

# Initial Environmental Examination

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## India: Rajasthan Urban Sector Development Investment Program—Chittorgarh Water Supply

Prepared by Local Self Government Department

For the Government of Rajasthan  
Rajasthan Urban Infrastructure Development Project

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

## ABBREVIATIONS

ADB	— Asian Development Bank
ASI	— Archaeological Survey of India
CAPP	— Community Awareness Participation Program
CBO	— community-based organization
CFE	— Consent for Establishment
CFO	— Consent for Operation
CLC	— City Level Committees
CLIP	— City Level Investment Plan
CMB	— Chittorgarh Municipal Board
CPHEEO	— Central Public Health and Environmental Engineering Organization
CWR	— clear water reservoirs
DSC	— Design and Supervision Consultants
EAC	— Expert Appraisal Committee
EARF	— Environmental Assessment Resettlement Framework
EIA	— Environmental Impact Assessment
EMP	— Environmental Management Plan
EMS	— Environmental Monitoring Specialist
EPA	— Environmental Protection Agency
GLSR	— ground level service reservoir
GRC	— Grievance Redress Committee
H&S	— health and safety
HCC	— Hindusthan Construction Company
IEE	— Initial Environmental Examination
IPIU	— Investment Program Implementation Unit
IPMC	— Investment Program Management Consultancy
IPMU	— Investment Program Project Management Unit
ITI	— industrial training institutes
JNNURM	— Jawaharlal Nehru National Urban Renewal Mission
LSGD	— Local Self Government Department
MFF	— Multitranches financing facility
MLD	— million liters per day
MOEF	— National Ministry of Environment and Forests
NAAQS	— National Ambient Air Quality Standards
NGO	— nongovernmental organization
NRRP	— National Resettlement and Rehabilitation Policy
O&M	— operation and maintenance
OHSA	— Occupational Health and Safety Administration
OHSR	— Overhead storage reservoirs
OMC	— Operations and Maintenance Contractors
PHED	— Public Health Engineering Department
PIU	— Project Implementation Unit
PMU	— Project Management Unit
RCC	— reinforce cement concrete
ROW	— right of way
RSPCB	— Rajasthan State Pollution Control Board
RUIDP	— Rajasthan Urban Infrastructure Development Project
RUSDIP	— Rajasthan Urban Sector Development Investment

	Programme
SEIAA	— State Environment Impact Assessment Authority
SPS	— Safeguard Policy Statement
STP	— sewage treatment plant
TDS	— total dissolved solids
TOR	— terms of reference
UFW	— unaccounted for water
UIDSSMT	— Urban Infrastructure Development Scheme for Small and Medium Towns
ULB	— urban local body
USEPA	— United States Environmental Protection Agency
WTP	— water treatment plant

### WEIGHTS AND MEASURES

$\mu\text{g}/\text{m}^3$	— micrograms per cubic meter
km	— kilometer
lpd	— liters per day
lpcd	liters per capita per day
lph	liters per hour
lps	liters per second
m	— meter
mg/l	— milligrams per liter
mm	— millimeter
ppm	— parts per million

### NOTES

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

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## EXECUTIVE SUMMARY

1. Rajasthan Urban Sector Development Investment Program (RUSDIP) is intended to optimize social and economic development in 15 selected towns in the State, particularly district headquarters and towns with significant tourism potential. RUSDIP Phase II is being implemented over a seven year period beginning in 2008, and being funded by a Multitranche Financing Facility (MFF) loan from Asian Development Bank (ADB). The Executing Agency is the Local Self-Government Department (LSGD) of the Government of Rajasthan; and the Implementing Agency is the Project Management Unit (PMU) of the Rajasthan Urban Infrastructure Development Project (RUIDP). ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for Environmental Assessment are described in ADB's Safeguard Policy Statement (SPS). This states that ADB requires environmental assessment of all project loans, program loans, sector loans, sector development program loans, loans involving financial intermediaries, and private sector loans.

2. This Initial Environmental Examination (IEE) has been prepared for the Chittorgarh Water Supply Subproject as part of RUSDIP Phase II – Tranche 3. The subproject covers (i) improvement in the existing distribution system; (ii) provision of a new network, clear water reservoirs (CWR) with pumping stations, additional pumping stations, overhead storage reservoirs (OHSR) and ground level service reservoir (GLSR); and (iii) construction of 2 water treatment plants (WTPs) including intake well, pumping mains, rising main from tube wells to CWRs and distribution pipelines.

3. An Environmental Management Plan (EMP) is proposed as part of this report which includes (i) mitigation measures for significant environmental impacts during implementation, (ii) environmental monitoring program, and the responsible entities for mitigation, monitoring, and reporting; and (iii) public consultation and information disclosure; and grievance redress mechanism.

4. The subproject is needed because the present water supply system is inadequate for the needs of the growing population. The current rate is at 65 liters per capita per day (lpcd) which is below the government required 135 lpcd and the unaccounted for water (UFW) is 40%. The storage and distribution network is insufficient to meet even present requirements. Improvement in the water supply system has been identified as a major priority in the City Level Investment Plan (CLIP) prepared for Chittorgarh town. The CLIP has been discussed at the City Level Committee (CLC) meeting comprising of the major stakeholders, who reinforced /confirmed that the proposed water supply subproject is a priority for the town.

Detailed design has begun in the 1st quarter of 2010 and been completed in September 2010. Implementation will in 2011 and likely to be completed by middle of 2012.

5. The subproject sites are located in the built-up area of Chittorgarh town. The subproject sites, being located in the town area, are generally flat. The subproject sites are not located in areas prone to water-logging, salinasation, and flash flooding. There are no protected areas, wetlands, mangroves, or estuarines in or within the subproject sites. Trees, vegetation (mostly shrubs and grasses), and animals are those commonly found in urban areas. The subproject sites are not located in agricultural lands. The subproject sites are not located in or near any historically-, culturally-, archaeologically- or architecturally-significant or tourists area, and well outside the Chittorgarh fort boundaries.

6. Potential negative impacts were identified in relation to construction and operation of the improved infrastructure. No impacts were identified as being due to the project design or

location. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. A number of impacts and their significance have already been reduced by amending the designs.

7. Special measures were also developed to protect workers and the public from exposure to carcinogenic asbestos fibres in the event that asbestos cement pipes used in the existing water supply system are uncovered accidentally during excavation work

8. During the construction phase, impacts mainly arise from the need to dispose of large quantities of waste soil and import a similar amount of sand to support the pipes in the trenches; and from the disturbance of residents, businesses, traffic and important buildings by the construction work. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation.

9. The use of asbestos cement pipes in the existing water distribution network presents a particular problem, as workers and the public will need to be protected from inhalation of asbestos dust, which can be carcinogenic. This has been addressed in the EMP.

10. It is proposed that the project will employ in the workforce people who live in the vicinity of construction sites to provide them with a short-term economic gain; and ensure that people employed in the longer term to maintain and operate the new facilities are residents of nearby communities.

11. Once the system is operating, most facilities (OHSRs, WTP, pump house) will operate with routine maintenance, which should not affect the environment. Leaks in the distribution network 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. It will also be conducted in areas that have already been excavated, so there will be no need to protect archaeological material.

12. The main impacts of the operating water supply system will be beneficial to the citizens of Chittorgarh. They will be provided with a constant supply of water thus improve the quality of life of people as well as benefit individual and public health with improvements in hygiene. This will reduce the incidence of disease associated with poor sanitation. This will also lead to economic gains as people will be less away from work and indirectly increase their income.

13. Mitigation will be assured by a program of environmental monitoring conducted during construction and operation to ensure that all measures in the EMP are implemented and to determine whether the environment is protected as intended. This will include observations on- and off-site, document checks, and interviews with workers and beneficiaries, and any requirements for remedial action will be reported to the Investment Program Management Unit (IPMU). There will also be longer-term surveys to monitor the expected improvements in the quality of domestic water and the health of the population.

14. The stakeholders were involved in developing the IEE through face-to-face discussions on site and a large public meeting held in the town, after which views expressed were incorporated into the IEE and the planning and development of the project. The IEE will be made available at public locations in the town and will be disclosed to a wider audience via ADB website. The consultation process will be continued and expanded during project implementation, when a nationally-recognised nongovernmental organization (NGO) will be

appointed to handle this key element to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation

15. Therefore the subproject is unlikely to cause significant adverse impacts. The potential adverse impacts that are associated with design, construction, and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures. Based on the findings of the IEE, the classification of the Project as Category "B" is confirmed, and no further special study or detailed Environmental Impact Assessment (EIA) needs to be undertaken to comply with ADB SPS (2009) or Government of India EIA Notification (2006).

## I. INTRODUCTION

### A. Purpose of the Report

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

2. RUSDIP Phase II is being implemented over a seven year period beginning in 2008, and being funded by a loan via the Multitranches Financing Facility (MFF) of Asian Development Bank (ADB). The Executing Agency is the Local Self-Government Department (LSGD) of the Government of Rajasthan; and the Implementing Agency is the Project Management Unit (PMU) of the Rajasthan Urban Infrastructure Development Project (RUIDP).

3. This Initial Environmental Examination (IEE) has been prepared for the Chittorgarh Water Supply Subproject as part of RUSDIP Phase II Tranche 3. The subproject covers (i) improvement in the existing distribution system; (ii) provision of a new network, clear water reservoirs (CWR) with pumping stations, additional pumping stations, overhead storage reservoirs (OHSR) and ground level service reservoir (GLSR); and (iii) construction of 2 water treatment plants (WTPs) including intake well, pumping mains, rising main from tube wells to CWRs and distribution pipelines.

4. This IEE report covers the general environmental profile of Chittorgarh and includes an overview of the potential environmental impacts and their magnitude on physical, ecological, economic, and social and cultural resources within the subproject's influence area during design, construction, and operation stages. An Environmental Management Plan (EMP) is also proposed as part of this report which includes mitigation measures for significant environmental impacts during implementation of the Project, environmental monitoring program, and the responsible entities for mitigation and monitoring.

### B. Extent of the IEE Study

5. This IEE report was prepared on the basis of detailed screening and analysis of all environmental parameters, field investigations and stakeholder consultations to meet the requirements for environmental assessment process and documentation per ADB's Safeguard Policy Statement (SPS, 2009) and Government of India Environmental Impact Assessment (EIA) Notification of 2006.

#### 1. ADB Policy

6. ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for Environmental Assessment are described in ADB SPS

2009. This states that ADB requires environmental assessment of all project loans, program loans, sector loans, sector development program loans, loans involving financial intermediaries, and private sector loans.

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

- (i) **Category A.** Projects could have significant adverse environmental impacts. An EIA is required to address significant impacts.
- (ii) **Category B.** Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. An 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 are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.
- (iv) **Category FI.** Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all Projects will result in insignificant impacts.

8. **Environmental Management Plan.** An EMP which addresses the potential impacts and risks identified by the environmental assessment shall be prepared. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the Project's impact and risks.

9. **Public Disclosure.** ADB will post the following safeguard documents on its website so affected people, other stakeholders, and the general public can provide meaningful inputs into the project design and implementation:

- (i) For environmental category A projects, draft EIA report at least 120 days before Board consideration;
- (ii) Final or updated EIA and/or IEE upon receipt; and
- (iii) Environmental Monitoring Reports submitted by Investment Program Implementation Unit (IPIU) during project implementation upon receipt.

## 2. National Law

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

11. Categories A projects require Environmental Clearance from the National Ministry of Environment and Forests (MOEF). The proponent is required to provide preliminary details of the project in the form of a Notification, after which an Expert Appraisal Committee (EAC) of the

MOEF prepares comprehensive Terms of Reference (TOR) for the EIA study, which are finalized within 60 days. On completion of the study and review of the report by the EAC, MOEF considers the recommendation of the EAC and provides the Environmental Clearance if appropriate.

12. Category B projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA). The State level EAC categorises the project as either B1 (requiring EIA study) or B2 (no EIA study), and prepares TOR for B1 projects within 60 days. On completion of the study and review of the report by the EAC, the SEIAA issues the Environmental Clearance based on the EAC recommendation. The Notification also provides that any project or activity classified as category B will be treated as category A if it is located in whole or in part within 10 km from the boundary of protected areas, notified areas or inter-state or international boundaries.

13. The only type of infrastructure provided by the RUSDIP that is specified in the EIA Notification is solid waste management. Environmental Clearance is not required for this subproject.

### 3. Others

14. Actions required for the Chittorgarh Water Supply subproject (Table 2 of the Environmental Assessment Resettlement Framework [EARF]) includes obtaining from Rajasthan State Pollution Control Board (RSPCB) (i) Consent for Establishment (CFE) before construction; and (ii) Consent for Operation (CFO) after construction prior to operation of the water treatment plants.

## II. DESCRIPTION OF THE PROJECT

### A. Type, Category and Need

15. **Type.** This is a urban drainage subproject intended to improve the current situation in Chittorgarh in terms of improved water supply system. This is one of a series of subprojects designed by the RUSDIP that are intended to raise the standards of the municipal infrastructure and services of Chittorgarh town and the other urban centres to those expected of modern Asian towns.

16. **Category.** Environmental examination indicates the proposed subproject falls within ADB's environmental Category B projects. The Project components will only have small-scale, localized impacts on the environment, and can be mitigated. Under ADB procedures such projects require an IEE to identify and mitigate the impacts, and to determine whether further study or a more detailed EIA may be required.

17. **Need.** The subproject is needed because the present water supply system is inadequate for the needs of the growing population. The current rate of 65 liters per capita per day (lpcd) is below the required 135 lpcd and the unaccounted for water (UFW) is 40%. The storage and distribution network is insufficient to meet even present requirements.

18. Improvement in the water supply system has been identified as a major priority in the City Level Investment Plan (CLIP) prepared for Chittorgarh town. The CLIP has been discussed

at the City Level Committee (CLC) meeting comprising of the major stakeholders, who reinforced /confirmed that the proposed water supply subproject is a priority for the town.

## B. Location and Implementation Schedule

19. The subproject is located in Chittorgarh town of Chittorgarh District, in the north east part of Rajasthan in northwestern India. The proposed infrastructures will be located in and around the town.

20. Detailed design began in the middle of 2009 and completed by March 2010. Construction will begin in latter part of 2010, and will take around twelve months, so all civil works will be completed by the end of 2011.

