastructure is built and commissioned, the Urban Local Bodies will operate and maintain the infrastructure.

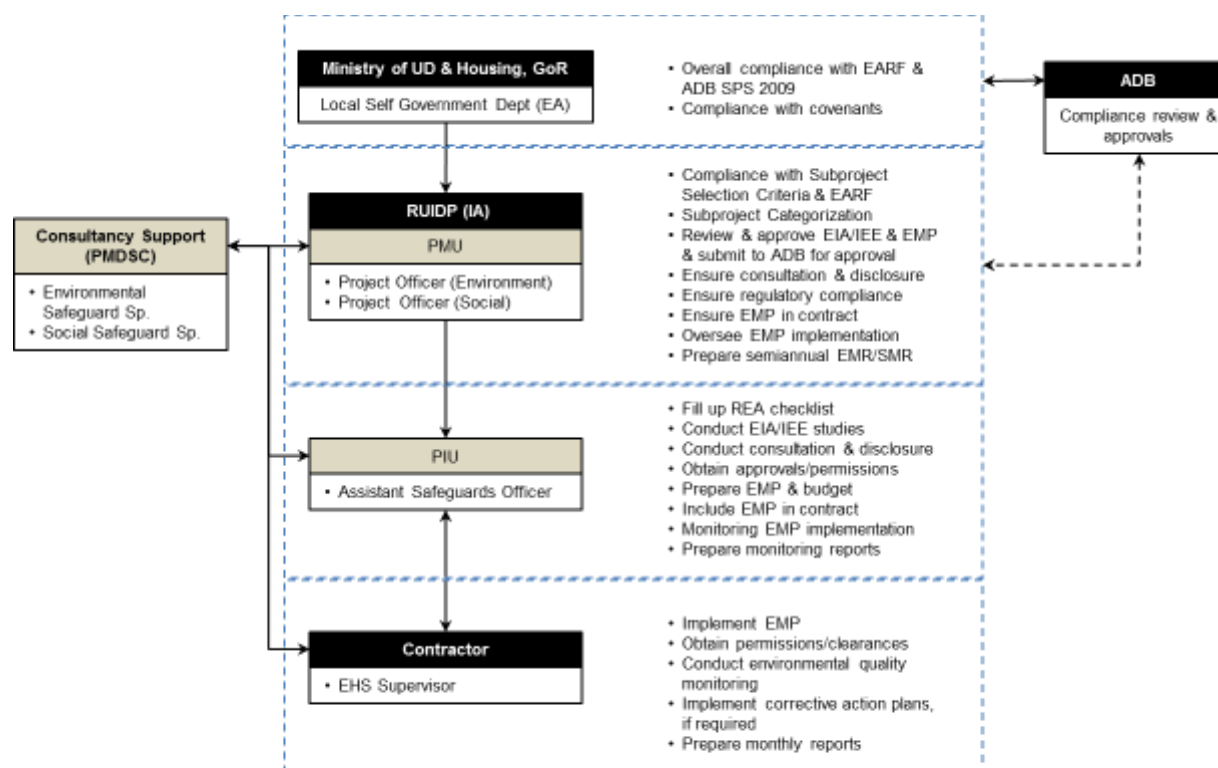
116. Project Officer (Environment) at PMU and Assistant Safeguard Officer (ASO) at each of the PIUs will be responsible for environment management and monitoring activities, and will be supported by Environment Safeguard Specialist of PMDSC Team and Community Mobilization of Community Awareness and Participation Consultant (CAPC).

117. At state-level an inter-ministerial Empowered Committee (EC) will be established to provide overall policy direction EC will provide approval for the projects and recommend to Government for providing administrative sanction for the sub-projects. City Level Committees (CLCs) will be established in each town to oversee the implementation at town level.

118. **Consultants.** PMU and PIUs will be assisted by Project Management, Design and Supervision Consultants (PMDSC) in project planning, preparation of project and cost estimates, coordination, technical guidance and supervision, financial control, training and overall project management. Consultant Team includes an environmental safeguards specialist (ESS), who will support PO (Environment) at PMU and ASOs at PIUs in implementation, management and monitoring of all safeguard related activities. The consultant team also includes an Assistant Construction Manager at each PIU responsible for the construction supervision including environmental safeguards at subproject town level. CAPC will support PIU in construction facilitation, community consultation and grievance registration and redressal during the construction.

119. **Contractor.** The contractor shall appoint an Environment, Health and Safety (EHS) supervisor who will be responsible on a day-to-day basis for (i) ensuring implementation of EMP, (ii) coordinating with the ACM and environment safeguards specialists (all levels PO, ASO & ESS); (iii) community liaison, consultations with interested/affected parties, and grievance redressal; and (iv) reporting. Requirement of EHS Supervisor will be included in the bid documents.

120. The following figure and **Table 12** summarizes the institutional responsibility of environmental safeguards at all stages of the project.

Figure 4: Environmental Safeguards Implementation Arrangement

ADB – Asian Development Bank; EARF – Environmental Assessment and Review Procedures; EHS – Environment, Health & Safety; EIA – Environmental Impact Assessment; EMP – Environmental Management Plan; GoR – Government of Rajasthan; IA – Implementing Agency; IEE – Initial Environmental Examination; PIU – Project Implementation Unit; PMU – Project Management Unit; PMDSC – Project Management, Design & Supervision Consultant; RUIDP – Rajasthan Urban Infrastructure Development Project; REA – Rapid Environmental Assessment; SPS – Safeguard Policy Statement, 2009.

Table 12: Institutional Roles and Responsibilities

Responsible Agency	Responsibility		
	Pre-Construction Stage	Construction Stage	Post-Construction
Project Officer (Environment), PMU	(i) Review REA checklists and assign categorization based on ADB SPS 2009 (ii) Review and approve EIA/IEE (iii) Submit EIA/IEE to ADB for approval and disclosure in ADB website (iv) Ensure approved IEEs are disclosed in RUIFDCO/PMU websites and summary posted in public areas accessible and understandable by local people. (v) Ensure environmental management plans (EMPs) are included in the bid documents and contracts (vi) Organize an orientation workshop for PMU, PIU, ULB and all staff involved in the project implementation on (a) ADB SPS, (b) Government of India national, state, and local environmental laws and regulations, (c) core	(i) Over-all environmental safeguards compliance of the project (iii) Monitor and ensure compliance of EMPs as well as any other environmental provisions and conditions. (i) Review monthly monitoring report (ii) Prepare and submit to ADB semi-annual monitoring reports (iv) If necessary prepare Corrective Action Plan and ensure implementation of corrective actions to ensure no environmental impacts; (iii) Review and submit Corrective Action Plans to ADB (iv) Organize capacity building programs on environmental safeguards	Compliance monitoring to review the environmental performance of project component, if required and as specified in EMP

Responsible Agency	Responsibility		
	Pre-Construction Stage	Construction Stage	Post-Construction
	<p>labor standards, (d) OH&S, (e) EMP implementation especially spoil management, working in congested areas, public relations and ongoing consultations, grievance redress, etc.</p> <p>(vii) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs</p> <p>(viii) Organize an induction course for the training of contractors preparing them on EMP implementation, environmental monitoring requirements related to mitigation measures; and taking immediate actions to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation.</p> <p>(ix) Ensure compliance with all government rules and regulations regarding site and environmental clearances as well as any other environmental requirements</p> <p>(x) Assist PMU, PIUs, and project NGOs to document and develop good practice construction guidelines to assist the contractors in implementing the provisions of IEE.</p> <p>(xi) Assist in the review of the contractors' implementation plans to ensure compliance with the IEE.</p>	<p>(iv) Coordinate with national and state level government agencies</p> <p>(vi) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs</p> <p>(ix) Coordinate PIUs, NGOs, consultants and contractors on mitigation measures involving the community and affected persons and ensure that environmental concerns and suggestions are incorporated and implemented</p>	
Assistant Safeguard Officer, PIU & ULB	<p>(i) Conduct initial environmental assessment for proposed project using REA checklists and submit to PMU</p> <p>(ii) Prepare EIA/IEE based on categorization and submit to PMU for approval</p> <p>(iii) Ensure IEE is included in bid documents and contract agreements. Ensure cost of EMP implementation is provided.</p> <p>(iv) Disclose approved EIAs/IEEs.</p> <p>(v) Obtain all necessary clearances, permits, consents, NOCs, etc. Ensure compliance to the provisions and conditions.</p> <p>(vi) EMP implementation regarding sites for disposal of wastes, camps, storage areas, quarry sites, etc.</p> <p>(vii) Ensure contractors undergo EMP implementation orientation prior to start of civil works</p>	<p>(i) Ensure EMP implementation is included in measuring works carried out by the contractors and certifying payments.</p> <p>(ii) Ensure Corrective Action Plan is implemented.</p> <p>(ii) Conduct public awareness campaigns and participation programs</p> <p>(iii) Prepare monthly reports.</p> <p>(vi) Address any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs</p>	<p>(i) Conducting environmental monitoring, as specified in the EMP.</p> <p>(ii) Issuance of clearance for contractor's post-construction activities as specified in the EMP.</p>

Responsible Agency	Responsibility		
	Pre-Construction Stage	Construction Stage	Post-Construction
Consultant - PMDSC 1. Environmental Safeguard Specialist 2. Assistant Construction Manager at PIU	(i) Assist PIU in preparation of REA checklists and EIAs/IEEs (ii) Assist PIU in obtaining all necessary clearances, permits, consents, NOCs, etc. Ensure provisions and conditions are incorporated in the IEE and detailed design documents. (iii) Assist in ensuring IEE is included in bid documents and contract agreements. Assist in determining adequacy of cost for EMP implementation. (iv) Assist in addressing any concern related to IEE and EMP. (v) Assist in summarizing IEE and translating to language understood by local people.	(i) Monitor EMP implementation (ii) Recommend corrective action measures for non-compliance by contractors (iii) Assist in the review of monitoring reports submitted by contractors (iv) Assist in the preparation of monthly monitoring reports (vi) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs	(i) Assist in the inspection and verification of contractor's post-construction activities.
Contractors	(i) Ensure EMP implementation cost is included in the methodology. (ii) Undergo EMP implementation orientation prior to award of contract (iii) Provide EMP implementation orientation to all workers prior to deployment to worksites (iv) Seek approval for camp sites and sources of materials. (v) Ensure copy of IEE is available at worksites. Summary of IEE is translated to language understood by workers and posted at visible places at all times.	(i) Implement EMP. (ii) Implement corrective actions if necessary. (iii) Prepare and submit monitoring reports including pictures to PIU (iv) Comply with all applicable legislation, is conversant with the requirements of the EMP; (v) Brief his staff, employees, and laborer about the requirements of the EMP and provide environmental awareness training to staff, employees, and laborers; (vi) Ensure any sub-contractors/ suppliers who are utilized within the context of the contract comply with all requirements of the EMP. The Contractor will be held responsible for non-compliance on their behalf; (vii) Bear the costs of any damages/compensation resulting from non-adherence to the EMP or written site instructions; (viii) Ensure that PIU and ACM/ASO are timely informed of any foreseeable activities related to EMP implementation. (vi) Address any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs	(i) Ensure EMP post-construction requirements are satisfactorily complied (ii) Request certification from PIU

C. Training Needs

121. The following **Table 13** presents the outline of capacity building program to ensure EMP implementation. The estimated cost is Rs.275,000 (excluding trainings of contractors which will be part of EMP implementation cost during construction) to be covered by the project's capacity building program. The detailed cost and specific modules will be customized for the available skill set after assessing the capabilities of the target participants and the requirements of the project by the ESS of PMDSC.

