

Initial Environmental Examination

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Prepared by Project Management Unit, Rajasthan Urban Drinking Water Sewerage and Infrastructure Corporation Limited, Government of Rajasthan for the Asian Development Bank.

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CURRENCY EQUIVALENTS

(as of 27 May 2020)

Currency unit	–	Indian rupee (₹)
₹1.00	=	\$0.01324
\$1.00	=	₹75.5425

ABBREVIATIONS

ADB	-	Asian Development Bank
ASI	-	Archeological Survey of India
ASO	-	Assistant Safeguards Officer
CFE	-	Consent for Establishment
CFO	-	Consent for Operation
CPCB	-	Central Pollution Control Board
EAC	-	Expert Appraisal Committee
EC	-	Environmental Clearance
EHS	-	Environmental Health & Safety
EIA	-	Environmental Impact Assessment
SEIAA	-	State Environmental Impact Assessment Authority
EMP	-	Environmental Management Plan;
GOI	-	Government of India
GOR	-	Government of Rajasthan
IEE	-	Initial Environmental Examination;
PIU	-	Project Implementation Unit;
PMU	-	Project Management Unit
LSGD	-	Local Self Government Department
MOEF	-	Ministry of Environment and Forest
MLD	-	Million Liters per Day
LPCD	-	Liters per Capita per Day
DWC	-	Double Corrugated Duct
NGT	-	National Green Tribunal
NHAI	-	National Highways Authority of India
NOC	-	No Objection Certificate
PHED	-	Public Health Engineering Department
PWD	-	Public Works Department
REA	-	Rapid Environmental Assessment Checklist
ROW	-	right-of-way
RPCB	-	Rajasthan Pollution Control Board
RUDSICO (EAP)	-	Rajasthan Urban Drinking Water Sewerage and Infrastructure Corporation Limited - (Externally Aided Projects)
RSTDSP-	-	Rajasthan Secondary Towns Development Sector Project
SPS	-	Safeguard Policy Statement, 2009
STP	-	Sewage Treatment Plant
ULB	-	urban local body
TLMC	-	Town Level Monitoring Committees
SLEC	-	State-Level Empowered Committee
PMCBC	-	Project Management and Capacity Building Consultants
CMSC	-	Construction Management and Supervision Consultants
CAPC	-	Community Awareness and Participation Consultants

WEIGHTS AND MEASURES

°C	-	Degree Celsius
km	-	kilometer
LPCD	-	liters per capita per day
mm	-	milli meter
m	-	meter
MLD	-	million liters per day
mm	-	millimeter
Nos	-	numbers
km ²	-	square kilometer

NOTE

In this report, "\$" refers to United States dollars.

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EXECUTIVE SUMMARY

Rajasthan Secondary Towns Development Sector Project (RSTDSP), the fourth phase of investment projects financed by Asian Development Bank (ADB) and implemented by the Rajasthan Urban Drinking Water Sewerage and Infrastructure Corporation Limited-Externally Aided Projects (RUDSICO - EAP), previously known as Rajasthan Urban Infrastructure Development Project (RUIDP). RSTDSP will support the ongoing efforts of the Government of Rajasthan (GOR) towards improving the water and wastewater services in about 14 towns.¹ RSTDSP seeks to improve WSS services in secondary towns with populations between 20,000-115,000 through a sector loan modality. The project is aligned with the following impact(s): access to potable, affordable, reliable, equitable, and environmentally sustainable drinking water supply in all urban areas of Rajasthan improved;² and health status of urban population, especially the poor and under-privileged improved.³ The project will have the following outcome: urban service delivery in secondary towns of Rajasthan improved. There are three outputs.

- **Output 1:** Water supply infrastructure in project towns improved with climate-resilient and inclusive features. By 2027: (i) about 1,350 kilometers of water supply pipelines will be commissioned through a district metered area approach for effective NRW management, (ii) about 100,000 households will be connected to an improved water supply system (including at least 95% BPL households) with 100% functional meters allowing for the introduction of volumetric billing, (iii) 3 new water treatment plants will be commissioned with total capacity of at least 28 million liters per day and (iv) 2 water treatment plants will be rehabilitated.
- **Output 2:** Sanitation systems in project towns improved with climate-resilient, cost-effective and inclusive features.⁴ By 2027: (i) about 1,300 kilometers of sewers will be constructed, (ii) 19 STPs with co-treatment of wastewater and fecal sludge and with a total capacity of about 80 million liters per day will be commissioned and 3 existing STPs will be upgraded to meet current effluent standards, (iii) about 103,000 new household connections (including at least 95% BPL households) to sewer system will be installed, (iv) 1 fecal sludge treatment plant with total 10 kilo liters per day capacity will be commissioned, and (v) agreements for reuse of wastewater mainly for industry or agriculture will be signed in at least 5 project ULBs.
- **Output 3:** Institutional and human capacities strengthened for service improvements, gender equality and sustainability. Under the sector project: (i) at least 500 women will gain professional experience through an internship program at RUDSICO, (ii) about 500 staff and 500 elected representatives of project ULBs, including 80% of eligible women, will report increased knowledge on O&M of WSS services, CWIS, financial sustainability and GESI action plan implementation, (iii) about 500 girls will report enhanced knowledge in conducting water audits in