## C. Description of the Subproject

### 4. Existing Water Supply and Service Delivery

21. The water supply to the town was first commissioned in 1954 with only few open wells as sources. The scheme was augmented later on by sourcing water from *Baglia deh*<sup>1</sup> on Gambhiri River. The water from this source is filtered at Padan Pole head works by 3 Pressure Filters Units. A new source at the Berada mining pit<sup>2</sup> has recently been added to the system.

- (i) **Existing tube wells.** There are total of 96 working tube wells in the town, some of them are connected to existing head works (CWRs/OSHRs), and some are directly feeding to the distribution system. Those which are connected to reservoirs are not connected with independent rising mains. This way the operating hours for some of the tube wells is only 12 to 20 hours and for those feeding in distribution is hardly 4 to 5 hours, though available water permits continuous operation. The Chittorgarh Ground Water Board reported that Chittorgarh town's groundwater table is over exploited and there is no possibility of further developing new tube wells within 10 km radius of the town.
- (ii) **Baglia deh raw water intake.** It is the oldest source of water supply for the town and is situated on Gambhiri river about 2.5 km away from town. The intake is situated on a sharp curve of river, where a *deh* (depression) is automatically generated. Due to increase in the demand of the town, an anicut of 2 meter height and 9.75 million cubic fit (mcft) capacity was constructed on the downstream side of the intake to facilitate extended drawl from this source. The present drawl from this source is only 1.5 million liters per day (MLD) only during post-monsoon season for few months.
- (iii) **Berda Mines intake.** The Birla Cement Works<sup>3</sup> had carried out mining operation in the area and left a mining pit of nearly 28.0 meters below nearby ground and 26.0 meters below the river bed. The pit remains full till onset of summers. At present 5.0 MLD of water is being drawn by Public Health Engineering Department (PHED) from this source.

22. Thus, a total of 13.70 MLD (**Table 1**) of water is available to the inhabitants of the town.

<sup>1</sup> 1 to 1.5 MLD of water is being drawn through a 200-millimeter diameter rising main.

<sup>2</sup> Approximately 7.2 MLD of water is presently being taken at.

<sup>3</sup> Located 8.5 km away from Chittorgarh town near the junction of Gambhiri and Berach rivers.

**Table 1: Present Available Water Source for Chittorgarh Town**

Sr. No	Name of Source	Production in Million Liters Per Day
1	Local Tube wells 96 working	7.20
2	Baglia Deh	1.50
3	Berada Mines	5.00
	<b>Total</b>	<b>13.70</b>

23. The storage and distribution network is insufficient to meet even present requirements. Most of the tube wells are connected directly in to the distribution system. Such tube wells are run for about 4 to 5 hours a day (during supply hours only). As such, the available production is not being used properly. Those which are connected to service reservoirs are not provided with properly designed pumping mains.

24. The duty condition of pumping sets in tube wells are not matching with the yield and draw down in tube wells. In general the practice to improve water supply of a particular colony had been, to construct one or two tube wells in the area and connect them directly to distribution system. A small service reservoir will be constructed for the particular colony and nearby tube wells connected to it. Then a small CWR will be constructed near this service reservoir and tube wells collect in this CWR. This way nearly 15 small head works have been developed in such a small town. Therefore during summers, when yield from these tube wells is reduced, no alternative is available but to provide drinking water to these colonies resulting in improper distribution of available sources.

25. Most of the rising mains are of asbestos cement pressure pipe Class-10, resulting to heavy leakages and frequent breakdown of the water supply system.<sup>4</sup> Resulting only 8.20 MLD being available to the public at a rate of 65 lpcd assuming present population is 106,357.<sup>5</sup> This is below the Central Public Health and Environmental Engineering Organisation (CPHEEO) requirement of 135 lpcd.

26. As reported, present domestic connections are 11,166, out of which 6,000 meters are out of order and required to be replaced. Approximately 9,000 of additional household connections are required in 2011.

## 5. Water Balancing

27. Proposal for water balancing:

- (i) **From 96 nos. of existing tube wells.** If all the tube wells will be centralized by connecting them to the nearest CWR then the current production rate of 6,000 liters per hour (lph) can be increased. If all the tube wells will operate for 16 hours then also the production can be increased up to 10.25 MLD.
- (ii) **From Berda mines.** As per present scenario, 5.0 MLD water taken from this source and that can be increased to 7.5 MLD. The concerned mining authority acceptance is enclosed with this report.

<sup>4</sup> Unaccounted for Water is 40%.

<sup>5</sup> 2001 Census.

- (iii) **Ghasunda Dam.** This dam is situated at 19 km away from the town and has been constructed by Hindustan Zinc Limited for multi-purpose use such as their own requirement, other industries, and that of PHED. 15.5 MLD can be used by PHED.

## 6. Subproject Components

28. **Table 2** summarizes the subproject components. The descriptions shown in the table are based on the present proposals, which are expected to be substantially correct, although certain details may change as development of the subproject progresses.

**Table 2: Chittorgarh Water Supply Subproject Components**

Component	Location	Function	Description	Remarks
Intake Well	Ghasunda Dam	Source and supply augmentation		new
Intake Well Pumping equipment	Ghasunda Dam	pump raw water from Intake well to the proposed WTP at Sengwa	Vertical turbine pumps (2 working + 1 standby) with capacity of 100 liters per second (lps) and 55 meter (m) head	new
	Berda Mines	pump raw water from Intake well to the proposed WTP at Berda,	Submersible pumps (2 working + 1 stand by) with capacity of 50 lps and 45 m head	additional to the existing intake
Raw Water Pumping Main	Ghasunda Dam	Intake well to the proposed WTP at Sengwa	Ductile Iron pumping main of 450 mm diameter and 12 km length	new (alignment will be parallel to the Chittorgarh-Udaipur National Highway)
	Berda Mines	Intake well to the proposed WTP at Berda,	Ductile Iron pumping main of 400 mm diameter and 0.3 km length	new
Water Treatment Plants (WTP)	Sengwa	Treat water from Ghasunda Dam	15 MLD	new
	Berda	Treat water from Berda Mines	7.5 MLD	new
Clear Water Reservoirs (CWR)	Sengwa WTP	Storage of clean water after treatment	- 1,500 kiloliters (KL) capacity CWR - pump house with 4 centrifugal pumps - electromechanical works	new
	Berda WTP	Storage of clean water after treatment	- 750 KL capacity CWR - pump house with 3 centrifugal pumps - electromechanical works	new
	Padan Pole Filtering Facility	Storage of clean water after treatment	- 600 KL capacity CWR - pump house with 6 centrifugal pumps - electromechanical works	new
Pump Houses	Baglia	water distribution	- pump house with 2 centrifugal pumps - electromechanical works	new
	Shasrinagar	water distribution	- pump house with 4	new

Component	Location	Function	Description	Remarks
			centrifugal pumps - electromechanical works	
Clear Water Pumping Mains	Pump houses to OHSRs and GLSRs	convey water to OHSRs/CWRs.	Ductile Iron pumping main of 100 mm to 500 mm diameters and 17.0 km length	new (alignment will be on government-owned right-of-way (ROW))
Overhead Service Reservoirs (OHSRs)	Vidya Niketan, Akash Bani; and Madhuvan	water storage for distribution	450 KL capacity	new
	Kheer Khera; and Berda	water storage for distribution	1,350 KL capacity	new
	Kailash Nagarone	water storage for distribution	550 KL capacity	new
Ground Level Service Reservoir (GLSRs)	Chungi Naka	water storage for distribution	1,100 KL capacity	new
Tube well rising mains	existing tube wells not connected to CWRs	centralize the tube wells to CWRs.	13.5 km rising main	new (alignment will be on government-owned right-of-way (ROW))
Distribution System	pump houses to OHSRs then to 29 different distribution zones	distribute water to zones in town	49 km unplasticized polyvinyl chloride (uPVC) pipe lines of. and 5.50 km Ductile Iron pipe lines	new (alignment will be on government-owned right-of-way)
Domestic meters	town areas	water connections metering	Replacement of 6,000 existing non-working domestic meters and 4,500 new connections	existing and new

DI = ductile iron, GLSR = ground level service reservoir, lps = liters per second, MLD = million liters per day, OHSR = overhead storage reservoirs, ROW = right of way, uPVC = unplasticized polyvinyl chloride, WTP = water treatment plant.

### III. DESCRIPTION OF THE ENVIRONMENT

#### A. Physical Resources

##### 1. Administrative Boundaries

29. The Chittorgarh District is situated in the northwest of Aravali Mountains which is in the western part of Malwa Plains. It covers an area of 10,856 km<sup>2</sup>. The district has twelve *tehsils* namely Rashmi, Gangrar, Begun, Kapasan, Chittorgarh, Bhadesar, Dungla, Nimbahera, Bari Sadri, Choti Sadri, Pratapgarh, and Arnaud. The administrative headquarters is Chittorgarh town.

##### 2. Topography, Drainage, and Natural Hazards

30. **Topography.** The topography of Chittorgarh ranges from flat to rugged terrains. Except for the Chittorgarh Fort area and the area in the foot hills of Fort (old town), the general topography of the town is not very much undulating. The ground level varies from 420 m to 395 m above the mean sea level. The subproject sites, being located in the town area, are generally flat.

31. **Drainage.** The peculiar topography of the town provides natural drainage pattern. The Banas, Berach, Wagan, Gambhiri, and Jakham are the main rivers draining the area.

32. **Natural Hazards.** Based on the evaluation of the earthquake zones of Rajasthan, Chittorgarh lies in a low damage risk zone and is less prone to earthquakes because it is located on relatively stable geological plains. The Natural Hazard Zone Map of Chittorgarh district is shown in **Figure 1**. Evaluation of the map shows water (gully/sheet) erosion in the town is very severe. No area is prone to water-logging, salinisation, and flash-flood. Thus the sites covered by the subproject are not located in areas prone to water-logging, salinisation, and flash flood.

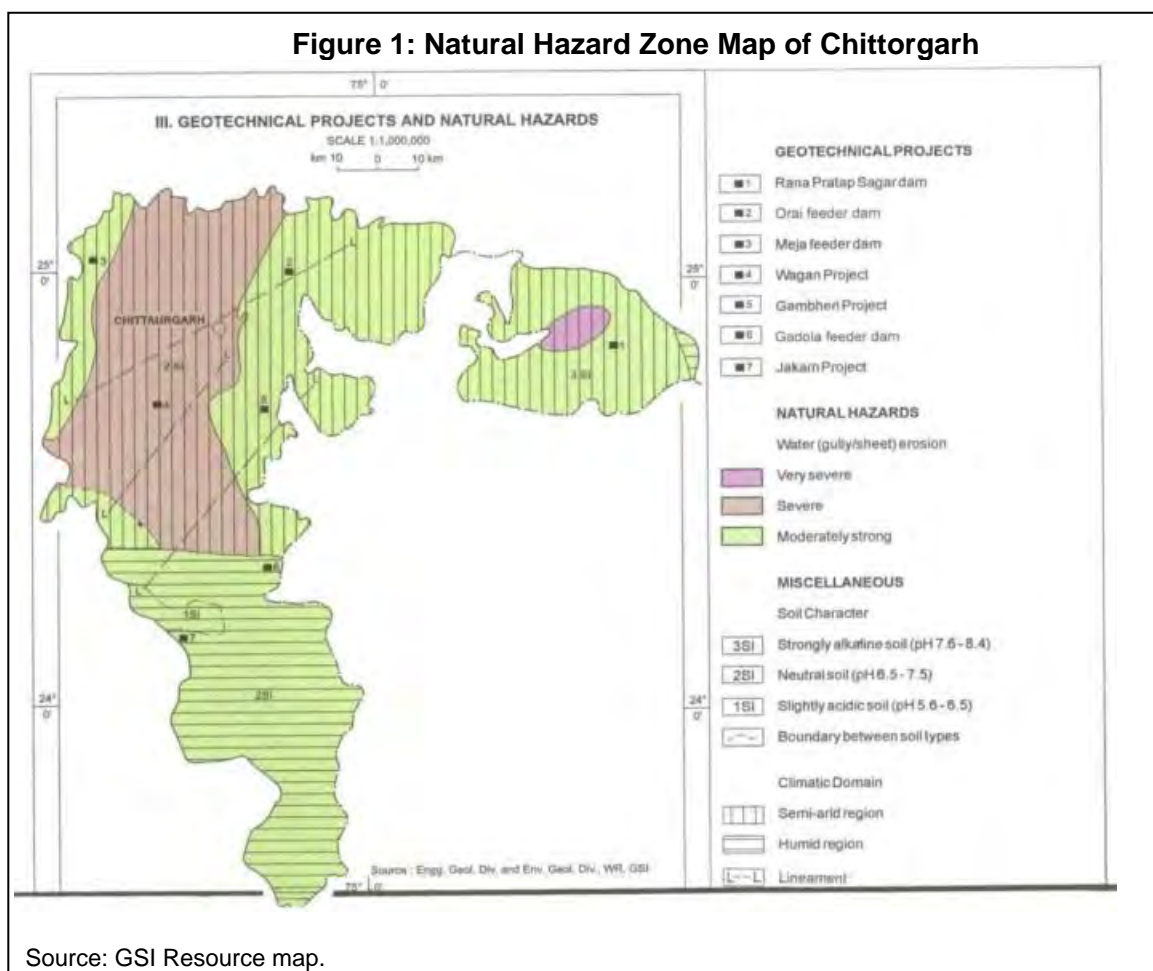
### **3. Geology, Geomorphology, Mineral Resources, and Soils**

33. **Geology.** The various rocks type exposed in the area belong to Bhilwara and Deccan Traps Supergroups. A major part of the district is occupied by schite, gneiss, migmatite, quartzite dolomitic marble, shale, slate, phyllite, tuff, and greywacke.

34. **Geomorphology.** The district is classified into structural plain, structural hills, structural ridge and valley, denudational ridge and valley, plain and plateau on Deccan Trap, highly dissected pediment, and undissected pediment. The area classified into two hydrological domain (of fissured formation on hilly area) with ground water potential ranging from less than one to five lps.

35. **Mineral Resources.** Sizeable reserves of good quality clay, marble, limestone, zinc, lead, copper, iron, rock phosphates, and building stones are found in the district. The sites covered in the subproject site are in the built-up portion of the town thus do not have mineral resources.