Table 13: Outline Capacity Building Program on EMP Implementation

Description	Target Participants & Venue	Estimate (INR)	Cost and Source of Funds
1. Introduction and Sensitization to Environmental Issues (1 day) - ADB Safeguards Policy Statement - Government of India and Rajasthan applicable safeguard laws, regulations and policies including but not limited to core labor standards, OH&S, etc. - Incorporation of EMP into the project design and contracts - Monitoring, reporting and corrective action planning	All staff and consultants involved in the project At PMU, Jaipur	INR 100,000 (Lump sum)	PMU cost
2. EMP implementation (2 days) - Roles and responsibilities - OH&S planning and implementation - Wastes management (water, hazardous, solid, excess construction materials, spoils, etc.) - Working in congested areas, - Public relations - Consultations - Grievance redress - Monitoring and corrective action planning - Reporting and disclosure - Post-construction planning	All staff and consultants involved in the Ton subproject All contractors prior to award of contract At PIU, Jhunjhunu	INR 50,000 (Lump sum)	PMU cost
3. Plans and Protocols (1 day) - Construction site standard operating procedures (SOP)	All staff and consultants involved in the project All contractors prior to	Lump sum INR 25,000 (Lump sum) Lump sum	PMU cost Contractors cost as compliance to contract

Description	Target Participants & Venue	Estimate (INR)	Cost and Source of Funds
<ul style="list-style-type: none"> - AC pipe protocol - Site-specific EMP - Traffic management plan - Spoils management plan - Waste management plan - Chance find protocol - O&M plans - Post-construction plan 	award of contract or during mobilization stage. At PIU Jhunjhunu	INR 25,000 (Lump sum)	provisions on EMP implementation (refer to EMP tables)
4. Experiences and best practices sharing <ul style="list-style-type: none"> - Experiences on EMP implementation - Issues and challenges - Best practices followed 	All staff and consultants involved in the project All contractors All NGOs At PMU Jaipur	INR 100,000 (Lump sum)	PMU Cost
5. Contractors Orientation to Workers on EMP implementation (OH&S, core labor laws, spoils management, etc.)	All workers (including manual laborers) of the contractor prior to dispatch to worksite	Lump sum INR 25,000 (Lump sum)	Contractors cost as compliance to contract provisions on EMP implementation (refer to EMP tables)

Summary of Capacity Building cost for EMP Implementation

Contractor Cost	- INR 50,000
PMU Cost	- INR 275,000
Total	- INR 325,000

D. Monitoring and Reporting

122. Prior to commencement of the work, the contractor will submit a compliance report to PIU ensuring that all identified pre-construction environmental impact mitigation measures as detailed in the EMP will be undertaken. PIU with the assistance of the ASO and ESS of PMDSC will review the report and thereafter PMU will allow commencement of works.

123. During construction, results from internal monitoring by the contractor will be reflected in their fortnightly (twice a month) EMP implementation reports to the PIU and Assistant Construction Manager of PMDSC. ASO and ACM will review and advise contractors for corrective actions if necessary. Monthly report summarizing compliance and corrective measures taken will be prepared by ASO with the assistance of ACM and submitted to PMU.

124. Based on monthly reports and measurements, PMU will draft, review, and submit to ADB, 6-monthly (twice a year) EMP implementation progress report (**Appendix 10**). Once concurrence from the ADB is received the report will be disclosed in the Project website.

125. ADB will review project performance against the RUSDP commitments as agreed in the legal documents. The extent of ADB's monitoring and supervision activities will be commensurate with the project's risks and impacts. Monitoring and supervising of social and environmental safeguards will be integrated into the project performance management system

E. EMP Implementation Cost

126. 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 construction contractors or consultants are included in the budgets for the civil works and do not need to be estimated separately here. Mitigation that is the responsibility of PIU/ULB will be provided as part of their management of the project, so this also does not need to be duplicated here. Cost for the capacity building program is included as part of the project.

Table 14: Cost Estimates to Implement the EMP

	Particulars	Stages	Unit	Total Number	Rate (INR)	Cost (INR)	Costs Covered By
A.	Monitoring Measures						
	Air quality monitoring	Construction	per sample	3 x 17 = 51	4,000	204,000	Civil works contract
	Noise levels monitoring	Construction	Per sample	3 x 17 = 51	1,500	76,500	Civil works contract
	Subtotal (A)					280,500	
B.	Capacity Building						
1.	Introduction and sensitization to environment issues	Pre-construction	lump sum			100,000	PMU
2.	EMP implementation	Construction	lump sum			50,000	PMU
3.	Plans and Protocols	Construction	lump sum			25,000	PMU
			lump sum			25,000	Civil works contract
4.	Experiences and best practices sharing	Construction/ Post-Construction	lump sum			100,000	PMU
5.	Contractors Orientation to Workers on EMP implementation	Prior to dispatch to worksite	Lump sum			25,000	Civil works contract
	Subtotal (B)					325,000	
C	Civil Works						
1	Construction of shelters for workers.	Construction	Lump sum			750,000	Civil works contract
2	Providing Water Supply Facility for the workers	Construction	Lump sum			250,000	Civil works contract
3	Providing Sanitation Facility for the workers	Construction	Lump sum			160,000	Civil works contract
5	Barricading to a height of 1.8 m (frame with MS pipes and cover with	Construction	m2	9,331	126	1,175,446	Civil works contract

	Particulars	Stages	Unit	Total Number	Rate (INR)	Cost (INR)	Costs Covered By
	corrugated sheets)						
6	Traffic management (Pavement Markings, Channelizing Devices, Arrow Panels and Warning Lights)	Construction	Per unit (at each location)	7	30000	210,000	Civil works contract
	Sub Total (C)					2,545,446	
	Total (A+B+C)				INR	3,150,946	

Contractor Cost - 2,875,946
PMU Cost - 275,000
Total - 3,150,946

VIII. CONCLUSION AND RECOMMENDATION

127. The process described in this document has assessed the environmental impacts of all elements of the Jhunjhunu water supply and sewerage subproject. All potential impacts were identified in relation to pre-construction, construction, and operation phases. Planning principles and design considerations have been reviewed and incorporated into the site planning and design process wherever possible; thus, environmental impacts as being due to the project design or location were not significant. During the construction phase, impacts mainly arise from the construction dust and noise, the need to dispose of large quantities of waste soil and import a similar amount of sand to support the sewer in the trenches; and from the disturbance of residents, businesses, traffic and important buildings by the construction work. The social impacts (access disruptions) due to construction activities are unavoidable, as the residential and commercial establishments exist along the roads where pipes/sewers will be laid. A resettlement plan has been developed in accordance with ADB SPS 2009 and Government of India laws and regulations.

128. Anticipated impacts of water supply during operation and maintenance will be related to detection and repair of leaks, pipe bursts. These are, however, likely to be minimal, as proper design and selection of good quality pipe material shall mean that leaks are minimal. Leak repair work will be similar to the pipe-laying work. Similarly sewers are not 100% watertight and leaks can occur at joints. Faulty section will be exposed and repaired following the same basic procedure as when the sewer was built. Also, sewer pipes require regular maintenance as silt inevitably collects in areas of low flow over time. Necessary equipment for cleaning and removal of blockages in the sewers are included in the project.

129. The public participation processes undertaken during project design ensured stakeholders are engaged during the preparation of the IEE. The planned information disclosure measures and process for carrying out consultation with affected people will facilitate their participation during implementation. The project's grievance redressal mechanism will provide the citizens with a platform for redressal of their grievances, and describes the channels, time frame, and mechanisms for resolving complaints about environmental performance.









130. The EMP will assist the PMU, PIU, PMDSC and contractors in mitigating the environmental impacts, and guide them in the environmentally sound execution of the proposed project. The EMP will also ensure efficient lines of communication between PIU/ULB, PMU,

consultants and contractor. A copy of the EMP shall be kept on-site during the construction period at all times. The EMP shall be made binding on all contractors operating on the site, and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document shall constitute a failure in compliance.

131. The project will benefit the general public by contributing to the long-term improvement of water supply and sewerage systems and community livability in Jhunjhunu. The potential adverse environmental impacts are mainly related to the construction period, which can be minimized by the mitigating measures and environmentally sound engineering and construction practices.

132. Therefore, as per ADB SPS, the project is classified as environmental category B and does not require further environmental impact assessment.

Subproject Sites Photographs

	
<p>Photo 1: Wide roads in Jhunjhunu</p>	<p>Photo 5: Wide roads in Jhunjhunu</p>
	
<p>Photo 2: Narrow Roads with Utilities</p>	<p>Photo 6: Discussion with local people</p>
	
<p>Photo 3: Narrow roads</p>	<p>Photo 7: Busy road with traffic & pedestrians</p>
	
<p>Photo 4: Trees along the roads</p>	<p>Photo 8: Open drains with wastewater</p>

Appendix 1: REA Check list

WATER SUPPLY

Instructions:

- ☐ This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Regional and Sustainable Development Department.
- ☐ This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department.
- ☐ This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development.
- ☐ Answer the questions assuming the “without mitigation” case. The purpose is to identify potential impacts. Use the “remarks” section to discuss any anticipated mitigation measures.

Country/Project Title: Rajasthan Urban Sector Development Program / Jhunjhunu Subproject

Sector Division: Urban Development

SCREENING QUESTIONS	Yes	No	REMARKS
Water Supply			
A. Project Siting Is the project area...			
▪ Densely populated?	√		Subproject activities extend to the entire town including the densely populated areas. There are no major negative impacts envisaged, because pipeline will be located in unused government lands alongside the existing roads and can be constructed without causing disturbance to, houses, and commercial establishments. In narrow streets, disruption to road users is likely, and measure like best activity scheduling, alternative routes, prior information to road users, houses and shops will minimize the impact to acceptable levels.
▪ Heavy with development activities?	√		Jhunjhunu is a developing town; urban expansion is considerable
▪ Adjacent to or within any environmentally sensitive areas?		√	
• Cultural heritage site		√	
• Protected Area		√	
• Wetland		√	
• Mangrove		√	
• Estuarine		√	
• Buffer zone of protected area		√	
• Special area for protecting biodiversity		√	
• Bay		√	
B. Potential Environmental Impacts Will the Project cause...			