¹ Secondary towns under consideration are Abu Road, Banswara, Didwana, Fatehpur, Khetri, Kuchaman, Laxmangarh, Ladnu, Mandawa, Makrana, Pratapgarh, Ratangarh, Sardarshahar, and Sirohi

² Government of Rajasthan. 2018. *Rajasthan: Urban Water Supply Policy*. Jaipur.

³ Government of Rajasthan. 2016. *State Sewerage and Wastewater Policy*. Jaipur.

⁴ Climate resilient and inclusive features included are: improvements in the distribution system to reduce losses; rainfall water harvesting; energy-efficient pumps; solar panels at project facilities; pressure control mechanisms in the water system to help avoid losses through pipe bursts; and wastewater reuse for productive uses.

schools and households, and (iv) data platforms will be established in all project towns.⁵

- Pratapgarh Town sewerage subproject is one of the subprojects designed under the investment component of Phase IV of RUDSICO-EAP. At present there is no sewerage system in the town, due to which most of the households depend on septic tanks for disposal of sewage. Effluent from septic tanks and sullage and sewage from houses without septic tanks is let off into open drains which ultimately collect in low lying areas in the outskirts of the town or led in to open nallah, which ultimately discharge into river.

Screening and Assessment of Potential Impacts. ADB requires consideration of environmental issues in all aspects of the Bank's operations, and the requirements for Environmental Assessment are described in ADB's SPS, 2009. As per the Government of India environmental impact assessment (EIA) Notification, 2006, this subproject does not require EIA study or environmental clearance. The potential environmental impacts of the subproject have been assessed using ADB rapid environmental assessment (REA) checklist for Sewerage. The potential negative impacts were identified in relation to pre-construction, construction and operation phases. This initial environmental examination (IEE) addresses the infrastructure components proposed under Pratapgarh town sewerage subproject.

Categorization. Environmental assessment has been conducted for the Pratapgarh sewerage subprojects based on (i) preliminary detailed design, and (ii) most likely environmentally sensitive components. The environmental assessment used ADB's REA checklists for sewerage works and "No Mitigation Scenario Checklist". The environmental assessment of the Pratapgarh sewerage subproject is not likely to have any significant adverse environmental impacts that are irreversible, diverse, or unprecedented. Potential impacts are mostly site-specific and few of them are irreversible. In most cases mitigation measures can be designed with uncomplicated measures commonly used at construction sites and known to civil works contractors.

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

Project Scope. The subproject is formulated to address gaps in sewerage infrastructure in a holistic and integrated manner. The main objective of this project is to improve sewerage system in the town, this will have an important effect on public health and environment. Major scope of works as per detail design is:

- Construction of 7.0 MLD STP at Pratapgarh on SBR Technology treated effluent pumping stations
- One sewage pumping station (SPS) near Depeshwar Talab of 7.0 MLD and one MWP of 0.10 MLD
- About 102.15 km sewer collection network including pipes up to property chamber (HDPE DWC SN8 -89.47 km, RCC pipes NP4 -3.33 km and Trenchless Method adopting with HDPE PE-100 / PN-6 -9.35 km)

⁵ Includes supervisory control and data acquisition system, hydraulic model, geographic information system, and drinking water and treated wastewater quality monitoring system.

- 1. 68 km of sewage pumping mains (100 mm and 500 mm diameter of DI pipe)
- Reuse of Treated Effluent - Design, construction, execution, testing and commissioning of Treated Effluent Elevated Reservoir (TEER), Treated Effluent Storage Reservoir (TESR) and Effluent Pumping Station (EPS)
- Disposal of Treated Effluent - Design, construction, execution, testing and commissioning of sewer pipe from STP effluent chamber to natural drain identified by Employer
- Sludge Management and Disposal – Safe disposal of sludge up to designated places provided by the employer or line agency within 10 km distance from STP.
- Construction of Manholes
- About 10,000 house sewer connection (up to year 2026) from property chamber to sewer outlet from property
- Fecal sludge management: provide 2 nos. of trucks- 4000 L and 1000 L capacities
- Provision of SCADA, Electrical, Mechanical and Allied Works. IEE will be updated if scope of works changes in any stage of detail design or during construction.