36. **Soils.** The nature of the soil is generally lothosolsat in the foothills while alluvial in the plains. Chittorgarh soil is classified as saline and sodic. The nutrient status of the Chittorgarh soil is graded as low nitrogen, medium phosphorus, and high potassium levels.



#### 4. Climate

37. The climate of Chittorgarh is generally dry being hilly terrain. The maximum average temperature during summer is 41.5°C and during winters it is 25°C. The average rainfall is 760 mm. 95% of the annual rains are experienced during southwest monsoon (June to September). The average rainy days in a year is about 33 days. The humidity is generally at 20% or low and it is only during southwest monsoon that it humidity goes up to 70%. The wind blows at low except during summer and monsoon when hard and turbulent winds are experienced. Winds blow southwest to northeast in summer and winter experience northern and northwest winds.

#### 5. Air Quality

38. There are no data on ambient air quality of Chittorgarh Town, which is not subject to monitoring by the RSPCB as there are no major industries. The nearest station is located at Udaipur (121 km from Chittorgarh). Traffic is the only significant pollutant in Chittorgarh, so levels of oxides of sulphur and nitrogen are likely to be well within the National Ambient Air Quality Standards (NAAQS).

#### 6. Surface Water

39. The Banas, Berach, Wagan, Gambhiri, and Jakham are the main rivers in Chittorgarh. Gambhiri River divides the town in two parts (the old town and the newly developed town) while

another major river named “Berach” flows along the western periphery of the town. The flow in both these rivers is from South to North. There is no water quality monitoring stations at any of these rivers. Visual observations and interviews with PHED show that main purpose of these rivers is agricultural, fishing, and domestic uses. Accordingly, water quality is not deteriorated.

## 7. Groundwater

40. The Central Ground Water Board monitors several national hydrographic monitoring stations in and around Chittorgarh. Records of monitoring conducted from May 2005 to January 2006 shows ground water table ranged between 10 to 20 meters below ground level. The direction of under ground rocks is dipping towards the river Gambhiri, so all the rainwater charged during monsoon is drained out when there is no flow in the river. The river is not perennial, and comprises of Granite Gneiss as base rock. The yield of ground sources is mainly dependent on the flow in river and charging from Irrigation canals of Gambhiri dam.

41. Records of groundwater quality monitoring from PHED show groundwater quality in Chittorgarh town does not conform to the set norms of Government of Rajasthan. It has been noted that groundwater contains high level of total dissolved solids.

## B. Biological Resources

42. There are no protected areas, wetlands, mangroves, or estuarines in or within the subproject sites.

43. **Flora.** The Chittorgarh district has diverse mix of plant species but none is classified as endangered or extinct. The mix includes *mahua*, *baheda*, *saded*, *aam*, *jhinjha*, *papal*, *bad* or *banyan tree*, *bael*, *dhak*, *kaith*, *datura*, and *indrokdhav*. The subproject sites are in the built-up area of town, abandoned minesite, and active cement facility therefore trees and vegetation (mostly shrubs and grasses) are those commonly found in urban areas.

44. **Fauna.** Chittorgarh has a large variety of animals, birds, and fishes which includes *Mor*, *Bandar*, *Langur*, *Baghera*, and *Kala hiran* but none is classified as endangered or extinct species are noted. The subproject sites are in the built-up area of town, abandoned mine site, and active cement facility therefore animals are those commonly found in urban areas.

## C. Economic Development

45. Economic base of a town reflects its prosperity. Chittorgarh being district headquarter, has been functioning as administrative city with sustained growth in tertiary economic activities. The major economic activities are trade and commerce, thus it offers a number of wholesale and retail markets which act as a distribution center for nearby towns and villages. Tourism income is also contributing very much towards economic generation of the town. The major industries are Bidla Cement Works and Zinc Smelter.

### 1. Land use

46. Chittorgarh town spreads over an area of 10,319 acres, out of which 3,665 acres are classified as developed area (residential, commercial industrial, government and semi-government, recreation, public facilities, and circulation). The remaining 6,345 acres are water bodies, forts, plantations, mining sites, and agriculture research and nurseries. Majority of the

subproject sites are in the developed area of the town with relatively small works at 2 mining sites.

## 2. Commerce, Industry and Agriculture

47. **Commerce.** The main retail and wholesale business activities of the town are carried out the newly developed main market street where retail and transport-oriented businesses are located.

48. **Industrials Development.** The first industrial unit in Chittorgarh District was the Cotton Jinning Factory which was established in 1924. Several industries cement and mining companies followed and has contributed to the reported fast industrialization of the district. Consequently, the raw materials found in nearby areas accelerated the growth and development of commercial and industrial activities in Chittorgarh town. Other industries include flour mills, jewellery making and repair, and stone (marble and diamond) cutting and polishing.

49. **Agriculture.** Chittorgarh is highest producer of groundnuts in Rajasthan, second highest producer of maize, alsin and sanai, third is barley and pulses, fourth in sugarcane and gram production fifth in chillies and cotton. Major production of opium in Rajasthan comes from Chittorgarh. About 70 to 80% of land in Chittorgarh town is used for agricultural purposes. The subproject sites are not located in agricultural lands.

## 3. Infrastructure

50. **Water supply.** The existing water supply network has 7 OSHRs and 11 GLSRs. The capacity of total water supply to Chittorgarh is 8.2 MLD out of which 7.4 MLD is used for residential purpose and 0.8 MLD is used for other purposes. Current supply per capita is 65 lpcd as against the standards of 135 lpcd. The existing water supply system comprises mainly of asbestos cement pipes.

51. **Sewerage and Sanitation.** Chittorgarh town does not have underground sewerage system. Only 85% of the total households reportedly have septic tanks, latrines and soak-well systems for sewerage disposal. The remaining households practice open defecation which is an unacceptable and unhygienic practice. The raw settled sewage from septic tanks is periodically flushed out by sanitary workers of the Chittorgarh Municipal Board (CMB) however, is being indiscriminately discharged to open spaces and agricultural lands which ultimately reaches to Gambhiri River.

52. **Drainage.** Presently there exists a minimal network of storm water drains. These drains are also receiving the sludge and waste through domestic sewer. The existing drainage system is a piece-meal construction without proper designs of open *nallahs* (drains) that are irregular and insufficient.

53. **Industrial Effluents.** Industries are outside the town area. The industries are required to treat their own effluents before disposal and are not allowed by the CMB to connect to the local sewer network.

54. **Solid Waste.** The total waste generation in the town is about 22 tons per day out of which 15 tons per day are collected by CMB. The garbage is collected and stored in a common point in every ward and the transportation is done by the tractor and wheel barrows. There are some open points within the town demarcated by CMB for garbage disposal in the wards. It is

common to see wastes being dumped in depressions, ditches, or by the roadsides because Chittorgarh has no landfill as final disposal.

55. **Transportation.** Chittorgarh is well connected with all the important towns of the state. It is situated on the junction of National Highways No. 76 and 79 and State Highway No. 9. All the 3 highways are very busy due to heavy traffic. Chittorgarh is also connected by meter gauge (railway) to Delhi, Jaipur Ajmer and Udaipur; and by broad gauge to Kota and Nimach. There is no airport in Chittorgarh but arrangements have been made at the boundary of Birla Cement Works for a temporary landing strip.

#### **D. Social and Cultural Resources**

56. **Demography.** Chittorgarh town has a population of 96,028 according to the 2001 Census. The population density is 2,299.52 person per km<sup>2</sup>.

57. **Health and Educational Facilities.** There are good educational facilities in Chittorgarh district, which serve both townspeople and inhabitants of surrounding villages and towns in the hinterland. There are 1,863 primary schools, 184 secondary and higher secondary schools, plus 5 general degree colleges, one polytechnic college and four industrial training institutes (ITI).

58. There is a hospital and community center in urban area of Chittorgarh. There are also 6 primary health centers and 39 sub-centers.

59. **History, Culture, and Tourism.** Chittorgarh has rich heritage and architectural sites which attract local and foreign tourists. These include the Chittorgarh Fort which stands 150 meters above plain ground and is 5 km long encompassing 690 acres of land. Some population is still residing in Fort area, though the trend is towards migration of the population towards newly developed localities.

60. Other historical places are Nagar Dwar, Prasad, and Vijay Stambh. There are also numerous religious sites such as temples in the town area. There two mega religious fairs (*Kalika ji fair and Johar Jyoti*) organized every year in Chittorgarh Fort which attract 20,000 tourists and 10,000 tourists. Although Chittorgarh is a very small town but due to inflow of tourists, hotels and *dharmshalas* for lodging and boarding are available in addition to Circuit Houses and *dak* bungalows.

61. The subproject sites are not located in or near any historically-, culturally-, archaeologically- or architecturally-significant or tourists area.

#### **IV. ANTICIPATED IMPACTS AND MITIGATION MEASURES**

62. This section of the IEE reviews possible subproject-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 subproject's area of influence. As defined previously, the primary impact areas are (i) the sites for intake well, WTPs, pumping houses, service reservoirs, raising mains, and pipe network alignments; (ii) main routes/intersections which will be traversed by construction vehicles; and (iii) quarries and borrow pits as sources of construction materials. The secondary impact areas are: (i) entire Chittorgarh area outside of the delineated

primary impact area; and (ii) entire Chittorgarh district in terms of over-all environmental improvement.

63. The ADB Rapid Environmental Assessment Checklist for Water Supply in [http://www.adb.org/documents/guidelines/environmental\\_assessment/eaguidelines002.asp](http://www.adb.org/documents/guidelines/environmental_assessment/eaguidelines002.asp) was used to screen the subproject for environmental impacts and to determine the scope of the IEE investigation. The completed Checklist is found in **Appendix 1**. All the proposed subproject components will interact physically with the environment.

64. In the case of this subproject (i) most of the individual elements are relatively small and involve straightforward 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 the built-up area of Chittorgarh, will not cause direct impact on biodiversity values. The subproject will be in properties held by the local government and access to the subproject area is thru public rights-of-way and existing roads hence, land acquisition and encroachment on private property will not occur.

## V. PRE-CONSTRUCTION – LOCATION AND DESIGN

65. **Design of the proposed components.** The subproject has been designed for a 30-year life. Accordingly, it is proposed that the subproject be commissioned by the year 2011 and the plan horizon year shall be 2041. The population forecast and demand calculations have also been done for the mid period, year 2026. The distribution system, rising mains and SRs have been designed keeping in mind the plan horizon year. But pumping machinery, and the reservoirs where phasing is possible, have been proposed for the demand of the year 2026. The rate of supply has been taken as 135 lpcd for 90% of population and 40 lpcd for 10% of population.

66. **Location of Sources.** Availability of groundwater in near vicinity of town was discussed with Senior Hydrologist of the Chittorgarh Ground Water Department and several other hydrologists who have worked in district during the past years, all of them view that (i) permeability in base rocks of the area is very low; (ii) every where there is compact rock; (iii) all Ground Water zones in the district are over exploited zones; and (iv) no aquifer is available where from required yield may be drawn.

67. Detailed study regarding availability of surface water (4 dams in Gambhiri, Bassi, Oraie, and Ghansunda) in near surroundings was also made. Gambhiri, Bassi, and Oraie are irrigation dams and have a very large network of irrigation canals therefore may not be possible to draw water for drinking purposes. Secondly they are at farther distance from the town. Looking to the availability of water in the Ghansunda dam, a Memorandum of Understanding (MOU) has been signed between PHED and Hindustan Zinc Limited, wherein permission has been accorded to draw 200 million cubic fit (mcft) of water from this dam for drinking purposes of Chittorgarh town. The design has been that 15.7 MLD of water shall be available from this source and after filtration, 15.0 MLD can be supplied to the town.

68. **Distribution Network.** The town has been subdivided in 29 distribution zones. The designs considered the demands for the year 2011, 2026, and 2041 and available production for the zones. The capacity of storage reservoirs required in each zone has been worked out

using the mass flow curve specified in the Indian Manual on Water Supply and Treatment. Some of the existing storage reservoirs, though may be of very small capacity have been utilized in the system, but some small CWRs located at different colonies have not been considered to restrict the number of pumping stations. A schematic diagram showing flow of water from different sources/pumping stations and from tube wells has been prepared and has also been enclosed in the subproject's Detailed Project Report.

69. **Utilities.** Telephone lines, electric poles and wires, water and sewer lines within the existing right-of-way (ROW) may be damaged. To mitigate the adverse impacts due to relocation of the utilities, Design and Supervision Consultants (DSC) will (i) identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and (ii) require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.

70. **Water Supply.** A different but no less significant impact is the effect on people and communities if water supplies are closed down for extended periods when work is conducted on the network. This would be inconvenient in the short term, and there could be health risks if the water supply was unavailable for several successive days or longer. It will therefore be important to take the necessary measures to avoid such a situation. This will require IPIU to:

- (i) plan the construction program to keep the cessation of water supplies to the minimum possible (in both area and duration);
- (ii) in coordination with PHED, provide alternative potable water to affected households and businesses for the duration of the shut-down; and
- (iii) liaise with affected persons to inform them of any cessation in advance, and to ensure that they are provided with an alternative supply.

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

- (i) no asbestos cement pipes will be disturbed during civil works and left in place.

72. However unlikely, the design consultant will develop a protocol to be applied in any instance that AC pipes are found, to ensure that appropriate action is taken. This should be based on the approach recommended by the United States Environmental Protection Agency (USEPA),<sup>6</sup> and amongst other things, should involve:

- (i) develop reporting procedures to inform management immediately if asbestos cement pipes are encountered; and
- (ii) require construction consultants to develop and apply an Asbestos Cement Management Plan, as part of the over-all health and safety (H&S) plan, to protect both workers and citizens in case accidental uncovering of asbestos cement

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<sup>6</sup> In the USA, standards and approaches for handling asbestos are prescribed by the Occupational Health and Safety Administration (OHS) and the Environmental Protection Agency (EPA) and can be found at <http://www.osha.gov/SLTC/asbestos>

pipes. This Asbestos Cement Management Plan should also contain national and international standards for safe removal and long-term disposal of all asbestos-containing material encountered.