SCREENING QUESTIONS	Yes	No	REMARKS
<ul style="list-style-type: none"> Pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff? 		√	Not applicable. The present project does not involve any proposal for intake works.
<ul style="list-style-type: none"> Impairment of historical/cultural monuments/areas and loss/damage to these sites? 		√	
<ul style="list-style-type: none"> Hazard of land subsidence caused by excessive ground water pumping? 		√	Not applicable; subproject does not involve groundwater abstraction
<ul style="list-style-type: none"> Social conflicts arising from displacement of communities? 		√	Project does not involve land acquisition /displacement. No social conflicts envisaged
<ul style="list-style-type: none"> Conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters? 		√	Not applicable. The present project does not involve any proposal for intake works
<ul style="list-style-type: none"> Unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)? 		√	The existing raw water supply will continue; no source intervention (new/ augmentation/ modification) is part of this subproject
<ul style="list-style-type: none"> Delivery of unsafe water to distribution system? 		√	The present project does not involve any proposal for upgrade / refurbishment of water treatment plant. The existing treatment plants will be maintained properly by the ULB to have the outlet quality meeting drinking water standards
<ul style="list-style-type: none"> Inadequate protection of intake works or wells, leading to pollution of water supply? 		√	Not applicable. The civil works are limited to distribution network improvement (DNI)
<ul style="list-style-type: none"> Over pumping of ground water, leading to salinization and ground subsidence? 		√	Not applicable; subproject does not involve groundwater abstraction
<ul style="list-style-type: none"> Excessive algal growth in storage reservoir? 		√	Not applicable; subproject does not involve storage reservoirs
<ul style="list-style-type: none"> Increase in production of sewage beyond capabilities of community facilities? 		√	Sewerage system will also be expanded under RUSDP along with water supply
<ul style="list-style-type: none"> Inadequate disposal of sludge from water treatment plants? 		√	The present project does not involve any proposal for altering design / facilities in Water Treatment Plant. The ULB has to ensure appropriate disposal of sludge
<ul style="list-style-type: none"> Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities? 		√	.The present project does not involve any pumping and treatment plants.
<ul style="list-style-type: none"> Impairments associated with transmission lines and access roads? 		√	Temporary impairments are anticipated along the new transmission line routes during construction stage. No new access roads are proposed.
<ul style="list-style-type: none"> Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals. 		√	The present project does not involve any proposal for altering design / facilities for chlorination
<ul style="list-style-type: none"> Health and safety hazards to workers from the management of chlorine used for disinfection and other contaminants? 		√	The present project does not involve any proposal for changes in operation of Water Treatment Plant. The ULB to follow proper safety procedures
<ul style="list-style-type: none"> Dislocation or involuntary resettlement of people 		√	There is no resettlement of people for project implementation.
<ul style="list-style-type: none"> Social conflicts between construction workers from other areas and community workers? 		√	The contractor will be utilizing the local labour force as far as possible; in case if it is unavoidable, labour camps and facilities will be provided appropriately. No conflicts envisaged

SCREENING QUESTIONS	Yes	No	REMARKS
• Noise and dust from construction activities?	√		All the construction machineries employed will comply with noise emission standards of Central Pollution Control Board. Dust suppression measures such as water sprinkling will be employed
• Increased road traffic due to interference of construction activities?	√		Excavation and laying pipelines along public roads will interfere with the traffic. Construction material transport will increase traffic within city. Proper traffic management and construction planning will be ensured to minimize the interference
• Continuing soil erosion/silt runoff from construction operations?	√		Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
• Delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?		√	The present project does not involve any proposal for altering design / facilities for chlorination facilities
• Delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?		√	Not envisaged
• Accidental leakage of chlorine gas?		√	The present project does not involve any proposal for altering design / facilities for chlorination facilities
• Excessive abstraction of water affecting downstream water users?		√	The existing raw water supply will continue; no source intervention (new/ augmentation/ modification) is part of this subproject
• Competing uses of water?		√	The existing raw water supply will continue; no source intervention (new/ augmentation/ modification) is part of this subproject
• Increased sewage flow due to increased water supply	√		Sewerage system will also be improved under RUSDP along with water supply
• Increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant	√		Sewerage system will also be improved under RUSDP along with water supply; this will take care of additional wastewater. Treatment & disposal facilities are under construction in Jhunjhunu.
Sewerage	Yes	No	Remarks
A. Potential Environmental Impacts Will the Project cause...			
▪ impairment of historical/cultural monuments/areas and loss/damage to these sites?		√	No
▪ interference with other utilities and blocking of access to buildings; nuisance to neighboring areas due to noise, smell, and influx of insects, rodents, etc.?	√		Sewers will be laid underground, and will be located away from water lines maintaining the minimum distance according to standards. Construction work may interfere with the power and communication lines, but resultant impact will be minimized with co-ordination of concerned agencies in finalization of best alignment and shifting of utilities, if required.

SCREENING QUESTIONS	Yes	No	REMARKS
<ul style="list-style-type: none"> dislocation or involuntary resettlement of people 	√		<p>Project does not involve land acquisition / involuntary resettlement /displacement.</p> <p>During the sewer construction, particularly in narrow streets and streets with on street commercial activities, there may be temporary disruption or relocation of hawkers and vendors. These are addressed through preparation of resettlement plan.</p>
<ul style="list-style-type: none"> Impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage? 		√	Sewage treatment facilities are under construction, no new facilities are proposed in the project
<ul style="list-style-type: none"> Overflows and flooding of neighboring properties with raw sewage? 		√	Sewerage system is designed following standards. Flooding and overflowing will be avoided through regular operation and maintenance.
<ul style="list-style-type: none"> Environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers? 		√	<p>Sewage treatment facilities are already in place, no new facilities are constructed in the project</p> <p>This sewerage system will cater only to domestic wastewater, no industrial wastewater discharge is allowed into the sewerage system.</p>
<ul style="list-style-type: none"> Noise and vibration due to blasting and other civil works? 		√	Blasting for underground works is unlikely, mainly because of geological setting. Road cutting works for sewers is likely to generate noise. Scheduling of works appropriately and prior information to the affected people will minimize the impact.
<ul style="list-style-type: none"> Discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers? 		√	<p>This sewerage system will cater only to domestic wastewater, no industrial wastewater discharge is allowed into the sewerage system.</p> <p>As a precaution, domestic wastewater from industrial units will also not be allowed into sewers.</p>
<ul style="list-style-type: none"> Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances, and protect facilities? 		√	There are no pumping stations in the project
<ul style="list-style-type: none"> Social conflicts between construction workers from other areas and community workers? 		√	The contractor will be utilizing the local labour force as far as possible; in case if it is unavoidable, labour camps and facilities will be provided appropriately. No conflicts envisaged
<ul style="list-style-type: none"> Road blocking and temporary flooding due to land excavation during the rainy season? 		√	Underground construction works (sewer laying, foundations) will be carried out in non-monsoon period. In Jhunjhunu, rainfall is very less and confined only to a limited period. No impacts envisaged
<ul style="list-style-type: none"> Noise and dust from construction activities? 	√		Road cutting (cement and bituminous roads) for sewer laying works is likely to generate noise. Scheduling of works appropriately and prior information to the affected people will minimize the impact. Dust generation will be controlled through water sprinkling, immediate transportation of excess soil, covered transport etc.

SCREENING QUESTIONS	Yes	No	REMARKS
▪ traffic disturbances due to construction material transport and wastes?	√		Linear activities like sewer laying along the roads is likely to disrupt traffic. Vehicle movement for construction purpose will increase the traffic. Identification of alternate routes, allowing limited - at least one-way traffic, prior information about the works and alternative arrangements, providing information/sign boards etc. will reduce the impact.
▪ temporary silt runoff due to construction?		√	Jhunjhunu is predominantly dry and rainfall is very limited
▪ hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?	√		Sewerage system will be designed with applicable standards. Adequate trained staff and necessary equipment will be in place for regular operation and maintenance of the system. Proposed treatment system will be efficient and appropriate repair and maintenance procedure will be developed. Sufficient funds for operation will be ensured. Backup power supply system is part of project.
▪ deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?		√	No treatment plant proposed in this project; existing facilities will be utilized for the purpose.
▪ contamination of surface and ground waters due to sludge disposal on land?		√	No treatment plant proposed in this project; existing facilities will be utilized for the purpose.
▪ Health and safety hazards to workers from toxic gases and hazardous materials which may be contained in sewage flow and exposure to pathogens in sewage and sludge?		√	Necessary apparatus and personal protection equipment will be provided. Staff will be trained in safe handling of sewage and in cleaning of sewers

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?	√		Arid zone, low and unreliable rainfall, less vegetation cover
Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (e.g., changes in rainfall patterns disrupt reliability of water supply; sea level rise creates salinity intrusion into proposed water supply source)?		√	No
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)?		√	No
Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by using water from a vulnerable source that is relied upon by many user groups, or encouraging settlement in earthquake zones)?		√	No

Appendix 2: National Ambient Air Quality Standards

SL NO:	Pollutants	Time weighted average	Concentration in ambient air		Method of measurement
			Industrial, Residential, Rural & Other Areas	Ecologically Sensitive Areas	
1	Sulphur Dioxide (SO ₂) µg/m ³	Annual 24 hours	50 80	20 80	Improved West and Geake-Ultraviolet fluorescence
2	Nitrogen Dioxide (NO ₂) µg/m ³	Annual 24 hours	40 80	30 80	Modified Jacob & Hochheiser (Na-Arsenite) Chemiluminescence
3	Particulate Matter (Size less than 10 µm) or PM10 µg/m ³	Annual 24 hours	60 100	60 100	Gravimetric -TOEM -Beta attenuation
4	Particulate Matter (Size less than 2.5 µm) or PM2.5 µg/m ³	Annual 24 hours	40 60	40 60	Gravimetric -TOEM -Beta attenuation
5	Carbon Monoxide (CO) mg/m ³	8 hours 1 hours	02 04	02 04	Non Dispersive Infra Red (NDIR) Spectroscopy

Appendix 3: National Ambient Air Quality Standards in Respect of Noise

Area code	Category of area/zone	Limit in dB (A)	
		Day time	Night time
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45
D	Silence zone	50	40

Appendix 4: General Standards for Discharge of Environmental Pollutants (Wastewater)

S. No.	Parameter	Inland surface water	Public sewers	Land for irrigation
.	2		3	.
.	.	(a)	(b)	(c)
1	Suspended solids mg/l, max.	100	600	200
2	Particle size of suspended solids	shall pass 850 micron IS Sieve	-	-
3	pH value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
4	Temperature	shall not exceed 5oC above the receiving water temperature		
5	Oil and grease, mg/l max,	10	20	10
6	Total residual chlorine, mg/l max	1.0	-	-
7	Ammonical nitrogen (as N),mg/l, max.	50	50	-
8	Total kjeldahl nitrogen (as N);mg/l, max. mg/l, max.	100	-	-
9	Free ammonia (as NH ₃), mg/l,max.	5.0	-	-
10	Biochemical oxygen demand (3 days at 27oC), mg/l, max.	30	350	100
11	Chemical oxygen demand, mg/l, max.	250	-	-
12	Arsenic(as As).	0.2	0.2	0.2
13	Mercury (As Hg), mg/l, max.	0.01	0.01	-
14	Lead (as Pb) mg/l, max	0.1	1.0	-
15	Cadmium (as Cd) mg/l, max	2.0	1.0	-
16	Hexavalent chromium (as Cr + 6),mg/l, max.	0.1	2.0	-
17	Total chromium (as Cr) mg/l, max.	2.0	2.0	-
18	Copper (as Cu)mg/l, max.	3.0	3.0	-
19	Zinc (as Zn) mg/l, max.	5.0	15	-
20	Selenium (as Se)	0.05	0.05	-
21	Nickel (as Ni) mg/l, max.	3.0	3.0	-
22	Cyanide (as CN) mg/l, max.	0.2	2.0	0.2
23	Fluoride (as F) mg/l, max.	2.0	15	-
24	Dissolved phos- phates (as P),mg/l, max.	5.0	-	-
25	Sulphide (as S) mg/l, max.	2.0	-	-
26	Phenolic compounds (as C ₆ H ₅ OH)mg/l, max.	1.0	5.0	-
27	Radioactive materials: (a) Alpha emitters micro curie mg/l, max. (b)Beta emittersmicro curie mg/l	10-7 10-6	10-7 10-6	10-8 10-7
28	Bio-assay test	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent
29	Manganese	2 mg/l	2 mg/l	-
30	Iron (as Fe)	3mg/l	3mg/l	-
31	Vanadium (as V)	0.2mg/l	0.2mg/l	-
32	Nitrate Nitrogen	10 mg/l	-	-

Appendix 5: Vehicle Exhaust Emission Norms

1. Passenger Cars

Norms	CO(g/km)	HC+ NOx(g/km)
1991 Norms	14.3-27.1	2.0(Only HC)
1996 Norms	8.68-12.40	3.00-4.36
1998 Norms	4.34-6.20	1.50-2.18
India stage 2000 norms	2.72	0.97
Bharat stage-II	2.2	0.5
Bharat Stage-III	2.3	0.35 (combined)
Bharat Stage-IV	1.0	0.18 (combined)