73. **Social and Cultural Resources.** Rajasthan is an area of rich and varied cultural heritage which includes many forts and palaces from the Rajput and Mughal periods, and large numbers of temples and other religious sites, so there is a risk that any work involving ground disturbance can uncover and damage archaeological and historical remains. For this subproject, excavation will occur in and around existing ROWs, so it could be that there is a low risk of such impacts. Nevertheless, IPIU/DSC will:

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

74. **Site selection of construction work camps, stockpile areas, storage areas, and disposal areas.** Priority is to locate these near the project area. 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 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 the tiger reserves, wetlands, swamps, or in areas which will inconvenience the community. All locations would be included in the design specifications and on plan drawings.

75. **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 included in the design specifications and on plan drawings. Priority would be sites already permitted by Mining Department. If other 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 even if some distance from construction activities. It will be the construction contractor's responsibility to verify the suitability of all material sources and to obtain the approval of Urban Local Body. 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 CMB.

## A. Construction

### 1. Screening of No Significant Impacts

76. The construction work is expected not to cause major negative impacts, mainly because:

- (i) most of the activities will be on the built-up areas of Chittorgarh town thus could be constructed without causing impacts to biodiversity;

- (ii) the site is located on an government-owned land which is not occupied or used for any other purpose;
- (iii) overall construction program will be relatively short and is expected to be completed in 24 months with activities to be conducted by small teams working on short lengths at a time so most impacts will be localized and short in duration; and
- (iv) most of the predicted impacts associated with the construction process are produced because the process is invasive, such as involving earth-moving and excavation. However the routine nature of the impacts means that most can be easily mitigated and the impacts are clearly a result of the construction process rather than the design or location, as impacts will not occur if excavation or other ground disturbance is not involved.

77. As a result, there are several aspects of the environment which are not expected to be affected by the construction process and these can be screened out of the assessment at this stage as required by ADB procedure. These are shown in **Table 3**. These environmental factors are screened out presently but will be assessed again before starting of the construction activities.

**Table 3: Fields in which Construction is not expected to have Significant Impacts**

Field	Rationale
Topography, Drainage, and Natural Hazards	Activities are not large enough to affect these features.
Geology, Geomorphology, Mineral Resources, and Soils	Activities are not large enough to affect these features. No mineral resources in the subproject sites.
Climate	Activities are not large enough to affect this feature.
Air Quality	Short-term production of dust is the only effect on atmosphere
Geohydrology and Groundwater	Activities will not be large enough to affect these features
Protected Areas	No protected areas in Chittorgarh town
Flora and Fauna	No rare or endangered species.
Land Use	No change in land use.
Socio-economic	Subproject site is located entirely on government-owned land so there is no need to acquire land from private owners.
Commerce, Industry, and Agriculture	Activities are not large enough to affect these features
Population	Activities are not large enough to affect this feature.
Health and education facilities	Activities are not large enough to affect this feature.
Historical, Archaeological, Paleontological, or Architectural sites	No scheduled or unscheduled historical, archaeological, paleontological, or architectural sites

## 2. Construction method

78. Distribution mains will be buried in trenches adjacent to roads unused ROWs. In some areas occupied by drains or edges of shops and houses, trenches may be dug into the edge of the road to avoid damage to utilities and properties.

79. Trenches will be dug using a backhoe digger, supplemented by manual digging where necessary. Excavated soil will be placed alongside, and the pipes (brought to site on trucks and stored on unused land nearby) will be placed in the trench by hand or using a small rig for the larger Ductile Iron pipes. Pipes will be joined by hand, after which sand from local quarries will be shovelled into the trench beneath and around the pipe for support and protection. Soil will then be replaced manually on top of the pipe and compacted by a vibrating compressor. Where trenches are dug into an existing roadway, the bitumen or concrete surface will be broken by

hand-held pneumatic drills, after which the trench will be excavated by backhoe, and the appropriate surface will be reapplied on completion.

80. Pipes are normally covered by 1.2 m of soil, and a clearance of 100 mm is left between the pipe and each side of the trench to allow backfilling. Trenches will be smaller for the distribution main (minimum of 1.4 m deep and 0.3 m wide). Old pipes will be replaced by new one after taken out old pipe by digging.

81. New pipes and connections to the distribution main will be provided to house connections, and these will run to individual dwellings in small hand-dug trenches, or on the surface. New consumer meters will be located outside houses, attached to a wall or set onto the ground. In slum areas water will be provided via communal taps from where people will collect their water.

82. CWRs, OHSRs, and the GLSR will be built on government land at various locations in the town. The cavity for the ground reservoirs and foundations for the overhead reservoirs will be excavated by backhoe, with soil being loaded onto trucks for disposal. Aggregate and concrete will be tipped into each void to create the foundations and floor, after which metal reinforcing rods will be added to create the outline of the walls of the ground reservoir and the vertical supporting pillars of the overhead reservoir. Sections of reinforcing will then be encased in wooden shuttering and concrete will be poured in, and this process will be repeated to gradually create each structure from reinforce cement concrete (RCC), including the tank of the overhead reservoir and the above-ground portion of the ground reservoir. Surfaces will be smoothed and finished where necessary by hand.

83. Small brick rooms will be built alongside WTPs to house the chlorination plant. The foundation will be dug and aggregate and concrete poured in to create the floors, after which the brick walls and roof materials will be added by hand. Chlorine cylinders and other equipment (including flow-meters) will be brought in on trucks and offloaded and attached by hand. A small cavity for the chlorination sump and trenches for pipe-work will also be dug, and the sump will be constructed from concrete and brick.

### 3. Anticipated Impacts and Mitigation Measures

84. Although construction of the subproject components involves quite simple techniques, the invasive nature of excavation, and in this case the relatively large size and length of the pipes, means that there will be quite a lot of physical disturbance in the built-up areas of Chittorgarh town where there are a variety of human activities.

85. Physical impacts will be reduced by the method of working, whereby the trenches will be (i) constructed by small teams working on short lengths at a time; (ii) refilled and compacted after pipes are installed; and (iii) if trenching done on roads, repaired to pre-construction conditions.

86. **Sources of Materials.** Significant amount of gravel, sand, and cement will be required for this subproject. Approximately 4,125 m<sup>3</sup> of sand will be brought to site and 35,062 m<sup>3</sup> of soil will be required for the trenches. The construction contractor will be required to:

- (i) use quarry sites and sources permitted by government;
- (ii) verify suitability of all material sources and obtain approval of IPIU;

- (iii) if additional quarries will be required after construction has started, obtain written approval from PMU; and
- (iv) submit to DSC on a monthly basis documentation of sources of materials.

87. **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) but temporary and during construction activities only. To mitigate the impacts, construction contractors will be required to:

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

88. **Surface Water Quality.** Construction activities will be conducted on drains flowing to *nallahs*, although dried up during the summer period, has significant amount of silt materials. Mobilization of settled silt materials, run-off from stockpiled materials, and chemical contamination from fuels and lubricants during construction works can contaminate downstream surface water quality. These potential impacts are temporary and short-term duration only and to ensure these are mitigated, construction contractor will be required to:

- (i) avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
- (ii) prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with IPIU/DSC on designated disposal areas;
- (iii) install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
- (iv) place storage areas for fuels and lubricants away from any drainage leading to water bodies;
- (v) dispose any wastes generated by construction activities in designated sites; and
- (vi) conduct surface quality inspection according to the EMP.

89. **Noise Levels.** There are no health facilities, religious sites (temples and churches), scheduled or unscheduled historical, archaeological, paleontological, or architectural sites near the construction sites. However, construction works will be on settlements, along schools, and areas with small-scale businesses. The sensitive receptors are the general population in these areas. Increase in noise level may be caused by earth-moving and excavation equipment, and the transportation of equipment, materials, and people. Impact is negative, short-term, and reversible by mitigation measures. The construction contractor will be required to:

- (i) plan activities in consultation with IPIU/DSC so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance;

- (ii) require horns not be used unless it is necessary to warn other road users or animals of the vehicle's approach;
- (iii) minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and
- (iv) maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at a distance of 10 m or more from the vehicle/s.

90. **Existing Infrastructure and Facilities.** Excavation works can damage existing infrastructure located alongside roads, in particular water supply pipes and sewer lines. It will be particularly important to avoid damaging existing water pipes as these are mainly manufactured from Asbestos Cement, which can be carcinogenic if inhaled, so there are serious health risks for both workers and the public. It is therefore important that construction contractors will be required to:

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

91. **Landscape and Aesthetics.** The construction works will produce 6,187 m<sup>3</sup> of excess excavated soils (excluding quantities from storage reservoirs and WTPs excavations), excess construction materials, and solid waste such as removed concrete, wood, trees and plants, packaging materials, empty containers, spoils, oils, lubricants, and other similar items. These impacts are negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

- (i) prepare and implement Waste Management Plan;
- (ii) avoid stockpiling of excess excavated soils;
- (iii) coordinate with CMB for beneficial uses of excess excavated soils or immediately dispose to designated areas;
- (iv) recover used oil and lubricants and reuse or remove from the sites;
- (v) manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- (vi) remove all wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and
- (vii) request IPIU/DSC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.

92. **Surface and Groundwater Quality.** Another physical impact that is often associated with large-scale excavation is the effect on drainage and the local water table if groundwater and surface water collect in the voids. However, this should not be a problem in this subproject, given the low rainfall and deep water table in this area. To ensure that water will not pond in pits and voids near subproject sites, the construction contractor will be required to conduct excavation works on non-monsoon season.

93. **Accessibility.** Hauling of construction materials and operation of equipment on-site can cause traffic problems and conflicts in ROW. Potential impact is negative but short term and reversible by mitigation measures. The construction contractor will be required to:

- (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 Chittorgarh Municipal Traffic Office for temporary road diversions and with for provision of traffic aids if transportation activities cannot be avoided during peak hours; and
- (vii) notify affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.

94. **Socio-Economic – Income.** The subproject components will be located on government lands and ROWs, so there will be no need to acquire land, and thus there will be no impacts on the asset or landowners or tenants. However construction works will impede the access of residents and customers to nearby shops. The potential impacts are negative and moderate but short-term and temporary. The construction contractor will be required to:

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

95. **Socio-Economic – Employment.** Manpower will be required during the 24-months construction stage. This can result to generation of contractual 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.

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

- (i) develop and implement site-specific Health and Safety (H&S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use Personal Protective Equipment; (c) H&S Training<sup>7</sup> for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;

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<sup>7</sup> 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

- (ii) ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;
- (iii) provide medical insurance coverage for workers;
- (iv) secure all installations from unauthorized intrusion and accident risks;
- (v) provide supplies of potable drinking water;
- (vi) provide clean eating areas where workers are not exposed to hazardous or noxious substances;
- (vii) provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers;
- (viii) provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted;
- (ix) ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
- (x) ensure moving equipment is outfitted with audible back-up alarms;
- (xi) mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and
- (xii) disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.

97. A particular acute health risk presented by this subproject the risk of contact with carcinogenic material if the asbestos cement pipes are uncovered in the course of work. Precautions have already been introduced into the design of the subproject to avoid uncovering of these asbestos cement pipes. However unlikely, the construction contractor will be required to:

- (i) train all personnel (including manual labourers) to enable them to understand the dangers of asbestos cement pipes and to be able to recognise them in situ;
- (ii) report to management immediately if asbestos cement pipes are encountered; and
- (iii) develop and apply Asbestos Cement Management Plan.

98. **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 IPIU/DSC in identifying high-risk areas on route cards/maps;

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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.

- (iii) maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure; and
- (iv) provide road signs and flag persons to warn of dangerous conditions.

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

100. **Social and Cultural Resources.** For this subproject, excavation will occur in and around existing ROWs, 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 IPIU/DSC or any authorized person with archaeological field training to observe excavation;
- (iii) stop work immediately to allow further investigation if any finds are suspected; and
- (iv) inform IPIU/DSC if a find is suspected, and take any action they require ensuring its removal or protection in situ.

## **B. Operation and Maintenance**

### **1. Screening out areas of no significant impact**

101. Because a water supply system should operate without the need for major repair and maintenance (see below), there are several environmental sectors which should be unaffected once the system begins to function. These are identified in **Table 4** below, with an explanation of the reasoning in each case. These factors are thus screened out of the impact assessment and will not be mentioned further.

**Table 4: Fields in which Operation and Maintenance of the Completed Water Supply System is not expected to have Significant Impacts**

<b>Field</b>	<b>Rationale</b>
Climate	Extraction and use of water from river will not affect climate
Fisheries and aquatic biology	Intake of water do not support a significant aquatic flora or fauna
Wildlife, forests, rare species, protected areas	There are no wildlife, forests, rare species, and protected areas.
Coastal resources	Chittorgarh is not located in a coastal area.
Industries	The water supplied by the new system will not be for industrial use

## **2. Operation and Maintenance of the Improved Water Supply System**

102. O&M of the water supply system will be the responsibility of PHED. A small number of people will be employed to operate and maintain the WTPs, intakes, and storage reservoir sites. PHED will employ local contractors to conduct network repairs, and contractors should be required to operate the same kinds of H&S procedures as used in the construction phase to protect workers and the public. This should include application of the asbestos protocol if any asbestos cement pipes are encountered, and prohibition of the use of ac pipes for any repair or maintenance work.

103. The system have a design life of 30 years, during which shall not require major repairs or refurbishments and should operate with little maintenance beyond routine actions required to keep the pumps and other 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.

104. The main requirement for maintenance of the transmission main and distribution system will be for the detection and repair of leaks. The generally flat topography and the usage of good quality ductile iron and uPVC pipes should mean that pipeline breaks are very rare, and that leaks are mainly limited to joints between pipes. The repair of household connections and the provision of new connections to slums and developing areas to increase the number of people supplied should reduce the incidence of illegal connections, which are often a major source of leaks.

## **3. Anticipated Environmental Impacts and Mitigation Measures**

105. **General.** If trenches are will be dug to locate and repair leaks or remove and replace lengths of pipe or illegal connections, the work will follow the same procedures during the construction stage. PHED needs to require its O&M contractor to:

- (i) refill and re-compact trenches soil and backfilled sand will be removed to expose the leaking junction or pipe;
- (ii) conduct work during non-monsoon period; and
- (iii) cover or wet excavated material to prevent dusts.

106. **Ecological Resources.** There are no significant ecological resources in or around the town, so any repairs or maintenance work can be conducted without ecological impacts. As there is no significant flora and fauna in or around project site, there should also not be any ecological impacts from the increase in abstraction.

107. **Economic Development.** Although network repairs could result in shops losing some business if the work means that access is difficult for customers, any losses will be small and short-lived and will probably be at the level of normal business fluctuations. It should therefore not be necessary to compensate for such losses. Nevertheless PHED needs to require its O&M contractor to:

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

108. The provision of an improved and expanded water supply system is not expected to have direct economic benefits for business or industry, as connections will only be provided to domestic users. However businesses will almost certainly benefit from the expected improvement in the health and wellbeing of their workforce as this should result in fewer days lost through illness, and overall increased productivity.

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

110. Repair works could cause some temporary disruption of activities at locations of social and cultural importance such as schools, hospitals, temples, tourist sites etc, so the same precautions as employed during the construction period should be adopted. PHED needs to require its O&M contractor to:

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

111. The citizens of the town will be the major beneficiaries of the improved water supply, as they will be provided with a constant supply of better quality water, piped into their homes. In addition to improved environmental conditions, the subproject will improve the overall health condition of the town as diseases of poor sanitation (such as diarrhoea and dysentery) will be reduced.

## VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

### A. Project Stakeholders

112. The primary stakeholders are:

- (i) residents, shopkeepers and businesspeople who live and work alongside the roads in which improvements will be provided and near sites where facilities will be built;
- (ii) custodians and users of socially and culturally important buildings in affected areas;
- (iii) state and local authorities responsible for the protection and conservation of archaeological relics, historical sites and artefacts; and
- (iv) state and local tourism authorities.

113. The secondary stakeholders are:

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

### B. Consultations and Disclosures Conducted

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

- (i) awareness and extent of the project and development components;
- (ii) benefits of Project for the economic and social upliftment of community;
- (iii) labour availability in the Project area or requirement of outside labour involvement;
- (iv) local disturbances due to Project Construction Work;
- (v) necessity of tree felling etc. at project sites;
- (vi) water logging and drainage problem if any;
- (vii) drinking water problem;
- (viii) forest and sensitive area nearby the project site; and
- (ix) movement of wild animals nearby the project site.

115. Public consultations and group discussion meetings were conducted by RUIDP on 23 July 2009 after advertising in local newspapers. The objectives were to appraise the stakeholders about the program's environmental and social impacts and present safeguards to mitigate any potential significant impacts. Records of public consultations are attached as **Appendix 2**. The major issues raised are related to traffic interferences and possible dust and noise problems during construction phase. Other comments include construction vehicles

creating some disturbances to the local people daily activities, necessity of proper safety arrangements, and widening of roads prior to construction activities. The issues and comments have been considered and incorporated in the design of the subproject and mitigation measures for the potential environmental impacts raised during the public consultations.

116. Informal discussions were held with the local people during site visits for the preparation of this IEE. Issues discussed were:

- (i) proposed water supply project should ensure enough supply of drinking water in all wards of city;
- (ii) executive agency should give preference to engage internationally reputed contractor like Gammon, Hindusthan Construction Company (HCC), etc as people do not faith about the local contractors in respect of quality of works as well as timely completion of work;
- (iii) efforts should be made by government to supply drinking water round the clock;
- (iv) livelihood affected households should be given assistance in the mode of cash compensation;
- (v) local people should be employed by the contractor during construction work;
- (vi) adequate safety measures should be taken during construction work;
- (vii) mobile kiosks/vendors/hawkers have shown willingness to shift in nearby places without taking any compensation and assistance from the Executing Agency; and
- (viii) local people have appreciated the water supply proposal of the government and they have ensured that they will cooperate with the Executing Agency during project implementation.

117. Hindi versions of the Environmental Framework were provided during workshops to ensure stakeholders understood the objectives, policy, principles, and procedures. Likewise, English and Hindi versions of the Environmental Framework have been placed in Urban Local Body (ULB) offices, Investment Program Project Management Unit (IPMU) and IPIU offices, and the town library.

### **C. Future Consultation and Disclosure**

118. LSGD extended and expanded the consultation and disclosure process significantly during implementation of RUSDIP. They have appointed an experienced NGO to handle this key aspect of the programme. The NGO (Community Awareness Participation Program, CAPP) continuously (i) conducts a wide range of activities in relation to all subprojects in each town; and (ii) ensures the needs and concerns of stakeholders are registered and are addressed in subproject design.

119. For this subproject, the CAPP consultant will develop, in close coordination with IPIU and DSC, a public consultation and disclosure program which is likely to include the following:

- (i) Consultation during detailed design:
  - (a) Focus-group discussions with affected persons and other stakeholders (including women's groups, NGOs and CBOs) to hear their views and concerns, so that these can be addressed in subproject design where necessary; and
  - (b) Structured consultation meetings with the institutional stakeholders (government bodies and NGOs) to discuss and approve key aspects of the project.

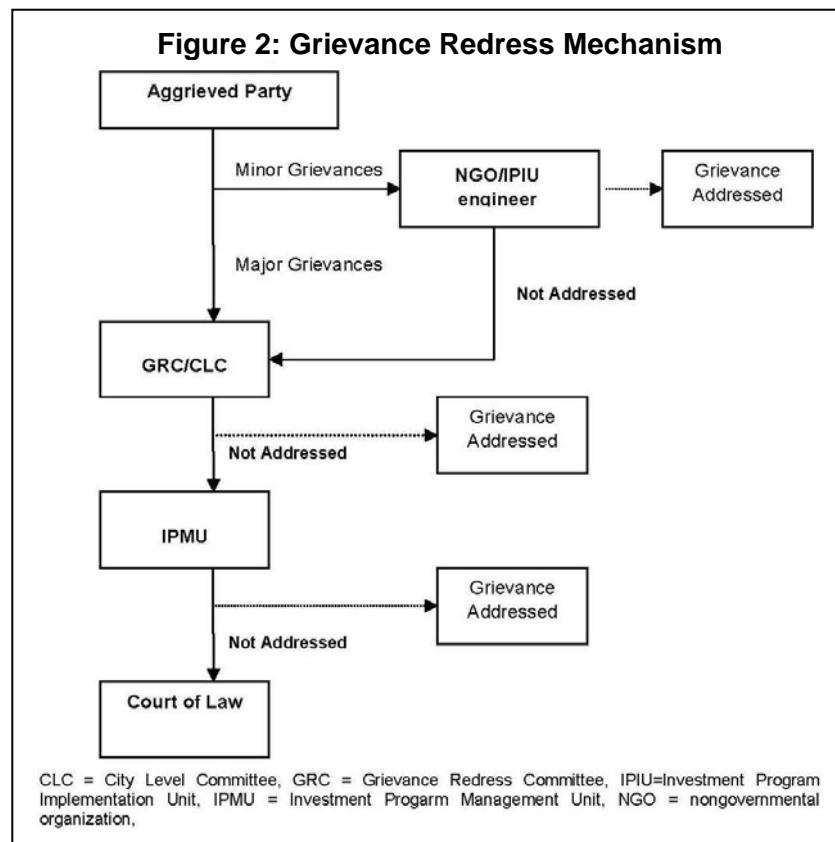
- (ii) Consultation during construction:
  - (a) Public meetings with affected communities to discuss and plan work programmes and allow issues to be raised and addressed once construction has started; and
  - (b) Smaller-scale meetings to discuss and plan construction work with individual communities to reduce disturbance and other impacts, and provide a mechanism through which stakeholders can participate in subproject monitoring and evaluation;
- (iii) Project disclosure:
  - (a) Public information campaigns (via newspaper, TV and radio) to explain the project to the wider town population and prepare them for disruption they may experience once the construction programme is underway;
  - (b) Public disclosure meetings at key project stages to inform the public of progress and future plans, and to provide copies of summary documents in Hindi; and
  - (c) Formal disclosure of completed project reports by making copies available at convenient locations in the study towns, informing the public of their availability, and providing a mechanism through which comments can be made.

120. Based on ADB requirements, the following will be posted on ADB website: (i) this IEE, upon receipt; (ii) a new or updated IEE, if prepared, reflecting significant changes in the Project during design or implementation; (iii) corrective action plan prepared during Project implementation to address unanticipated environmental impacts and to rectify non-compliance to EMP provisions; and (iv) environmental monitoring reports, upon receipt.

## **VII. GRIEVANCE REDRESS MECHANISM**

121. Grievances of affected persons will first be brought to the attention of the implementing NGO or IPIU engineer. Grievances not redressed by the NGO or IPIU will be brought to the CLC set up to monitor project implementation in each town. The CLC, acting as a grievance redress committee (GRC) is chaired by the District Collector with representatives from the ULB, state government agencies, IPIU, CBOs and NGOs. As GRC, the CLC will meet every month. The GRC will determine the merit of each grievance, and resolve grievances within a month of receiving the complaint, failing which the grievance will be addressed by the inter-ministerial Empowered Committee. The Committee will be chaired by the Minister of Urban Development and LSGD, and members will include Ministers, Directors and/or representatives of other relevant Government Ministries and Departments. Grievance not redressed by the GRC will be referred to the IPMU for action failing which grievances will be referred by displaced persons/affected persons to the appropriate courts of law. The IPIU will keep records of all grievances received including: contact details of complainant, date that the complaint was received, nature of grievance, agreed corrective actions and the date these were effected, and final outcome. The grievance redress process is shown in Figure 2.

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



## VIII. ENVIRONMENTAL MANAGEMENT PLAN

### A. Institutional Arrangements

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

- (i) LSGD is responsible for management, coordination, and execution of all activities funded under the loan;
- (ii) IPMU is responsible for coordinating construction of subprojects across all towns, and for ensuring consistency of approach and performance;
- (iii) IPMC assists IPMU in managing the program and assures technical quality of design and construction;
- (iv) DSCs design the infrastructure, manage tendering of Contractors and supervise the construction process;
- (v) IPIUs appoint and manage Construction Contractors to build elements of the infrastructure in a particular town;
- (vi) An inter-ministerial Empowered Committee<sup>8</sup> assists LSGD in providing policy guidance and coordination across all towns and subprojects; and
- (vii) CLCs<sup>9</sup> have also been established in each town to monitor project implementation in the town and provide recommendations to the IPIU where necessary.

<sup>8</sup> The Empowered Committee is chaired by the Minister of Urban Development and LSG, and members include Ministers, Directors and/or representatives of other relevant Government Ministries and Departments.

124. **Figure 3** shows institutional responsibility for implementation of environmental safeguard at different level.

**1. Responsible for carrying out mitigation measures**

125. During construction stage, implementation of mitigation measures is the construction contractor's responsibility while during operation stage, CMB will be responsible for the conduct of maintenance or repair works.

126. To ensure implementation of mitigation measures during the construction period, contract clauses (**Appendix 3**) for environmental provisions will be part of the civil works contracts. Contractors' conformity with contract procedures and specifications during construction will be carefully monitored by IPIU.

**2. Responsible for carrying out monitoring measures**

127. During construction, DSC's Environment Safeguards Officer and the designated representative of IPIU will monitor the construction contractor's environmental performance.

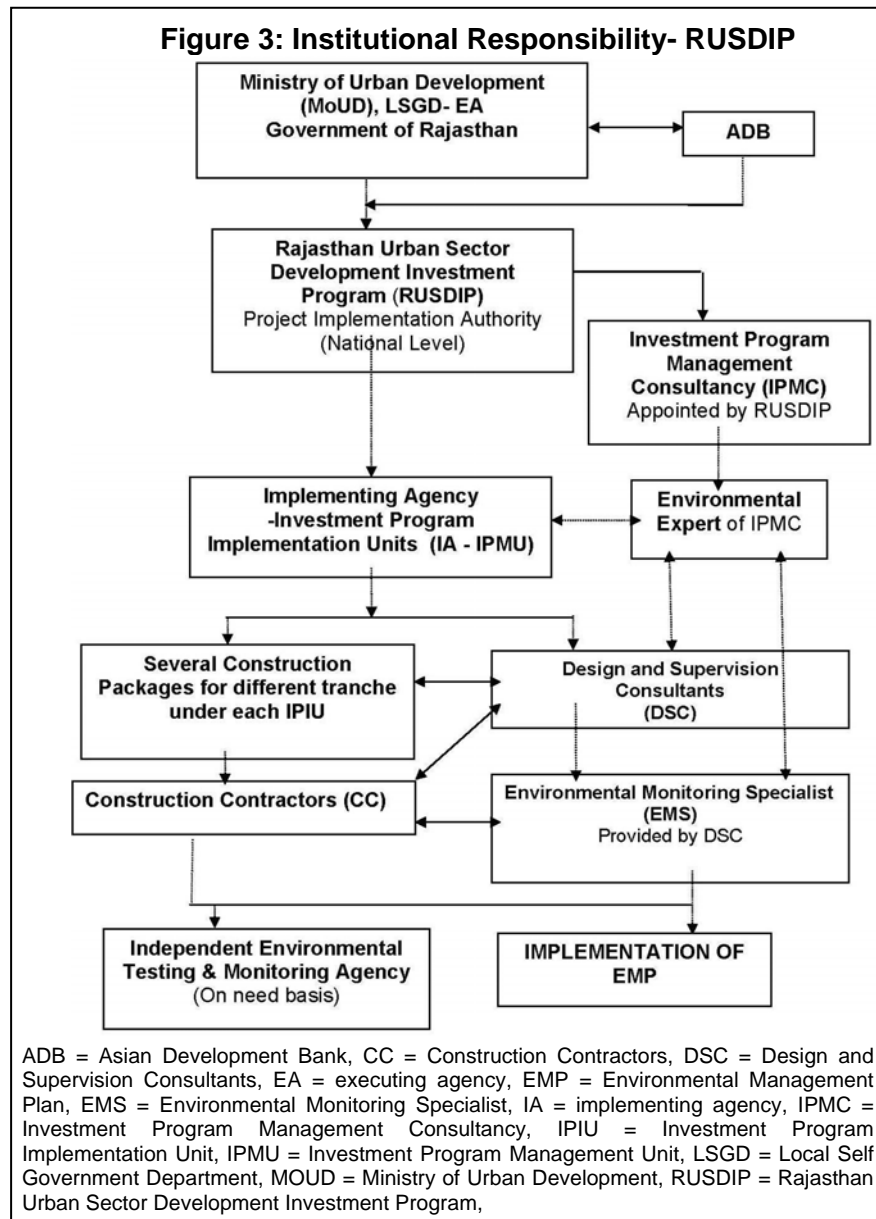
128. During the operation stage, monitoring will be the responsibility of CMB.