2. Heavy Diesel Vehicles

Norms	CO(g/kmhr)	HC (g/kmhr)	NOx (g/kmhr)	PM(g/kmhr)
1991 Norms	14	3.5	18	-
1996 Norms	11.2	2.4	14.4	-
India stage 2000 norms	4.5	1.1	8.0	0.36
Bharat stage-II	4.0	1.1	7.0	0.15
Bharat Stage-III	2.1	1.6	5.0	0.10
Bharat Stage-IV	1.5	0.96	3.5	0.02

Source: Central Pollution Control Board

CO = Carbon Monoxide; g/kmhr = grams per kilometer-hour; HC = Hydrocarbons; NOx = oxides of nitrogen; PM = Particulates Matter

Appendix 6: Drinking Water Standards

No.	Substance or characteristic	Requirement Desirable limit	Undesirable effect outside the desirable	Permissible limit in the absence of alternate Source	Remarks
Essential Characteristic					
1.	Colour Hazen Units, Max	5	Above 5, consumer acceptance decreases	25	Extended to 25 only if toxic Substance are not suspect in absence of alternate sources
2.	Odour	Unobjectionable	-	-	a) test cold and when heated b) test are several dilutions
3.	Taste	Agreeable	-	-	Test to be conducted only after safely has been established
4.	Turbidity (NTU) Max	5	Above 5, consumer acceptance decreases	10	-
5.	pH value	6.5 to 8.5	Beyond this range the water will after the mucous membrane and/or water supply system	No relaxation	-
6.	Total Hardness (mg/L) CaCO ₃	300	Encrustation in water supply structure and adverse effects on domestic use	600	-
7.	Iron (mg/L, Fe) Max	0.3	Beyond this limit taste/appearance are affected; has adverse effects on domestic uses and water supply structure and promotes iron bacteria	1.0	-
8.	Chlorides 250 (mg/L, Cl) Max	250	Beyond effects outside the desirable limit	1000	-
9.	Residual free Chlorine (mg/L), Max	0.2	-	-	To be applicable only when water is chlorinated. Tested at customer end. When protection against viral infection is required, it should be min. 0.5 mg/L.
Desirable Characteristics					
10.	Dissolved solids mg/L. Max	500	Beyond this, palatability decreases and may cause gastrointestinal irritation.	2000	-
11.	Calcium (mg/L, Ca) Max.	75	Encrustation in water supply structure and adverse effects on domestic use.	200	-
12.	Magnesium (mg/L, Mg) Max	30	Encrustation in water supply structure and adverse effects on domestic use.	100	-
13.	Copper (mg/L, Cu) Max	0.05	Astringent taste discoloration and corrosion of pipes fittings and utensils	1.5	-

No.	Substance or characteristic	Requirement Desirable limit	Undesirable effect outside the desirable	Permissible limit in the absence of alternate Source	Remarks
			will be caused beyond this.		
14.	Manganese (mg/L, Mn) Max	0.1	Beyond this limit taste/appearance are affected, has adverse effect on domestic use and water supply structure	0.3	-
15.	Sulphate (mg/L, SO ₄) Max.	200	Beyond this causes gastro intestinal irritation when magnesium or sodium are present	400	May be extended upto 400 provided magnesium (as Mg) does not exceed 30
16.	Nitrate (mg/L, NO ₃) Max.	45	Beyond this methaemoglobinemia takes place.	100	-
17.	Fluoride (mg/L, F) Max.	1.0	Fluoride may be kept as low as possible. High fluoride may cause fluorosis.	1.5	-
18.	Phenolic Compounds (mg/L C ₆ H ₅ OH) Max.	0.001	Beyond this, it may cause objectionable taste and odour	0.002	-
19.	Mercury (mg/L Hg) Max	0.001	Beyond this the water becomes toxic	No Relaxation.	To be tested when pollution is suspected
20.	Cadmium (mg/L, Cd) Max	0.01	Beyond this the water becomes toxic	No Relaxation.	To be tested when pollution is suspected
21.	Selenium (mg/L, Se) Max	0.01	Beyond this the water becomes toxic.	No Relaxation.	To be tested when pollution is suspected
22.	Arsenic (mg/L, As) Max.	0.05	Beyond this the water becomes toxic	No Relaxation	To be tested when pollution is suspected
23.	Cyanide	0.05	Beyond this the water becomes toxic	No Relaxation	To be tested when pollution is suspected
24.	Lead (mg/L Pb) Max.	0.05	Beyond this the water becomes toxic	No Relaxation	To be tested when pollution is suspected
25.	Zinc (mg/L, Zn) Max.	5	Beyond this limit it can cause astringent taste and an opalescence in water	15	To be tested when pollution is suspected
26.	Anionic detergents (mg/L, MBAS) Max	0.2	Beyond this limit it can cause a light froth in water	1.0	To be tested when pollution is suspected
27.	Chromium (mg/L, Cr ⁶⁺)	0.05	May be carcinogenic above this limit	-	-
28.	Polynuclear Aromatic Hydrocarbons (mg/L, PAH) Max	-	May be carcinogenic	-	-
29.	Mineral oil (mg/L)	0.01	Beyond this limit, undesirable taste and odour after chlorination takes place	0.03	To be tested when pollution is suspected
30.	Pesticides (mg/L) max	Absent	Toxic	0.001	-
Radioactive materials					
31.	Alpha emitters Bq/L Max	-	-	0.1	-
32.	Beta emitters Pci/L Max	-	-	1.0	-
33.	Alkalinity (mg/L,) Max	200	Beyond this limit, taste becomes unpleasant	600	-

No.	Substance or characteristic	Requirement Desirable limit	Undesirable effect outside the desirable	Permissible limit in the absence of alternate Source	Remarks
34.	Aluminum (mg/L, Al) Max	0.03	Cumulative effect is reported to cause dementia	0.2	
35.	Boron (mg/L) Max	1.0	-	5.0	-

Appendix 7

Compliance with Environmental Criteria for Subproject Selection

Applicability	Environmental Selection Criteria	Compliance
All Subprojects	i. Comply with all requirements of relevant national and state laws.	Being complied
	ii. Avoid significant environmental impacts.	Being complied
	iii. Avoid and/or minimize involuntary resettlement by prioritizing rehabilitation over new construction, using vacant government land where possible, and taking all possible measures in design and selection of site or alignment to avoid resettlement impacts	Complied
	iv. Avoid locating subprojects in forest areas	Complied
	v. If there are underground asbestos cement (AC) pipes in the existing systems, the project design should include that the AC pipes are left undisturbed in the ground	Being complied
	vi. Prior to site clearance & trench exaction for pipes/sewers, exact location of underground AC pipes should be ascertain with the Public Health Engineering Department (PHED)	
	vii. Avoid where possible, and minimize to extent feasible, facilities in locations with social conflicts.	Complied
	viii. Avoid where possible locations that will result in destruction/disturbance to historical and cultural places/values.	Being complied
	ix. Avoid tree-cutting where possible. Retain mature roadside trees which are important/valuable or historically significant. If any trees have to be removed, plant two new trees for every one that is lost.	Being complied
	x. Ensure all planning and design interventions and decisions are made in consultation with local communities and include women. Reflect inputs from public consultation and disclosure for site selection.	Being complied
Water Supply	i. Comply with all requirements of relevant national and local laws, rules, and guidelines.	Being complied
	ii. Utilize water sources at sustainable levels of abstraction only (i.e. without significant reductions in the quantity or quality of the source overall); augmentation of water supply from an existing groundwater source or development of new groundwater source should be supported by groundwater studies establishing water availability and sustainability	Not applicable
	iii. Avoid using water sources that may be polluted by upstream users;	Not applicable
	iv. Avoid water-use conflicts by not abstracting water that is used for other purposes (e.g., irrigation);	Not applicable
	v. Locate all new facilities/buildings at sites where there is no risk of flooding or other hazards that might impair functioning of, or present a risk of damage to water treatment plants, tanks/reservoirs, or their environs.	Complied
	vi. Locate pipelines within road right of way (RoW) as far as possible, to reduce the acquisition of new land. Ensure that pipeline routes do not require the acquisition of land from private owners in amounts that are a significant proportion of their total land holding (>10%).	Complied
	vii. Ensure that communities who relinquish land needed for pipelines or other facilities are provided with an improved water supply as part of the scheme.	Not applicable
	viii. Avoid all usage of pipes that are manufactured from asbestos concrete.	Complied
	ix. Ensure water to be supplied to consumers will meet national drinking water standards at all times.	Being complied
	x. Ensure that improvements in the water supply system are combined with improvements in wastewater and drainage to deal with the increased discharge of domestic wastewater.	Being complied
	xi. Ensure appropriate training will be provided to ULB staff on the	Being complied

Applicability	Environmental Selection Criteria	Compliance
	operations and maintenance of the facilities.	
	xii. Ensure sludge management facilities are included in the water treatment plant.	Not applicable
Sewerage	i. Comply with all requirements of relevant national and local laws, rules, and guidelines.	Being complied
	ii. Ensure no immediate downstream drinking water intakes at treated wastewater disposal point.	Being complied
	iii. Locate sewage treatment plant (STP) preferably 500 m from any inhabited areas, in locations where no urban expansion is expected in the next 20 years, so that people are not affected by odor or other nuisance from the STP.	Not applicable
	iv. Locate facilities where there is a suitable means of disposal for the treated wastewater effluent and bio-solids.	Not applicable
	v. Locate facilities where there is no risk of flooding or other hazards that might impair operations and present a risk of damage to the facilities or its environs.	Not applicable
	vi. Ensure appropriate training will be provided to ULB staffs on the operations and maintenance of the facilities.	Being complied
	vii. Locate sewage pipelines on roads RoW wherever feasible, to reduce the acquisition of new land	Complied

Appendix 8: Salient Features of Major Labor Laws Applicable to Establishments Engaged in Construction of Civil Works

- (i) Workmen Compensation Act, 1923 - The Act provides for compensation in case of injury by accident arising out of and during the course of employment.
- (ii) Payment of Gratuity Act, 1972 - Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years' service or more or on death at the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.
- (iii) Employees' PF and Miscellaneous Provisions Act, 1952 - The Act provides for monthly contributions by the employer plus workers @10 % or 8.33 %. The benefits payable under the Act are: (a) Pension or family pension on retirement or death as the case may be; (b) deposit linked insurance on the death in harness of the worker; (c) payment of PF accumulation on retirement/death etc.
- (iv) Maternity Benefit Act, 1951 - The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.
- (v) Contract Labour (Regulation and Abolition) Act, 1970 - The Act provides for certain welfare measures to be provided by the Contractor to contract labor and in case the Contractor fails to provide, the same are required to be provided by the Principal Employer by Law. The principal employer is required to take Certificate of Registration and the Contractor is required to take a License from the designated Officer. The Act is applicable to the establishments or Contractor of principal employer if they employ 20 or more contract labor.
- (vi) Minimum Wages Act, 1948 - The employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, Runways are scheduled employment.
- (vii) Payment of Wages Act, 1936 - It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.
- (viii) Equal Remuneration Act, 1979 - The Act provides for payment of equal wages for work of equal nature to Male and Female workers and not for making discrimination against Female employees in the matters of transfers, training and promotions etc.
- (ix) Payment of Bonus Act, 1965 - The Act is applicable to all establishments employing 20 or more workmen. The Act provides for payments of annual bonus subject to a minimum of 8.33 % of wages and maximum of 20 % of wages to employees drawing Rs. 3,500/- per month or less. The bonus to be paid to employees getting Rs. 2,500/- per month or above up to Rs.3,500/- per month shall be worked out by taking wages as Rs.2,500/- per month only. The Act does not apply to certain establishments. The newly set up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of the Act.
- (x) Industrial Disputes Act, 1947 - The Act lays down the machinery and procedure for resolution of industrial disputes, in what situations a strike or lock-out becomes illegal and what

are the requirements for laying off or retrenching the employees or closing down the establishment.