**3. Responsible for reporting**

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

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<sup>9</sup> CLCs are chaired by District Collectors, with members including officials of the ULB, local representatives of state government agencies, the IPIU, and local NGOs and CBOs.



## B. Environmental Mitigation Plan

130. **Tables 5 to 7** show the potential adverse environmental impacts, proposed mitigation measures, responsible parties, and estimated cost of implementation. This EMP will be included in the bid documents and will be further reviewed and updated during implementation.

## C. Environmental Monitoring Program

131. **Tables 8 to 10** show the proposed environmental monitoring program for this subproject. It includes all relevant environmental parameters, description of sampling stations, frequency of monitoring, applicable standards, responsible parties, and estimated cost. Monitoring activities during the detailed engineering design stage will from part of the baseline conditions of the subproject sites and will be used as the reference for acceptance of restoration works by the construction contractors.

**Table 5: Anticipated Impacts and Mitigation Measures – Pre-construction Environmental Mitigation Plan**

<b>Field</b>	<b>Anticipated Impact</b>	<b>Mitigation Measures</b>	<b>Responsible for Mitigation</b>	<b>Monitoring of Mitigation</b>
Utilities	Telephone lines, electric poles and wires, water and sewer lines within the existing bridge right-of-way (ROW) may be damaged.	(i) Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and (ii) Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.	DSC	(i) List of affected utilities and operators; and (ii) bid document to include requirement for a contingency plan for service interruptions
Water Supply	Health risk due to closure of water supply	(i) Plan the construction program to keep the cessation of water supplies to the minimum possible (in both area and duration); (ii) In coordination with PHED, provide alternative potable water to affected households and businesses for the duration of the shut-down; and (iii) Liaise with affected persons to inform them of any cessation in advance, and to ensure that they are provided with an alternative supply.	IPIU	(i) Schedule of closure; and (ii) delivery of PHED of potable water to affected people
Asbestos Cement Pipes	Risk of contact with carcinogenic materials	(i) Require DSC to develop Asbestos Cement Protocol; (ii) Develop reporting procedures to inform management immediately if asbestos cement pipes are encountered; and (ii) Require construction consultants to develop and apply an Asbestos Cement Management Plan, as part of the over-all health and safety (H&S) plan, to protect both	IPIU and DSC	(i) Asbestos Cement Protocol; (ii) requirement for Asbestos Cement Management included in bid documents

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		workers and citizens in case accidental uncovering of asbestos cement pipes. This Asbestos Cement Management Plan should also contain national and international standards for safe removal and long-term disposal of all asbestos-containing material encountered.		
Social and Cultural Resources	Ground disturbance can uncover and damage archaeological and historical remains	(i) Consult Archaeological Survey of India (ASI) to obtain an expert assessment of the archaeological potential of the site; (ii) Consider alternatives if the site is found to be of medium or high risk; (iii) Include state and local archaeological, cultural and historical authorities, and interest groups in consultation forums as project stakeholders so that their expertise can be made available; and (iv) Develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognised and measures are taken to ensure they are protected and conserved.	IPIU and DSC	Chance Finds Protocol
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Disruption to traffic flow and sensitive receptors	(i) Prioritize areas within or nearest possible vacant space in the subproject sites; (ii) If it is deemed necessary to locate elsewhere, consider sites that will not promote instability and result in destruction of property,	IPIU and DSC to determine locations prior to award of construction contracts.	List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		vegetation, irrigation, and drinking water supply systems; (iii) Do not consider residential areas; and (iv) Take extreme care in selecting sites to avoid direct disposal to Latiya nallah or in areas which will inconvenience the community.		
Sources of Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution.	(i) Prioritize sites already permitted by the Mining Department; (ii) If other sites are necessary, inform construction contractor that it is their responsibility to verify the suitability of all material sources and to obtain the approval of IPIU; and (iii) If additional quarries will be required after construction is started, inform construction contractor to obtain a written approval from PMU.	IPIU and DSC to prepare list of approved quarry sites and sources of materials	(i) List of approved quarry sites and sources of materials; (ii) bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.

ASI = Archaeological Survey of India, DSC = Design and Supervision Consultants, H&S = health and safety, IPIU = Investment Program Implementation Unit, PHED = Public Health Engineering Department, PMU = Project Management Unit, ROW = right of way.

**Table 6: Anticipated Impacts and Mitigation Measures – Construction Environmental Mitigation Plan**

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
Sources of Materials	Extraction of rocks and material may cause ground instability	(i) Use quarry sites and sources permitted by government; (ii) Verify suitability of all material sources and obtain approval of Investment Program Implementation Unit (IPIU); (iii) If additional quarries will be required after construction has started, obtain written approval from PMU; and	Construction Contractor	Construction Contractor documentation

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		(iv) Submit to DSC on a monthly basis documentation of sources of materials.		
Air Quality	Emissions from construction vehicles, equipment, and machinery used for excavation and construction resulting to dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons)	(i) Consult with IPIU/DSC on the designated areas for stockpiling of clay, soils, gravel, and other construction materials; (ii) (iii) Damp down exposed soil and any stockpiled on site by spraying with water when necessary during dry weather; (iv) Use tarpaulins to cover sand and other loose material when transported by trucks; and (v) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly.	Construction Contractor	(i) Location of stockpiles; (ii) complaints from sensitive receptors; (iii) heavy equipment and machinery with air pollution control devices (iv) ambient air for respirable particulate matter (RPM) and suspended particulate matter (SPM); and (v) vehicular emissions such as sulphur dioxide (SO <sub>2</sub> ), nitrous oxides (NO <sub>x</sub> ), carbon monoxide (CO), and hydrocarbons
Surface water quality	Mobilization of settled silt materials, run-off from stockpiled materials, and chemical contamination from fuels and lubricants during construction works can contaminate downstream surface water quality.	(i) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets; (ii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with IPIU/DSC on designated disposal areas; (iii) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; (iv) Place storage areas for fuels and lubricants away from any drainage leading to water bodies; (v) Dispose any wastes generated by construction activities in designated sites;	Construction Contractor	(i) Areas for stockpiles, storage of fuels and lubricants and waste materials; (ii) number of silt traps installed along drainages leading to water bodies; (iii) records of surface water quality inspection; (iv) effectiveness of water management measures; and (v) for inland water: suspended solids, oil and grease, biological oxygen demand (BOD), and coliforms.

<b>Field</b>	<b>Anticipated Impact</b>	<b>Mitigation Measures</b>	<b>Responsible for Mitigation</b>	<b>Monitoring of Mitigation</b>
		and (vi) Conduct surface quality inspection according to the Environmental Management Plan (EMP).		
Noise Levels	Increase in noise level due to earth-moving and excavation equipment, and the transportation of equipment, materials, and people	(i) Plan activities in consultation with IPIU/DSC so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance; (ii) Require horns not be used unless it is necessary to warn other road users or animals of the vehicle's approach; (iii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and (iv) Maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at a distance of 10 m or more from the vehicle/s.	Construction Contractor	(i) Complaints from sensitive receptors; (ii) use of silencers in noise-producing equipment and sound barriers; and (iii) Equivalent day and night time noise levels
Existing Infrastructure and Facilities	Disruption of service and damage to existing infrastructure located alongside roads, in particular water supply pipes and sewer lines.	(i) Obtain from IPIU and/or DSC the list of affected utilities and operators; (ii) Prepare a contingency plan to include actions to be done in case of unintentional interruption of services; and (iii) Develop and implement an Asbestos Cement Pipes Management Plan	Construction Contractor	(i) Existing Utilities Contingency Plan; (ii) Asbestos Cement Pipes Management Plan
Landscape and Aesthetics	Solid wastes as well as excess construction materials	(i) Prepare and implement Waste Management Plan; (ii) Avoid stockpiling of excess excavated soils;	Construction Contractor	(i) Waste Management Plan; (ii) complaints from sensitive receptors; (iii) IPIU/DSC to report in writing that the

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		<p>(ii) Coordinate with CMB for beneficial uses of excess excavated soils or immediately dispose to designated areas;</p> <p>(iv) Recover used oil and lubricants and reuse or remove from the sites;</p> <p>(v) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;</p> <p>(vi) Remove all wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and</p> <p>(vii) Request IPIU/DSC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.</p>		<p>necessary environmental restoration work has been adequately performed before acceptance of work.</p>
Accessibility	Traffic problems and conflicts in right-of-way (ROW)	<p>(i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;</p> <p>(ii) Schedule transport and hauling activities during non-peak hours;</p> <p>(iii) Locate entry and exit points in areas where there is low potential for traffic congestion;</p> <p>(iv) Keep the site free from all unnecessary obstructions;</p> <p>(v) Drive vehicles in a considerate manner;</p> <p>(vi) Coordinate with Chittorgarh Municipal Traffic Office for temporary road diversions and with for</p>	Construction Contractor	<p>(i) Traffic Management Plan;</p> <p>(ii) complaints from sensitive receptors; and (iii) number of signages placed at subproject sites.</p>

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		provision of traffic aids if transportation activities cannot be avoided during peak hours; and (vii) Notify affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.		
Socio-Economic – Income.	Impede the access of residents and customers to nearby shops	(i) Leave spaces for access between mounds of soil; (ii) Provide walkways and metal sheets where required to maintain access across trenches for people and vehicles; (iii) Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools; (iv) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and (v) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.	Construction Contractor	(i) Complaints from sensitive receptors; and (ii) number of walkways, signages, and metal sheets placed at subproject sites.
Socio-Economic Employment	- Generation of contractual employment and increase in local revenue	(i) Employ at least 50% of the labour force, or to the maximum extent, local persons within the 2-km immediate area if manpower is available; and (ii) Secure construction materials from local market.	Construction Contractor	(i) Employment records; and (ii) records of sources of materials
Occupational Health and Safety	occupational hazards which can arise from working in infrastructures like roads and bridges	(i) Develop and implement site-specific Health and Safety (H&S) Plan which will include measures such as: (a)	Construction Contractor	(i) Site-specific Health and Safety (H&S) Plan; (ii) Equipped first-aid stations; (iii) Medical insurance

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		<p>excluding public from the site;            (b) ensuring all workers are provided with and use Personal Protective Equipment; (c) H&amp;S Training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;            (ii) Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;            (iii) Provide medical insurance coverage for workers;            (iv) Secure all installations from unauthorized intrusion and accident risks;            (v) Provide supplies of potable drinking water;            (vi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances;            (vii) Provide H&amp;S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers;            (viii) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted;            (ix) Ensure the visibility of workers through their use of</p>		<p>coverage for workers;            (iv) Number of accidents;            (v) Supplies of potable drinking water;            (vi) Clean eating areas where workers are not exposed to hazardous or noxious substances;            (vii) record of H&amp;S orientation trainings            (viii) personal protective equipments;            (ix) % of moving equipment outfitted with audible back-up alarms; and            (xi) sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal.</p>

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		<p>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 alarms;</p> <p>(xi) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and</p> <p>(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.</p>		
Asbestos Cement Pipes	Health risk	<p>(i) Train all personnel (including manual labourers) to enable them to understand the dangers of asbestos cement pipes and to be able to recognise them in situ;</p> <p>(ii) Report to management immediately if asbestos cement pipes are encountered;</p> <p>(iii) Develop and apply Asbestos Cement Management Plan.</p>	Construction Contractor	(i) Records of trainings; (ii) Asbestos Cement Management Plan approved by PIU/DSC
Community Health and Safety.	Traffic accidents and vehicle collision with pedestrians	(i) Plan routes to avoid times of peak-pedestrian activities;	Construction Contractor	(i) Traffic Management Plan; (ii) complaints from sensitive

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		<ul style="list-style-type: none"> <li>(ii) Liaise with IPIU/DSC in identifying high-risk areas on route cards/maps;</li> <li>(iii) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure;</li> <li>(iv) Provide road signs and flag persons to warn of dangerous conditions; and</li> <li>(v) erect fences to protect public from entering work sites.</li> </ul>		receptors
Work Camps	Temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants	<ul style="list-style-type: none"> <li>(i) Consult with IPIU/DSC before locating project offices, sheds, and construction plants;</li> <li>(ii) Minimize removal of vegetation and disallow cutting of trees;</li> <li>(iii) Provide water and sanitation facilities for employees;</li> <li>(iv) Prohibit employees from poaching wildlife and cutting of trees for firewood;</li> <li>(v) Train employees in the storage and handling of materials which can potentially cause soil contamination;</li> <li>(vi) Recover used oil and lubricants and reuse or remove from the site;</li> <li>(vii) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;</li> <li>(viii) Remove all wreckage, rubbish, or temporary</li> </ul>	Construction Contractor	(i) Complaints from sensitive receptors; (ii) water and sanitation facilities for employees; and (iii) IPIU/DSC report in writing that the camp has been vacated and restored to pre-project conditions

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		structures (such as buildings, shelters, and latrines) which are no longer required; and (ix) Request IPIU/DSC to report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.		
Social and Cultural Resources	Risk of archaeological chance finds	(i) Strictly follow the protocol for chance finds in any excavation work; (ii) Request IPIU/DSC or any authorized person with archaeological field training to observe excavation; (iii) Stop work immediately to allow further investigation if any finds are suspected; and (iv) Inform IPIU/DSC if a find is suspected, and take any action they require ensuring its removal or protection in situ.	Construction Contractor	(i) Records of chance finds

BOD = biological oxygen demand, CMB = Chittorgarh Municipal Board, dbA = decibel, DSC = Design and Supervision Consultants, EMP = Environmental Management Plan, H&S = health and safety, IPIU = Investment Program Implementation Unit, PIU = Project Implementation Unit, PMU = Project Management Unit, RPM = respirable particulate matter, SPM = suspended particulate matter.