(xi) Industrial Employment (Standing Orders) Act, 1946 - It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the employer on matters provided in the Act and get the same certified by the designated Authority.

(xii) Trade Unions Act, 1926 - The Act lays down the procedure for registration of trade unions of workmen and employees. The trade unions registered under the Act have been given certain immunities from civil and criminal liabilities.

(xiii) Child Labor (Prohibition and Regulation) Act, 1986 - The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of child labor is prohibited in Building and Construction Industry.

(xiv) Inter-State Migrant Workmen's (Regulation of Employment and Conditions of Service) Act, 1979 - The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The inter-state migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home up to the establishment and back, etc.

(xv) The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996 - All the establishments who carry on any building or other construction work and employ 10 or more workers are covered under this Act. All such establishments are required to pay Cess at rate not exceeding 2% of the cost of construction as may be notified by the Government. The employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation for workers near the workplace etc. The employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.

Appendix 9: Sample Outline Spoil Management Plan

- The Spoil Management Plan should be site specific and be part of the monthly Construction Management Plan.
- The contractor, in consultation with the ULB, has to find out appropriate location/s for the disposal of the excess soil generated. The spoils should be deposited only at these sites.
- Further precautions need to be taken in case of the contaminated spoils.
- The vehicle carrying the spoil should be covered properly.
- The spoils generating from each site should be removed on the same day or immediately after the work is complete. The site / road should be restored to the original condition.

I. Spoils information

The spoil information contains the details like a) The type / material, b) Potential contamination by that type, c) Expected volume (site / component specific), d) Spoil Classification etc.

II. Spoils management

The Spoil Management section gives the details of a) Transportation of spoil b) disposal site details c) Precautions taken d) Volume of contaminated spoil, if present, d) Suggested reuse of disposal of the spoil

III. Documentation

The volume of spoil generated (site specific, date wise), site disposed, reuse / disposal details should be documented properly.

Appendix 10: Sample Outline Traffic Management Plan

A. Principles for TMP around the Water Pipes/Sewer Construction Sites

1. One of the prime objectives of this TMP is to ensure the safety of all the road users along the work zone, and to address the following issues:
 - (i) the safety of pedestrians, bicyclists, and motorists travelling through the construction zone;
 - (ii) protection of work crews from hazards associated with moving traffic;
 - (iii) mitigation of the adverse impact on road capacity and delays to the road users;
 - (iv) maintenance of access to adjoining properties; and
 - (v) addressing issues that may delay the project.

B. Operating Policies for TMP

2. The following principles will help promote safe and efficient movement for all road users (motorists, bicyclists, and pedestrians, including persons with disabilities) through and around work zones while reasonably protecting workers and equipment.
 - (i) Make traffic safety and temporary traffic control an integral and high-priority element of project from planning through design, construction, and maintenance.
 - (ii) Inhibit traffic movement as little as possible.
 - (iii) Provide clear and positive guidance to drivers, bicyclists, and pedestrians as they approach and travel through the temporary traffic control zone.
 - (iv) Inspect traffic control elements routinely, both day and night, and make modifications when necessary.
 - (v) Pay increased attention to roadside safety in the vicinity of temporary traffic control zones.
 - (vi) Train all persons that select, place, and maintain temporary traffic control devices.
 - (vii) Keep the public well informed.
 - (viii) Make appropriate accommodation for abutting property owners, residents, businesses, emergency services, railroads, commercial vehicles, and transit operations.
3. **Figure A2 to Figure A12** illustrates the operating policy for TMP for the construction of water pipes and the sewers along various types of roads.

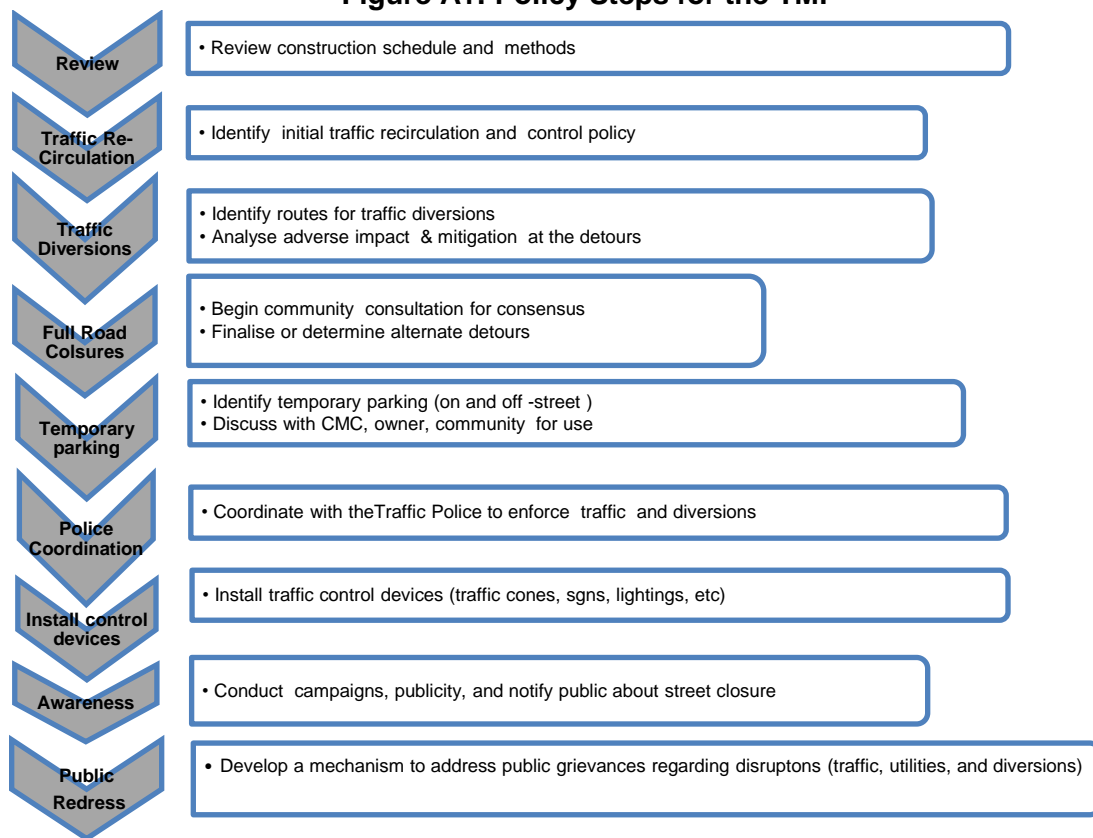
C. Analyze the impact due to street closure

4. Apart from the capacity analysis, a final decision to close a particular street and divert the traffic should involve the following steps:
 - (i) approval from the ULB/ Public Works Department (PWD) to use the local streets as detours;
 - (ii) consultation with businesses, community members, traffic police, PWD, etc., regarding the mitigation measures necessary at the detours where the road is diverted during the construction;
 - (iii) determining of the maximum number of days allowed for road closure, and incorporation of such provisions into the contract documents;

- (iv) determining if additional traffic control or temporary improvements are needed along the detour route;
- (v) considering how access will be provided to the worksite;
- (vi) contacting emergency service, school officials, and transit authorities to determine if there are impacts to their operations; and
- (vii) developing a notification program to the public so that the closure is not a surprise. As part of this program, the public should be advised of alternate routes that commuters can take or will have to take as result of the traffic diversion.

5. If full road-closure of certain streets within the area is not feasible due to inadequate capacity of the detour street or public opposition, the full closure can be restricted to weekends with the construction commencing on Saturday night and ending on Monday morning prior to the morning peak period.

Figure A1: Policy Steps for the TMP



D. Public awareness and notifications

6. As per discussions in the previous sections, there will be travel delays during the constructions, as is the case with most construction projects, albeit on a reduced scale if utilities and traffic management are properly coordinated. There are additional grounds for travel delays in the area, as most of the streets lack sufficient capacity to accommodate additional traffic from diverted traffic as a result of street closures to accommodate the works.

6. The awareness campaign and the prior notification for the public will be a continuous activity which the project will carry out to compensate for the above delays and minimize public claims as result of these problems. These activities will take place sufficiently in advance of the time when the roadblocks or traffic diversions take place at the particular streets. The reason for this is to allow sufficient time for the public and residents to understand the changes to their travel plans. The project will notify the public about the roadblocks and traffic diversion through public notices, ward level meetings and city level meeting with the elected representatives.

7. The PIU will also conduct an awareness campaign to educate the public about the following issues:

- (i) traffic control devices in place at the work zones (signs, traffic cones, barriers, etc.);
- (ii) defensive driving behaviour along the work zones; and
- (iii) reduced speeds enforced at the work zones and traffic diversions.

8. It may be necessary to conduct the awareness programs/campaigns on road safety during construction.

9. The campaign will cater to all types of target groups i.e. children, adults, and drivers. Therefore, these campaigns will be conducted in schools and community centres. In addition, the project will publish a brochure for public information. These brochures will be widely circulated around the area and will also be available at the PIU, and the contractor's site office. The text of the brochure should be concise to be effective, with a lot of graphics. It will serve the following purpose:

- (i) explain why the brochure was prepared, along with a brief description of the project;
- (ii) advise the public to expect the unexpected;
- (iii) educate the public about the various traffic control devices and safety measures adopted at the work zones;
- (iv) educate the public about the safe road user behaviour to emulate at the work zones;
- (v) tell the public how to stay informed or where to inquire about road safety issues at the work zones (name, telephone, mobile number of the contact person; and
- (vi) indicate the office hours of relevant offices.

E. Install traffic control devices at the work zones and traffic diversion routes

10. The purpose of installing traffic control devices at the work zones is to delineate these areas to warn, inform, and direct the road users about a hazard ahead, and to protect them as well as the workers. As proper delineation is a key to achieve the above objective, it is important to install good traffic signs at the work zones. The following traffic control devices are used in work zones:

- Signs
- Pavement Markings
- Channelizing Devices
- Arrow Panels
- Warning Lights

11. Procedures for installing traffic control devices at any work zone vary, depending on road configuration, location of the work, construction activity, duration, traffic speed and volume, and pedestrian traffic. Work will take place along major roads, and the minor internal roads. As such, the traffic volume and road geometry vary. The main roads carry considerable traffic; internal roads in the new city areas are wide but in old city roads very narrow and carry considerable traffic. However, regardless of where the construction takes place, all the work zones should be cordoned off, and traffic shifted away at least with traffic cones, barricades, and temporary signs (temporary “STOP” and “GO”).

12. **Figure A2 to Figure A12** illustrates a typical set-up for installing traffic control devices at the work zone of the area, depending on the location of work on the road way, and road geometrics:

- Work on shoulder or parking lane
- Shoulder or parking lane closed on divided road
- Work in Travel lane
- Lane closure on road with low volume
- Lane closure on a two-line road with low volume (with yield sign)
- Lane closure on a two-line road with low volume (one flagger operation)
- Lane closure on a two lane road (two flagger operation)
- Lane closure on a four lane undivided Road
- Lane closure on divided roadway
- Half road closure on multi-lane roadway
- Street closure with detour

13. The work zone should take into consideration the space required for a buffer zone between the workers and the traffic (lateral and longitudinal) and the transition space required for delineation, as applicable. For the works, a 30 cm clearance between the traffic and the temporary STOP and GO signs should be provided. In addition, at least 60 cm is necessary to install the temporary traffic signs and cones.

14. Traffic police should regulate traffic away from the work zone and enforce the traffic diversion result from full street closure in certain areas during construction. Flaggers/ personnel should be equipped with reflective jackets at all times and have traffic control batons (preferably the LED type) for regulating the traffic during night time.

16. In addition to the delineation devices, all the construction workers should wear fluorescent safety vests and helmets in order to be visible to the motorists at all times. There should be provision for lighting beacons and illumination for night constructions.