**Table 7: Anticipated Impacts and Mitigation Measures – Operation and Maintenance Environmental Mitigation Plan**

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
Occupational Health and Safety	Adverse impacts on the appearance of surrounding environment and exposure of workers to hazardous debris	(i) Ensure persons employed will be provided with suitable equipment (such as shovels and wheelbarrows); and (ii) Ensure all removed material will be deposited in the municipal waste storage bins. (iii) Train all personnel (including manual labourers) to enable them to understand the dangers of asbestos cement pipes and to be able	PHED and O&M Contractors	(i) Records of training; (ii) H&S Plan and Asbestos Management Management Plan approved by PHED

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		to recognise them in situ; (iv) Report to management immediately if asbestos cement pipes are encountered; and (v) Develop and apply Asbestos Cement Management Plan.		
General	General impact	(i) Refill and re-compact trenches soil and backfilled sand will be removed to expose the leaking junction or pipe; (ii) Conduct work during non-monsoon period; and (iii) Cover or wet excavated material to prevent dusts.	PHED and O&M Contractors	Complaints from sensitive receptors
Economic Development	Impediments to residents and businesses	(i) Inform all residents and businesses about the nature and duration of any work well in advance so that they can make preparations if necessary; (ii) Conduct these works to provide wooden walkways across trenches for pedestrians and metal sheets where vehicle access is required; and (iii) Consult the local police regarding any such work so that it can be planned to avoid traffic disruption as far as possible, and road diversions can be organised if necessary.	PHED and O&M Contractors	Complaints from sensitive receptors
Social and Cultural Resources	Temporary disruption of activities	(i) Consult the town authorities to identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity; (ii) Complete work in these	PHED and O&M Contractors	Complaints from sensitive receptors

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		<p>areas quickly;</p> <p>(iii) Provide wooden bridges for pedestrians and metal sheets for vehicles to allow access across open trenches where required; and</p> <p>(iv) Consult municipal authorities, custodians of important buildings, cultural and tourism authorities and local communities in advance of the work to identify and address key issues, and avoid working at sensitive times, such as religious and cultural festivals.</p>		

H&S = health and safety, O&M = operation and maintenance, PHED = Public Health Engineering Department.

**Table 8: Pre-construction Environmental Monitoring Program**

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Baseline Environmental Condition – Ambient Air Quality	Subproject sites	DSC	Establish baseline values of respirable particulate matter (RPM) and (ii) suspended particulate matter (SPM)	Air sample collection and analyses by in-house laboratory or accredited 3rd party laboratory	Government of India Ambient Air Quality Standards	Once prior to start of construction	IPMU
Baseline Environmental Condition - Water Quality	Subproject sites	DSC	Establish baseline values of suspended solids (TSS), (iii) pH (iv) biological oxygen demand (BOD), (v) fecal coliform	Air sample collection and analyses by in-house laboratory or accredited 3rd party laboratory	Government of India Water Quality Standards	Once prior to start of construction	IPMU
Utilities	not applicable	DSC	(i) list of affected utilities and operators; (ii) bid document to include	checking of records	(i) list of affected utilities and operators prepared; (ii) requirement for a	once	PMU

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
			requirement for a contingency plan for service interruptions		contingency plan for service interruptions included in bid documents		
Water Supply Cessation	not applicable	IPIU	(i) schedule of closure; (ii) delivery of PHED of potable water to affected people	checking of records	(i) tentative schedule of closure made known to affective people 2 weeks prior to cessation of water supply; (ii) coordination with PHED for supply of potable water to 100% affected people	once	PMU
Asbestos Cement Pipes	not applicable	IPIU and DSC	(i) Asbestos Cement Protocol; (ii) requirement for Asbestos Cement Management included in bid documents	checking of records	(i) Asbestos Cement Protocol prepared; (ii) bid documents include requirements for Asbestos Cement Management Plan	once	PMU
Social and Cultural Heritage	not applicable	IPIU and DSC	Chance Finds Protocol	checking of records	Chance Finds Protocol provided to construction contractors prior to commencement of activities	once	PMU
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	not applicable	IPIU and DSC to determine locations prior to award of construction contracts.	List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	checking of records	List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas	once	PMU

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
					provided to construction contractors prior to commencement of works.		
Sources of Materials	not applicable	IPIU and DSC to prepare list of approved quarry sites and sources of materials	(i) list of approved quarry sites and sources of materials; (ii) bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.	checking of records	(i) list of approved quarry sites and sources of materials provided to construction contractors  (ii) bid document included requirement for verification of suitability of sources and permit for additional quarry sites if necessary.	once	PMU

BOD = biological oxygen demand, DSC = Design and Supervision Consultants, IPIU = Investment Program Implementation Unit, IPMU = Investment Program Management Unit, PHED = Public Health Engineering Department, PMU = Project Management Unit, RPM = respirable particulate matter, SPM = suspended particulate matter.

**Table 9: Construction Environmental Monitoring Program**

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

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
	materials		receptors; (iii) heavy equipment and machinery with air pollution control devices (iii) ambient air for respirable particulate matter (RPM) and suspended particulate matter (SPM); (iv) vehicular emissions such as sulphur dioxide (SO <sub>2</sub> ), nitrous oxides (NO <sub>x</sub> ), carbon monoxide (CO), and hydrocarbons (HC)		from sensitive receptors satisfactorily addressed; (iii) air pollution control devices working properly; (iv) Government of India Ambient Quality Standards for ambient air quality; (iv) Government of India Vehicular Emission Standards for SO <sub>2</sub> , NO <sub>x</sub> , CO and HC.		
Surface Water Quality	(i) construction sites; (ii) areas for stockpiles, storage of fuels and lubricants and waste materials;	Construction Contractor	(i) Areas for stockpiles, storage of fuels and lubricants and waste materials; (ii) number of silt traps installed along drainages leading to water bodies; (iii) records of surface water quality inspection; (iv) effectiveness of water management measures; (v) for inland water: suspended solids, oil and	visual inspection	(i) designated areas only; (ii) silt traps installed and functioning; (iii) no noticeable increase in suspended solids and silt from construction activities (iv) Government of India Standards for Water Discharges to Inland Waters and Land for Irrigation	Monthly	DSC in coordination with ASI

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
			grease, biological oxygen demand (BOD), and coliforms.				
Noise Levels	(i) construction sites; (ii) areas for stockpiles, storage of fuels and lubricants and waste materials; (iii) work camps	Construction Contractor	(i) Complaints from sensitive receptors; (ii) use of silencers in noise-producing equipment and sound barriers; and (iii) Equivalent day and night time noise levels	(i) checking of records; (ii) visual inspection	(i) complaints from sensitive receptors satisfactorily addressed; and (ii) silencers in noise-producing equipment functioning as design; and (iii) sound barriers installed where necessary	Monthly	DSC in coordination with ASI
Existing Utilities and Infrastructure	(i) construction sites; (ii) alignment of affected utilities	Construction Contractor	(i) Existing Utilities Contingency Plan; (ii) Asbestos Cement Pipes Management Plan	(i) checking of records; (ii) visual inspection	implementation according to Utilities Contingency Plan and Asbestos Cement Plan	as needed	DSC
Landscape and Aesthetics	(i) construction sites; (ii) areas for stockpiles, storage of fuels and lubricants and waste materials; (iii) work camps	Construction Contractor	(i) Waste Management Plan; (ii) complaints from sensitive receptors; (iii) IPIU/DSC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.	(i) checking of records; (ii) visual inspection	(i) no accumulation of solid wastes on-site; (ii) implementation of Waste Management Plan; (iii) complaints from sensitive receptors satisfactorily addressed.	monthly	DSC in coordination with ASI

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Accessibility	(i) construction sites; (ii) traffic routes	Construction Contractor	(i) Traffic Management Plan; (ii) complaints from sensitive receptors; and (iii) number of signages placed at subproject sites.	visual inspection	(i) implementation of Traffic Management Plan; (ii) complaints from sensitive receptors satisfactorily addressed; (iii) signages visible and located in designated areas	Monthly	DSC in coordination with ASI
Socio-Economic - Income	construction sites	Construction Contractor	(i) complaints from sensitive receptors; (ii) number of walkways, signages, and metal sheets placed at subproject sites.	visual inspection	(i) complaints from sensitive receptors satisfactorily addressed; (ii) walkways, ramps, and metal sheets provided; and (iii) signages visible and located in designated areas	Quarterly	DSC
Asbestos Cement Pipes	construction sites	Construction Contractors	(i) records of trainings; (ii) Asbestos Cement Management Plan approved by IPIU/DSC	checking of records	no exposure to asbestos cement pipes	as needed	IPIU and DSC
Socio-Economic - Income	construction sites	Construction Contractor	(i) employment records; (ii) records of sources of materials	checking of records	number of employees from Chittorgarh equal or greater than 50% of total workforce	quarterly	DSC
Occupational Health and Safety	construction sites	Construction Contractor	(i) site-specific Health and Safety (H&S) Plan; (ii) Equipped first-	(i) checking of records; (ii) visual inspection	(i) implementation of H&S plan; (ii) number of work-related	Quarterly	DSC

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
			aid stations; (iii) Medical insurance coverage for workers; (iv) Number of accidents; (v) Supplies of potable drinking water; (vi) Clean eating areas where workers are not exposed to hazardous or noxious substances; (vii) record of H and S orientation trainings (viii) personal protective equipments; (ix) % of moving equipment outfitted with audible back-up alarms; (xi) sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal.		accidents; (iii) % usage of personal protective equipment; (iv) number of first-aid stations, frequency of potable water delivery, provision of clean eating area, and number of sign boards are according to approved plan; (v) % of moving equipment outfitted with audible back-up alarms		
Community Health and Safety	construction sites	Construction Contractor	(i) Traffic Management Plan;	visual inspection	(i) implementation of Traffic Management	quarterly	DSC

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

ASI = Archaeological Survey of India BOD = biological oxygen demand, DSC = Design and Supervision Consultants, H&S = health and safety, HC = hydrocarbons, IPIU = Investment Program Implementation Unit, RPM = respirable particulate matter, SPM = suspended particulate matter.

**Table 10: Operation and Maintenance Environmental Monitoring Program**

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Occupational Health and Safety	subproject sites	PHED and O&M Contractors	complaints from sensitive receptors	(i) records of training; (ii) H&S Plan and Asbestos Cement Management Plan approved by PHED	(i) complaints from sensitive receptors satisfactorily addressed; (ii) no exposure to asbestos cement pipes	as needed	PMU
General Maintenance work (pipe cleaning, declogging, pipe	subproject sites	PHED and O&M Contractors	complaints from sensitive receptors	checking of records	complaints from sensitive receptors satisfactorily addressed	as needed	PMU

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
replacement)							
Community Health and Safety	subproject sites	PHED and O&M Contractors	complaints from sensitive receptors	checking of records	complaints from sensitive receptors satisfactorily addressed	as needed	PMU
Accessibility	subproject sites	PHED and O&M Contractors	complaints from sensitive receptors	checking of records	complaints from sensitive receptors satisfactorily addressed	as needed	PMU
Water Quality	All CWRs	PHED and O&M Contractors	Drinking water quality parameter: pH, total metals, chloride, fluoride, coliform, BOD	Sample collection and laboratory analyses	Government of India Drinking Water Standards	As needed	PMU

BOD = biological oxygen demand, CWR = clear water reservoir, H&S = health and safety, O&M = operation and maintenance, PHED = Public Health Engineering Department, PMU = Project Management Unit.

## D. Environmental Management Plan Costs

132. Most of the mitigation measures require the Construction 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 DSC are included in the budgets for the civil works and do not need to be estimated separately here. Mitigation that is the responsibility of LSGD will be provided as part of their management of the project, so this also does not need to be duplicated here.

133. The remaining actions in the EMP are the various environmental monitoring activities to be conducted by the Environmental Monitoring Specialist. These have not been budgeted elsewhere, and their costs are shown in **Table 11**. The figures show that the total cost of environmental management and monitoring for the subproject as a whole (covering design, 2 years of construction and the first five years of operation) is INR1,260,000.

**Table 11: Environmental Management and Monitoring Costs (INR)**

Item	Quantity	Unit Cost	Total Cost	Sub-total	Source of Funds
1. Implementation of EMP					
Domestic Environmental Monitoring Specialist- DSC	1 x 3 month	130,000 <sup>a</sup>	390,000		DSC
2. Survey of municipal water quality					DSC
Domestic Consultant	6 x ½ month	130,000	390,000		
Sample Analysis	6 x 20	4,000 <sup>b</sup>	480,000		
<b>TOTAL</b>				<b>1,260,000</b>	

DSC = Design and Supervision Consultants, EMP = Environmental Management Plan, INR = Indian Rupees.

<sup>a</sup> Unit costs of domestic consultants include fee, travel, accommodation and subsistence.

<sup>b</sup> Cost of a standard suite of drinking water quality parameters (pH, turbidity, chlorinity, alkalinity, conductivity, TDS, DO, total and faecal coliforms, and selected metals) per sample.

## IX. FINDINGS AND RECOMMENDATIONS

### A. Findings

134. Mitigation measures are developed to reduce all negative impacts to acceptable levels. These were discussed with specialists responsible for the engineering aspects, and as a result some measures have already been included in the outline designs for the infrastructure. This means that the number of impacts and their significance has already been reduced by amending the design.

135. Because the distribution network is located in an ancient town where there are densely populated areas and sites of historical and tourism interest; and because Rajasthan is an area with a rich history, so there is a high risk that ground disturbance may uncover important remains. A series of specific measures have been developed to avoid damaging important archaeological remains.

136. During the construction phase, impacts mainly arise from the need to dispose of large quantities of waste soil and import a similar amount of sand to support the pipes in the trenches; and from the disturbance of residents, businesses, traffic and important buildings by the

construction work. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation.

137. The use of asbestos cement pipes in the existing water distribution network presents a particular problem, as workers and the public will need to be protected from inhalation of asbestos dust, which can be carcinogenic. This has been addressed in the EMP.

138. It is proposed that the project will employ in the workforce people who live in the vicinity of construction sites to provide them with a short-term economic gain; and ensure that people employed in the longer term to maintain and operate the new facilities are residents of nearby communities.

139. Once the system is operating, most facilities (OHSRs, WTP, pump house) will operate with routine maintenance, which should not affect the environment. Leaks in the distribution network 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. It will also be conducted in areas that have already been excavated, so there will be no need to protect archaeological material.

140. The main impacts of the operating water supply system will be beneficial as the citizens of Chittorgarh will be provided with a constant supply of water, which will serve a greater proportion of the population, including slum-dwellers. This will improve the quality of life of people as well as benefiting both individual and public health as the improvements in hygiene should reduce the incidence of disease associated with poor sanitation. This should lead to economic gains as people will be away from work less and will spend less on healthcare, so their incomes should increase.