Figure A2 & A3: Work on shoulder or parking lane & Shoulder or parking lane closed on divided road

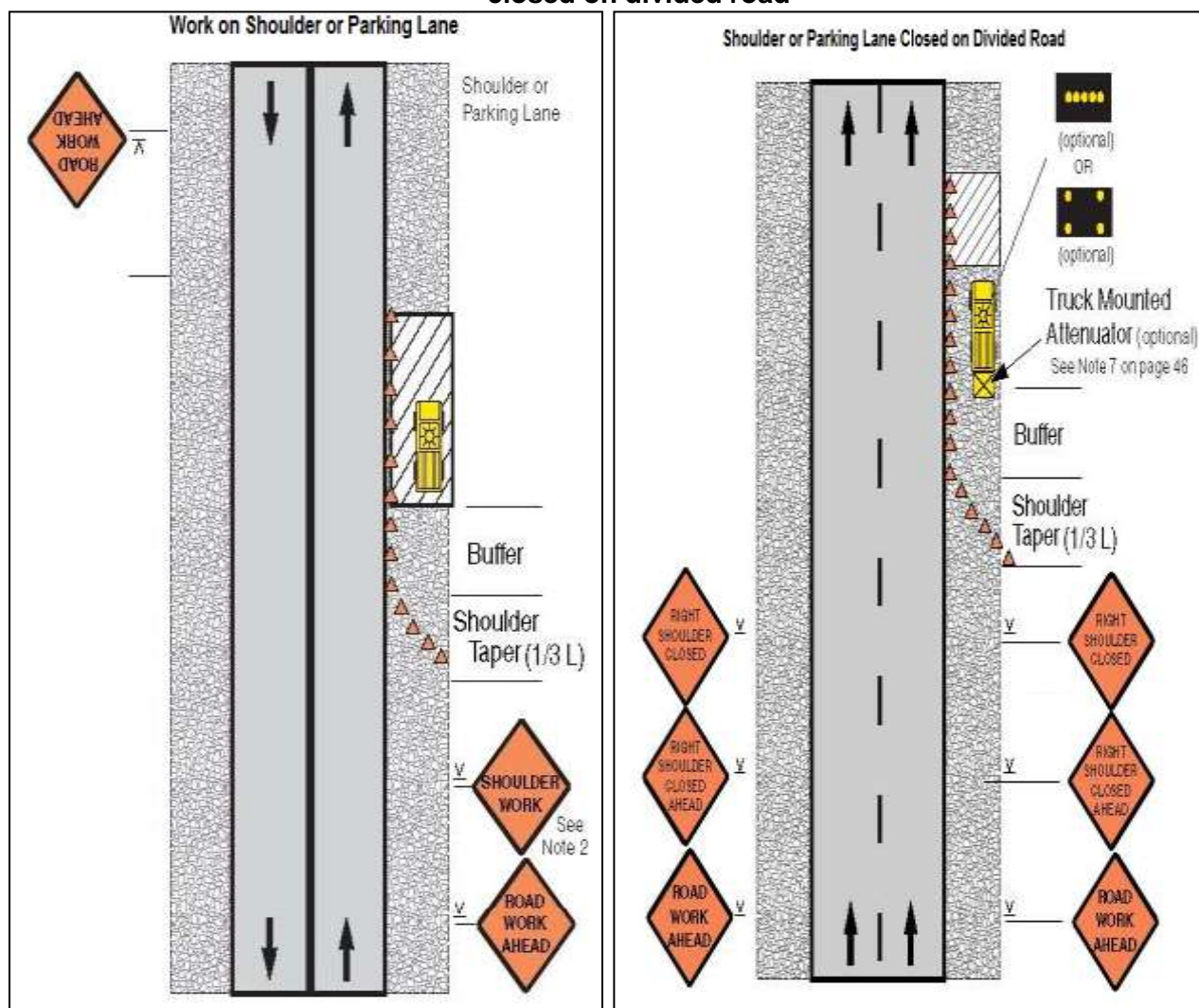
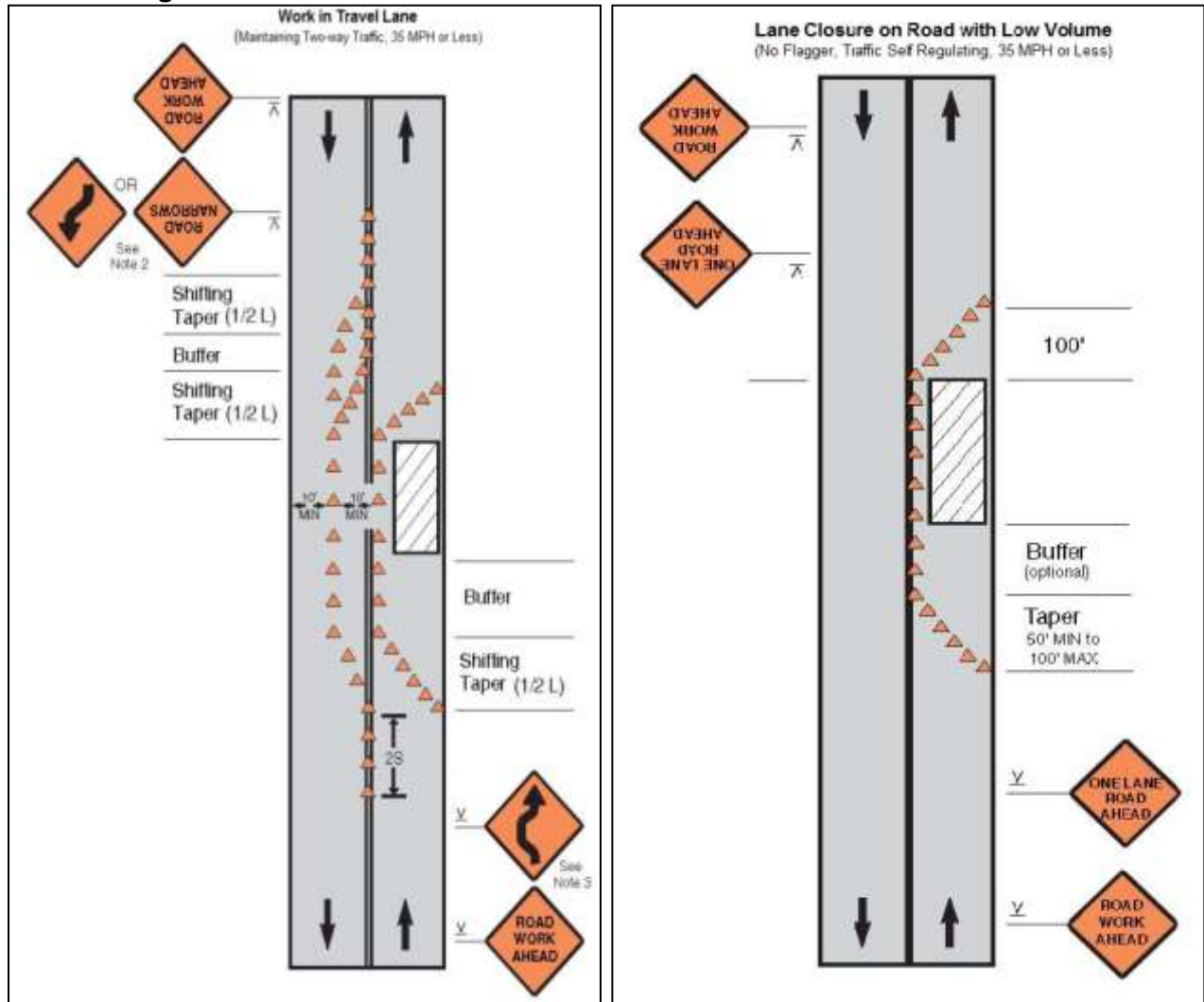


Figure A4 & A5: Work in Travel lane & Lane closure on road with low volume



**Figure A6 & A7: Lane closure on a two-line road with low volume (with yield sign)
& Lane closure on a two-line road with low volume (one flagger operation)**

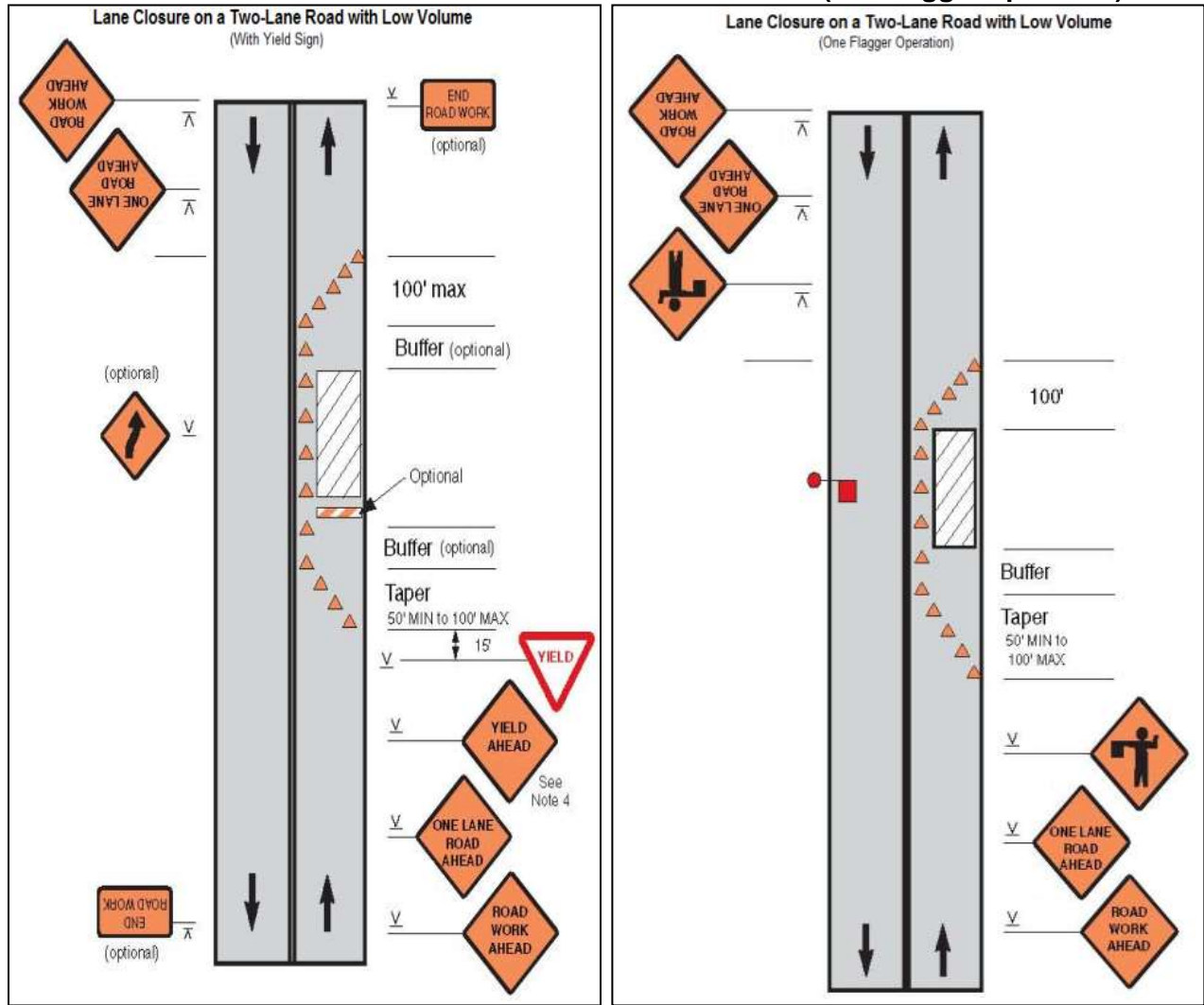


Figure A8 & A9: Lane Closure on a Two-Lane Road (Two Flagger Operation) & Lane Closure on a Four-Lane Undivided Road

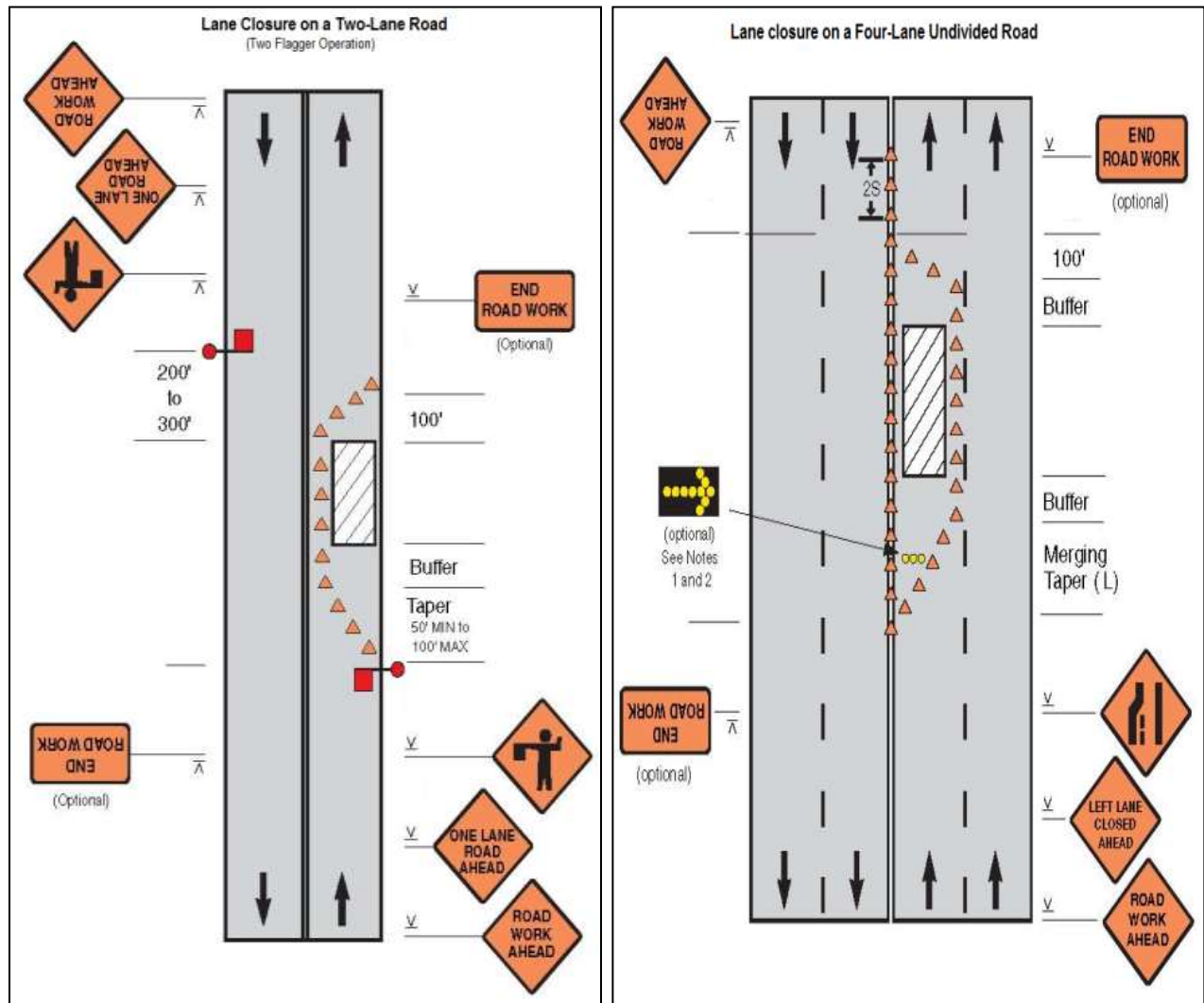


Figure A10 & A11: Lane Closure On Divided Roadway & Half Road Closure On Multi-Lane Roadway

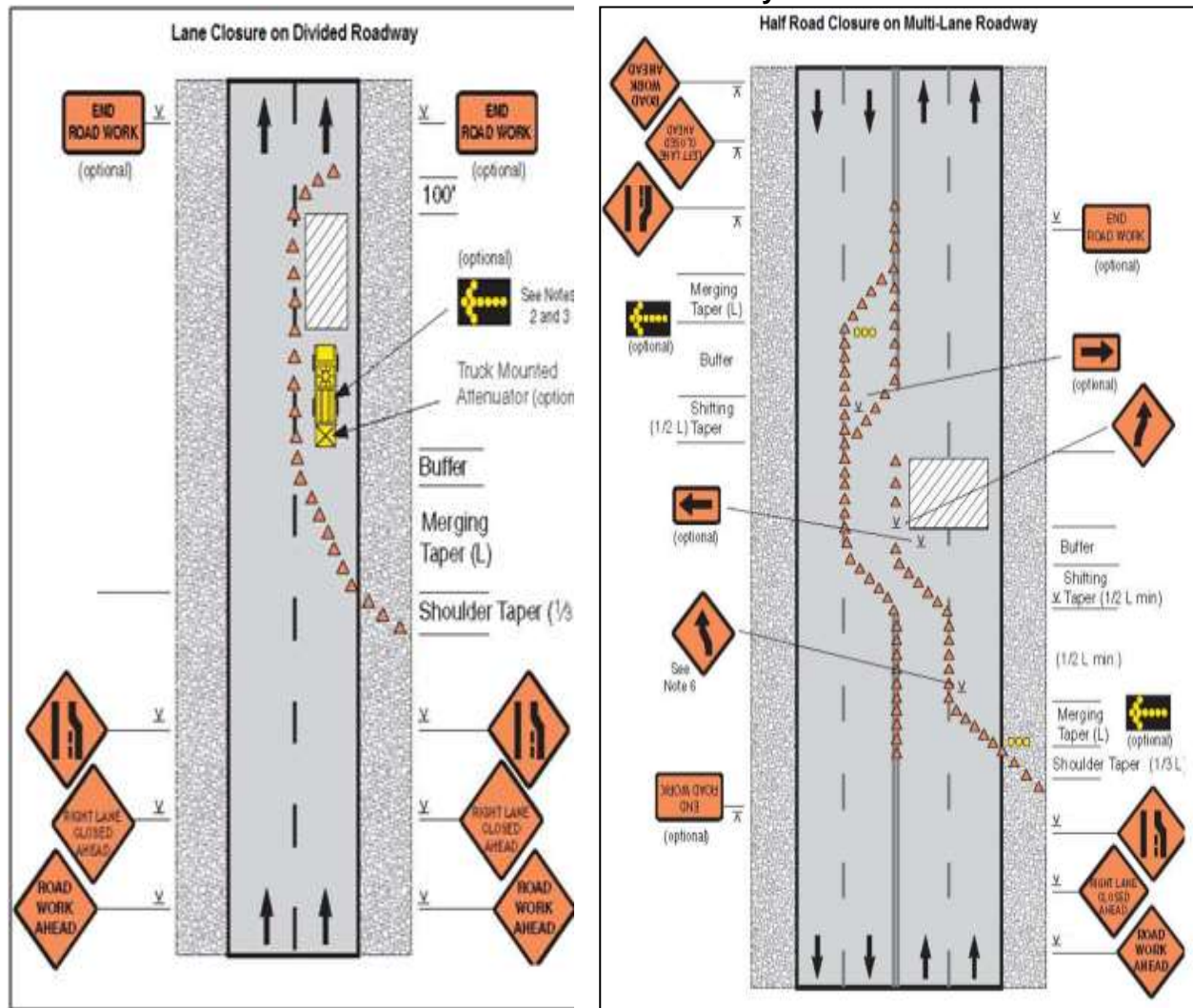
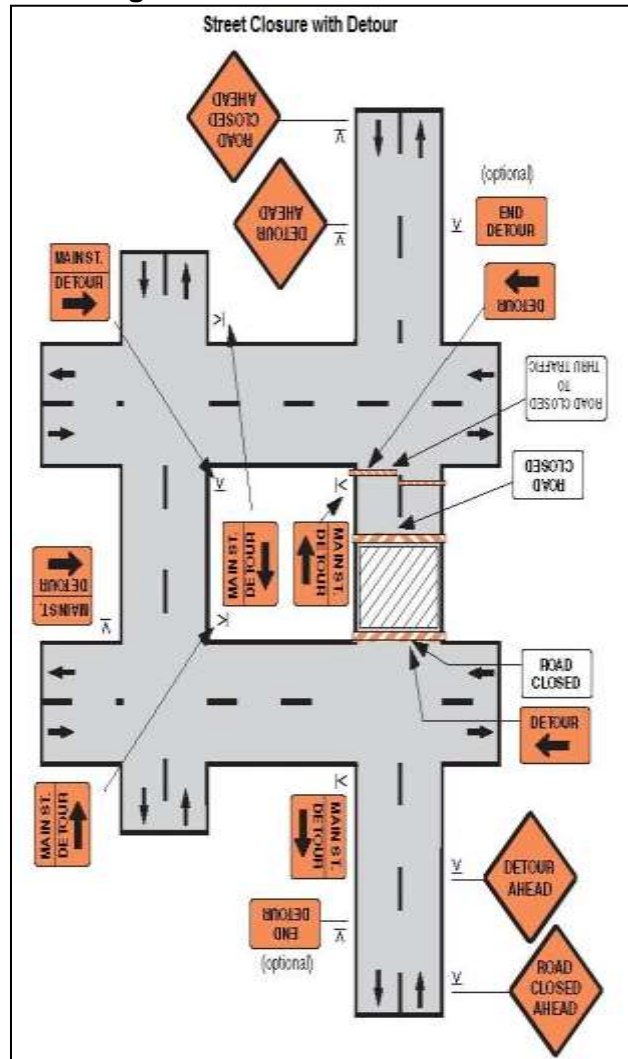


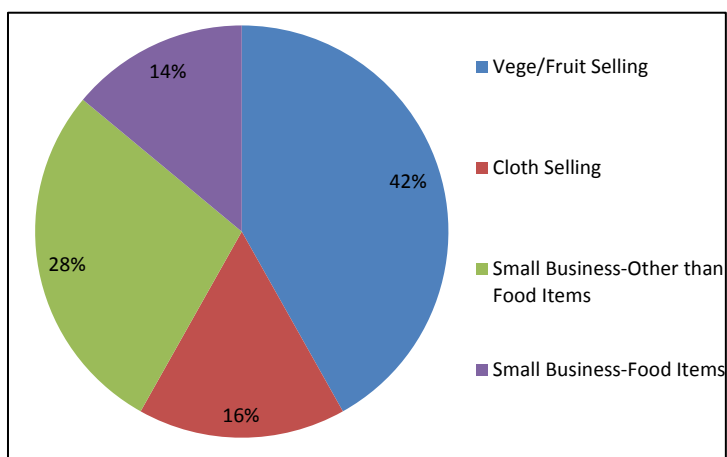
Figure A12: Street closure with detour



Appendix 11: Public Consultations Conducted During Project Preparation

A. Results of Socio-Economic Surveys Conducted in June-August 2013

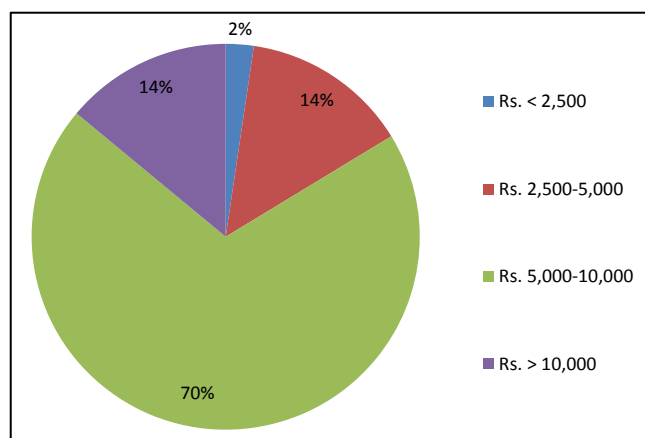
1. Transect walks identified a total of 43 APs whose business will be temporarily affected during pipe laying, as they carry their activities within RoW. These businesses can be broadly classified into four main categories as: (i) vegetable/fruit selling; (ii) cloth selling; (iii) small business other than food items such as shoe, watch selling etc.; and (iv) small businesses related to food items such as tea and fast food selling. Close to 42 percent of these however are engaged in vegetable/fruit selling.