141. Mitigation will be assured by a program of environmental monitoring conducted during construction and operation to ensure that all measures are implemented, and to determine whether the environment is protected as intended. This will include observations on- and off-site, document checks, and interviews with workers and beneficiaries, and any requirements for remedial action will be reported to the IPMU. There will also be longer-term surveys to monitor the expected improvements in the quality of domestic water and the health of the population.

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

## **X. CONCLUSIONS**

143. The subproject is not anticipated to cause significant adverse impacts. The potential adverse impacts that are associated with design, construction, and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures.

144. Based on the findings of the IEE, the classification of the Project as Category "B" is confirmed, and no further special study or detailed EIA needs to be undertaken to comply with ADB SPS (2009) or Government of India EIA Notification (2006).

## RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST- CHITTORGARH WATER SUPPLY

Rapid Environmental Assessment (REA) Checklist		Water Supply		
<b>Instructions:</b>				
◆	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.			
<b>Country/Project Title: India/ Water supply Chittorgarh</b>		<b>RUSIDP</b>		RUSIDP/TR-03/CHT/WS/01
<b>Sector Division</b>		<b>Water supply</b>		
<b>SCREENING QUESTIONS</b>		<b>Yes</b>	<b>No</b>	<b>REMARKS</b>
<b>A.</b>	<b>Project Siting</b>			
Is the project area .....				
◆	Densely populated?	√		Only a small village containing 40-50 houses is about 0.5 Km from the Ghosunda dam, rest of the area is vacant or agricultural land and river area Segwa Housing board colony, WTP site is densely populated
◆	Heavy with development activities?		√	Previously Mining of stones for Birla Cement Factory was done at site but mining is stopped since last 25 years
◆	Adjacent to or within any environmentally sensitive area		√	A water reservoir is developed due to excessive mining of the area Ghosunda Dam is constructed on River Bedach
	● Cultural heritage site		√	No
	● Protected Area		√	No
	● Wetland		√	No
	● Mangrove		√	No
	● Estuarine		√	No
	● Buffer zone of protected area		√	No
	● Special area for protecting biodiversity	√		Some Crocodiles have been reported to seen in the water reservoir
	● Bay		√	No
<b>B.</b>	<b>Potential Environmental Impacts</b>			
Will the Project cause .....				
◆	pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?		√	Not expected
◆	impairment of historical/cultural		√	No impact expected

Rapid Environmental Assessment (REA) Checklist			Water Supply	
	monuments/areas and loss/damage to these sites?			
♦	hazard of land subsidence caused by excessive ground water pumping?		√	Water from reservoir and Ghosunda Dam is to be used, no underground water pumping shall be done
♦	social conflicts arising from displacement of communities?		√	Project area is in government land and no habitation expected.
♦	conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?	√		Birla Cement Works also uses water of this reservoir for its factory. A conversation should be made with Management of Birla Cement Factory. A big Zinc Factory of Vedanta Group (formerly Known as Hindustan Zinc Factory) also uses water of this reservoir for its factory
♦	unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents) ?		√	Water testing should be done before treatment and after treatment
♦	delivery of unsafe water to distribution system?		√	Regular monitoring of water distribution will be done so the delivery of unsafe water will be unexpected.
♦	inadequate protection of intake works or wells, leading to pollution of water supply?		√	Proper design criteria will be implemented.
♦	over pumping of ground water, leading to Stalination and ground subsidence?		√	Only surface water is to be used.
♦	excessive algal growth in storage reservoir?		√	Measures should be taken to avoid algal growth
♦	Increase in production of sewage beyond capabilities of community facilities?		√	Sewerage system is being designed considering the future water demand so this type of situation will not arise
♦	Inadequate disposal of sludge from water treatment plants?		√	WTP is planned to be constructed at about 15 km from this site. Sludge should be disposed in appropriate manner and as per design
♦	Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?		√	Most of the project area is sufficient away from habitation A green belt area will be developed surrounding the boundary well. Plants with thick canopy will be planted in order to reduce the noise levels reaching the nearby surroundings.
♦	Impairments associated with transmission lines and access roads?		√	Transmission lines and access road is already existing as presently a water intake plant is already running
♦	health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.		√	Chlorine dosing will be done through chlorinator. MSIHC rules, 1989 and its amendment in 2010 will be followed.
♦	health and safety hazards to workers from the management of chlorine used for disinfection and other contaminants?		√	Proper arrangement will be made for handling and storage of chlorine gas. Adequate measures will be taken to prevent the exposure of workers to chlorine gas.
♦	dislocation or involuntary resettlement of people		√	No habitation at the site
♦	social conflicts between construction workers from other areas and community workers?		√	Preference will be given to the local workers in order to minimize the chances of such conflicts.

Rapid Environmental Assessment (REA) Checklist			Water Supply
♦	noise and dust from construction activities?	√	The noise and the dust emissions will be insignificant as per the nature of the work. Adequate measures will be taken to further minimize it.
♦	increased road traffic due to interference of construction activities?	√	A temporary phase of disturbance can arise during the construction activities. A traffic management plan will be prepared before the construction activities at site.
♦	continuing soil erosion/silt runoff from construction operations?	√	The excavated soil will be stockpiled at appropriate location and will be used for refilling with better compaction.
♦	delivery of unsafe water due to poor O and M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?	√	O and M manual will be prepared and followed. Training will be given to the staffs operating the plant to ensure proper O and M.
♦	delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?	√	Water testing will be done Moreover DI and uPVC pipes will be used which is not corrosive in nature
♦	accidental leakage of chlorine gas?	√	Chlorine dosing will be done with the help of chlorinators. Adequate measures will be taken to prevent the exposure of workers to chlorine gas. Regular monitoring will be done to ensure the implementation of EMP in an efficient manner.
♦	excessive abstraction of water affecting downstream water users?	√	This is a water reservoir like a lake, not the running water, no other user of water is there except Birla Cement Works
♦	competing uses of water?	√	Birla Cement Works also uses water of this reservoir for its factory. Hindustan Zinc Factory also uses water of this dam for their factory A conversation should be made with Management of Birla Cement Factory and Bendant Zinc plant.
♦	increased sewage flow due to increased water supply	√	The increased sewer flow has been included while designing the sewerage design by including an additional safety factor in the design parameters.
♦	increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant	√	The following factors will be covered in the solid waste management plan of the town.

**PUBLIC CONSULTATION- ENVIRONMENT  
SUBPROJECT-: WATER SUPPLY (CHITTORGARH)**

**Issues discussed**

- Awareness and extent of the project and development components
  - Benefits of Project for the economic and social Upliftment of Community
  - Labour availability in the Project area or requirement of outside labour involvement
  - Local disturbances due to Project Construction Work
  - Necessity of tree felling etc. at project sites
  - Water logging and drainage problem if any
  - Drinking water problem
  - Forest and sensitive area nearby the project site
  - Movement of wild animal if any
  - Other problems, encountered, if any
- **Area:** Chowki village near intake site, Date and time of Consultation: 05.07.2010, 5.50 P.M., 6.7.10
  - **Area:** Segwa Housing Board Colony, Date and Time of consultation: 06.07.2010, 12.10 P.M.
  - **Area:** Ghosunda dam, Date and Time of consultation: 06.07.2010, 3.30 PM

**Table A2: Issues of the Public Consultation- Design phase**

Sr. No.	Key Issues/Demands	Perception of community	Action to be Taken
1	Awareness of the project—including coverage area	Yes people of nearby area like vill. Chanderia, vill Chowki are aware of the project as water intake plant is already working there	
2	In what way they may associate with the project	At the construction phase some people can work as labourers, after completion water supply to nearby areas shall be improved	
3	Presence of any forest, wild life or any sensitive / unique environmental components nearby the project area	It was reported by local people that there is existence of some crocodiles in the Berda mines water reservoir	Forest departments officials should be contacted to explore the actual position of crocodiles and care should be take in operation phase
4	Presence of historical/cultural/religious sites nearby	No any, only one sculpture of Lord Ganesha is situated at a distance of about 50 mtrs near the site	Proper care should be taken to preserve that sculpture of Lord Ganesha
5	Unfavorable climatic condition	Excessive hot in Summer about 48 Degree Celsius and excessive cold about upto 3 Degree Celsius in winters	
6	Occurrence of flood	No such case is reported Rarely Bedach river is flooded in monsoon when heavy rain occurs	
7	Drainage and sewerage problem facing	No any	
8	Present drinking water problem – quantity and quality	Sufficient quantity and good quality of water is available in nearby areas	
9	Present solid waste collection and disposal problem	No, entire area is mines area and is isolated from habitation	
10	Availability of labour during construction	Yes, labours are easily available	

Sr. No.	Key Issues/Demands	Perception of community	Action to be Taken
	time	in the nearby villages	
11	Access road to project Site	Yes existing bitumen road	
12	Perception of villagers on tree felling and afforestation	Not required for the project	
13	Dust and noise pollution and disturbances during construction work	Request for arresting of dust and protection of habitation from noise pollution	
14	Setting up worker camp site within the village/ project locality	Project area is having sufficient space for workers camp	
15	Safety of residents during construction phase and plying of vehicle for construction activities	No habitation near the project area particularly intake site. But near treatment plant site housing colony exist	
16	Conflict among beneficiaries downstream users – water supply project using of river water	People do not use the water reservoir for any purpose, except the Birla Cement Factory who also uses this water	
17	Requirement of enhancement of other facilities	No any	
18	Whether local people agreed to sacrifice their lands (cultivable or not) for beneficial project after getting proper compensation	Not required for the project	

#### NAME AND POSITION OF PERSONS CONSULTED:

1. Balu Ram Rawat- Villager, Vill. Chowki
2. Manoj Kumar Meena- Pump operator, vill chowki
3. Bhawarji Meena- Pump operator, vill. Chowki
4. Ram Lal- vill. Chanderia
5. Banshi lal, Vill Chanderia
6. Bhawani, vill. Chowki
7. Govind, vill Chanderia
8. Gopal Dhobi- Resident of 2D 30, Segwa Housing Board Colony
9. Shahzad Khan- Resident of 2E 15, Segwa Housing Board Colony
10. Kamla Choudhary- Resident of 2E 16, Segwa Housing Board Colony
11. Arbina- Resident of 2E 14, Segwa Housing Board Colony
12. Roop Sing Rathore- Resident of 2D 27, Segwa Housing Board Colony
13. Banoo- Resident of 2D-29, Segwa Housing Board Colony
14. Tolaram- Fitter, Hindustan Zinc Ltd.
15. Heera Singh- Labor contractor, vill. Hapavas
16. Narain Singh- Vill Hapavas
17. Amar Singh- Vill Hapavas
18. Bhairon Singh- Vill Hapavas
19. Girdhari Singh- Vill Hapavas
20. Mohan Singh- Labour, Vill Hapavas

#### Summary of Outcome:

The project area is already having the intake pumping facility. Additional augmentation is necessary. Required infrastructure like road and transmission line already exists. Some crocodiles are reported in the reservoir water. So it is required to explore their existence and legal position. Water conflicts may arise due to parallel uses of water by Birla Cement Factory, so conservation should be made with Birla Cement officials and concerned Government departments. Water intake and pump house proposed on Ghosunda Dam on the river Bedach is already having water intake pump house which supplies a great deal of water to Zinc factory. Proper conversation should be made with factory

officials and concerned government officials. The site area is having all the infrastructure facilities. Segwa housing board colony (WTP site) is facing the problem in terms of quality and quantity of water. People expect much more from this project for future supply of good quality water from this project. No Environmental issue may arise here for the project. People wish to work in the project and cooperate in all aspects.

## RECOMMENDED CONTRACT CLAUSES

### A. Sources of Materials

1. Use quarry sites and sources permitted by government;
2. Verify suitability of all material sources and obtain approval of Investment Program Implementation Unit (IPIU);
3. If additional quarries will be required after construction has started, obtain written approval from PMU; and;
4. Submit to DSC on a monthly basis documentation of sources of materials.

### B. Air Quality

5. Consult with IPIU/DSC on the designated areas for stockpiling of clay, soils, gravel, and other construction materials;
6. Damp down exposed soil and any stockpiled on site by spraying with water when necessary during dry weather;
7. Use tarpaulins to cover sand and other loose material when transported by trucks; and
8. Fit all heavy equipment and machinery with air pollution control devices which are operating correctly.

### C. Surface Water Quality

9. Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
10. Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with IPIU/DSC on designated disposal areas;
11. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
12. Place storage areas for fuels and lubricants away from any drainage leading to water bodies;
13. Dispose any wastes generated by construction activities in designated sites; and
14. Conduct surface quality inspection according to the Environmental Management Plan (EMP).

### D. Noise Levels

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

19.

### E. Existing Infrastructure and Facilities

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

### F. Accessibility

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

**G. Landscape and Aesthetics**

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

**H. Socio-Economic – Income**

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

**I. Socio-Economic – Employment**

40. 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
41. Secure construction materials from local market.

**J. Occupational Health and Safety**

42. Develop and implement site-specific Health and Safety (H&S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use Personal Protective Equipment; (c) H&S Training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;
43. Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;
44. Provide medical insurance coverage for workers;
45. Secure all installations from unauthorized intrusion and accident risks;
46. Provide supplies of potable drinking water;
47. Provide clean eating areas where workers are not exposed to hazardous or noxious substances;

48. 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;
49. 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;
50. Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
51. Ensure moving equipment is outfitted with audible back-up alarms;
52. Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and
53. Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.

#### **K. Asbestos Cement Pipes**

54. Train all personnel (including manual labourers) to enable them to understand the dangers of asbestos cement pipes and to be able to recognise them in situ;
55. Report to management immediately if asbestos cement pipes are encountered;
56. Develop and apply Asbestos Cement Management Plan.

#### **J. Community Health and Safety.**

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

#### **L. Work Camps**

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

#### **M. Social and Cultural Resources**

70. Strictly follow the protocol for chance finds in any excavation work;
71. Request IPIU/DSC or any authorized person with archaeological field training to observe excavation;
72. Stop work immediately to allow further investigation if any finds are suspected; and

73. Inform IPIU/DSC if a find is suspected, and take any action they require ensuring its removal or protection in situ.