Some of the surveyed APs (especially those engaged in vegetable/fruit selling) indicated that they sometimes take rounds in confined areas to sell their products home-to-home though their place of standing is stationary/fixed otherwise. Almost all of them (80 percent) have movable structures while some APs sit on roads for selling their goods. An average cost of their business unit/structure was estimated at Rs. 11,430 with minimum at Rs. 2,000 and maximum at Rs. 40,000.

2. Street vending is quite a common practice in commercial and mixed land use areas of Jhunjhunu and around 40 percent of the APs indicated that they are doing their business at present location for more than 10 years. An additional 28 percent indicated that they have this fixed location for more than five years while the remaining 33 percent said they have moved in respective places in last 1-5 years.

3. In terms of the socio-economic background around two percent of APs earn income below poverty line (Rs. less than 2,500 per month). A majority of the households (70 percent) earn monthly income between Rs. 5,000-10,000 and belong to lower middle class group. Average monthly income works out at Rs. 7,779 with minimum at Rs. 2,000 and maximum at Rs. 18,000. Considering work week of six days (26 days per month), average daily income is estimated at Rs. 299 for APs. This is certainly higher than daily minimum wages prescribed for the region for skilled labour at Rs.166.

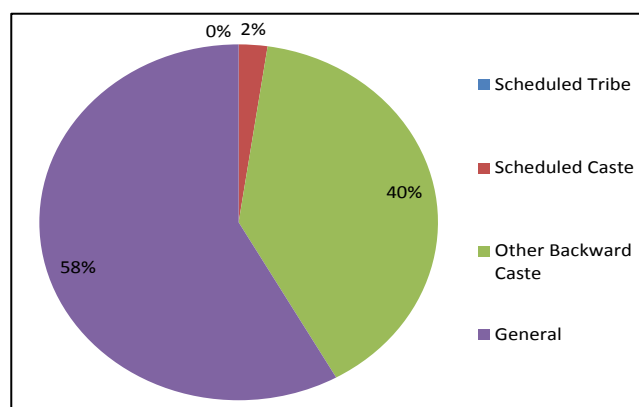


4. A majority of the APs (58%) belong to general (upper) caste category while the remaining are scheduled caste (SCs-2%), and other backward classes (OBC-40%). There were no scheduled tribe (ST) APs and women headed households (WHH)¹ found during the survey.

¹ Household is considered women headed when she is the single bread earner of the family or earn most of the

Total vulnerable² APs comprise four percent of the total surveyed APs. Average family size for surveyed APs was 6.7. All the surveyed APs were residents of Jhunjhunu living in city for more than 5 years.

5. Transect walk data/analysis will be updated road wise where pipelines will be laid before mobilization of contractor and revised RP will be submitted to the ADB for approval³. A 100 percent census and socio-economic surveys will be undertaken to register and document the status of affected people (APs) within subproject impact area⁴.



income for the family.

² Vulnerable households may include female-headed household, physically handicapped-headed household, scheduled tribe-headed households, Below Poverty Line households, and households with marginal land holdings, that is the only source of livelihood, and majority of that land is being acquired under the project.

³ It is suggested under this RUSDP that separate RPs needs to be prepared for each subproject (separate for water supply and sewerage, and not city wise) and list of temporary APs should be separated from any APs which envisage permanent impacts. RPs should also include separate and clear sections on their socio-economic profile, impacts and entitlements.

⁴ During RP revision, census/socio-economic surveys for temporary impacts should include specific questions on place of business, its seasonal variation and AP's migrant nature. A separate list of such APs should be made to suggest that they may not be present at the same location during construction time/compensation. These APs however will be still entitled for compensation (if affected due to project). However, such list will tentatively indicate PMU/PIU/ADB the extent of missing APs during implementation. It is also suggested under this RUSDP that missing APs under temporary impacts not traceable for more than 18 months after the start of compensation disbursement, or do not claim their entitlement within project construction period, will bear no impacts of the project and hence will not be considered for compensation.

Appendix 12: Sample Monthly Reporting Format for Assistant Safeguards Officer/Assistant Construction Manager

1. Introduction

- Overall project description and objectives
- Description of sub-projects
- Environmental category of the sub-projects
- Details of site personnel and/or consultants responsible for environmental monitoring
- Overall project and sub-project progress and status

No.	Sub-Project Name	Status of Sub-Project				List of Works	Progress of Works
		Design	Pre-Construction	Construction	Operational Phase		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

2. Compliance status with National/ State/ Local statutory environmental requirements

No.	Sub-Project Name	Statutory Environmental Requirements	Status of Compliance	Action Required

3. Compliance status with environmental loan covenants

No. (List schedule and paragraph number of Loan Agreement)	Covenant	Status of Compliance	Action Required

4. Compliance status with the environmental management and monitoring plan

- Provide the monitoring results as per the parameters outlined in the EMP. Append supporting documents where applicable, including Environmental Site Inspection Reports.
- There should be reporting on the following items which can be incorporated in the checklist of routine Environmental Site Inspection Report followed with a summary in the semi-annual report send to ADB. Visual assessment and review of relevant site documentation during routine site inspection needs to note and record the following:
 - What are the dust suppression techniques followed for site and if any dust was noted to escape the site boundaries;
 - If muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads;
 - adequacy of type of erosion and sediment control measures installed on site, condition of erosion and sediment control measures including if these were intact following heavy rain;

- Are their designated areas for concrete works, and refuelling;
- Are their spill kits on site and if there are site procedure for handling emergencies;
- Is there any chemical stored on site and what is the storage condition?
- Is there any dewatering activities if yes, where is the water being discharged;
- How are the stockpiles being managed;
- How is solid and liquid waste being handled on site;
- Review of the complaint management system;
- Checking if there are any activities being under taken out of working hours and how that is being managed.

Summary Monitoring Table

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
Design Phase						
Pre-Construction Phase						
Construction Phase						
Operational Phase						

Overall Compliance with CEMP/ EMP

No.	Sub-Project Name	EMP/ CEMP Part of Contract Documents (Y/N)	CEMP/ EMP Being Implemented (Y/N)	Status of Implementation (Excellent/ Satisfactory/ Partially Satisfactory/ Below Satisfactory)	Action Proposed and Additional Measures Required

5. Approach and methodology for environmental monitoring of the project

- Brief description on the approach and methodology used for environmental monitoring of each sub-project

6. Monitoring of environmental impacts on project surroundings (ambient air, water quality and noise levels)

- Brief discussion on the basis for monitoring
- Indicate type and location of environmental parameters to be monitored
- Indicate the method of monitoring and equipment to be used
- Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements

As a minimum the results should be presented as per the tables below.

Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Government Standards)		
			PM10 µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM10 µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³

Water Quality Results

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L

Site No.	Date of Sampling	Site Location	Parameters (Monitoring Results)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L

Noise Quality Results

Site No.	Date of Testing	Site Location	LA _{eq} (dBA) (Government Standard)	
			Day Time	Night Time

Site No.	Date of Testing	Site Location	LA _{eq} (dBA) (Monitoring Results)	
			Day Time	Night Time

7. Summary of key issues and remedial actions

- Summary of follow up time-bound actions to be taken within a set timeframe.

8. Appendixes

- Photos
- Summary of consultations
- Copies of environmental clearances and permits
- Sample of environmental site inspection report
- Other

Appendix 13: SAMPLE ENVIRONMENTAL SITE INSPECTION REPORT

Project Name _____
 Contract Number _____

NAME: _____ DATE: _____
 TITLE: _____ DMA: _____
 LOCATION: _____ GROUP: _____

WEATHER: _____

Project Activity Stage	Survey	
	Design	
	Implementation	
	Pre-Commissioning	
	Guarantee Period	

Monitoring Items	Compliance
Compliance marked as Yes / No / Not applicable (NA) / Partially Implemented (PI)	
EHS supervisor appointed by contractor and available on site	
Construction site management plan (spoils, safety, schedule, equipment etc.,) prepared	
Traffic management plan prepared	
Dust is under control	
Excavated soil properly placed within minimum space	
Construction area is confined; no traffic/pedestrian entry observed	
Surplus soil/debris/waste is disposed without delay	
Construction material (sand/gravel/aggregate) brought to site as & when required only	
Tarpaulins used to cover sand & other loose material when transported by vehicles	
After unloading , wheels & undercarriage of vehicles cleaned prior to leaving the site	
No AC pipes disturbed/removed during excavation	
No chance finds encountered during excavation	
Work is planned in consultation with traffic police	
Work is not being conducted during heavy traffic	
Work at a stretch is completed within a day (excavation, pipe laying & backfilling)	
Pipe trenches are not kept open unduly	
Road is not completely closed; work is conducted on edge; at least one line is kept open	
Road is closed; alternative route provided & public informed, information board provided	
Pedestrian access to houses is not blocked due to pipe laying	
Spaces left in between trenches for access	
Wooden planks/metal sheets provided across trench for pedestrian	
No public/unauthorized entry observed in work site	
Children safety measures (barricades, security) in place at works in residential areas	
Prior public information provided about the work, schedule and disturbances	
Caution/warning board provided on site	
Guards with red flag provided during work at busy roads	
Workers using appropriate PPE (boots, gloves, helmets, ear muffs etc)	
Workers conducting or near heavy noise work is provided with ear muffs	
Contractor is following standard & safe construction practices	
Deep excavation is conducted with land slip/protection measures	
First aid facilities are available on site and workers informed	

Monitoring Items	Compliance
Drinking water provided at the site	
Toilet facility provided at the site	
Separate toilet facility is provided for women workers	
Workers camps are maintained cleanly	
Adequate toilet & bath facilities provided	
Contractor employed local workers as far as possible	
Workers camp set up with the permission of PIU	
Adequate housing provided	
Sufficient water provided for drinking/washing/bath	
No noisy work is conducted in the nights	
Local people informed of noisy work	
No blasting activity conducted	
Pneumatic drills or other equipment creating vibration is not used near old/risky buildings	

Signature

Sign off

Name
Position

Name
Position

Appendix 14: Sample Grievance Registration Form

(To be available in Hindi and English)

The _____ Project welcomes complaints, suggestions, queries, and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback. Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing *(CONFIDENTIAL)* above your name. Thank you.

Date	Place of registration	Project Town			
		Project:			
Contact information/personal details					
Name		Gender	* Male * Female	Age	
Home address					
Place					
Phone no.					
E-mail					
Complaint/suggestion/comment/question Please provide the details (who, what, where, and how) of your grievance below:					
If included as attachment/note/letter, please tick here:					
How do you want us to reach you for feedback or update on your comment/grievance?					

FOR OFFICIAL USE ONLY

Registered by: (Name of official registering grievance)	
Mode of communication: Note/letter E-mail Verbal/telephonic	
Reviewed by: (Names/positions of officials reviewing grievance)	
Action taken:	
Whether action taken disclosed:	Yes No
Means of disclosure:	