Description of the Environment. Subproject components are located in Pratapgarh town and in its immediate surroundings which were converted into urban use for many years ago and there is no natural habitat left at these sites. No involuntary land acquisition of private land is anticipated for this project. The project sites are located in existing road right-of-way (ROW) and government-owned lands. There are no protected areas, wetlands, mangroves or estuaries in or near the project locations. Soils are deep, and do not require cutting of rocks for pipe laying. STP site is located in the available vacant Govt. land near village Talab Kheda. There are only bushes and shrubs present in the land few habitations exist about 500 meters away from the STP land. Pratapgarh experiences semi-arid hot climate with dry hot summers and cold winters. The cold season is from December to February and is followed by hot summers from March to the last week of June. There are no protected monuments or places of historical or archeological importance at the project locations. As per the seismic zoning map of India, Pratapgarh falls under the zone II, which is the lowest earthquake risk zone in India. This zone is termed as "low damage risk zone".

Potential Environmental Impacts and Mitigation Measures. In this draft IEE, negative impacts were identified in relation to location, design, construction and operation of the improved infrastructure. Locations and siting of the proposed infrastructures were considered to further reduce impacts. These include (i) locating facilities on government-owned land to avoid the need for land acquisition and relocation of people; and (ii) laying of pipes in ROW alongside main/access roads, to reduce acquisition of land and impacts on livelihoods specifically in densely populated areas of the town.

Potential impacts were identified in relation to location, design, construction and operation of the improved infrastructure. During the construction phase, impacts mainly arise from the need to dispose of moderate quantities of waste soil and disturbance of residents, businesses, and traffic. These are common temporary impacts of construction in urban areas and there are well developed methods for their mitigation. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. Resettlement Plan prepared for the Pratapgarh Subproject addresses temporary resettlement/livelihood issues resulting mainly from laying of sewers in busy commercial areas.

Proposed site of Sewage Treatment Plant (STP) is vacant government land sufficiently away from the habitations and sensitive receptors. STP is designed as per latest applicable standards.

Treated effluent and sludge will be used for beneficial purposes such as agriculture and for which parameters of treatment have been considered in design phase.

Measures such as appropriate scheduling of works (non-monsoon season, low traffic hours, etc.) and minimizing inconvenience by best construction methods will be employed. Traffic management plan will be prepared for sewer-laying works on busy roads. In the operational phase, infrastructure will operate with routine maintenance, which should not affect the environment. Facilities will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only. Measures are included to prevent industrial discharges into sewers, which may affect the working of sewage treatment plants.

Mitigation measures have been developed to reduce all negative impacts to acceptable levels. Mitigation will be assured by a program of environmental monitoring to be conducted during construction. The environmental monitoring program will ensure that all measures are implemented and will determine whether the environment is protected as intended. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries. Any requirements for corrective action will be reported to the ADB.

Environmental Management Plan. An Environmental Management Plan (EMP) has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels, along with the delegation of responsibility to appropriate agency. Various design related measures are already included in the project design. During construction, the EMP includes mitigation measures such as (i) selection of construction methodology(ii) proper planning of sewer works to minimize the public inconvenience; (iii) barricading, dust suppression and control measures; (iv) traffic management measures for works along the roads and for hauling activities; (v) provision of walkways and planks over trenches to ensure access will not be impeded; and (vi) finding beneficial use of excavated materials to extent possible to reduce the disposal quantity. EMP will guide the environmentally-sound construction of the subproject. EMP includes a monitoring program to measure the effectiveness of EMP implementation and include observations on- and off-site, document checks, and interviews with workers and beneficiaries. A copy of the updated EMP/ SEMP shall be kept on-site during the construction period at all times. The EMP shall be made binding on all contractors operating on the site and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document shall constitute a failure in compliance. To monitor the operation stage performance, there will also be longer-term surveys to monitor raw and treated water quality, treatment efficiency of STP (raw and treated sewage quality), sludge at STP. Mitigation and monitoring measures, along with the project agency responsible for such actions, form part of the Environmental Management Plan. The estimated implementation cost of the EMP is INR 1,91,42,385 (in words Rupees One Crore Ninety one Lakhs forty-two Thousand three hundred eighty five only).

This draft IEE and EMP will be included in the bid and contract documents to ensure compliance with the conditions set out in this document. The contractor will be required to submit to PIU, for review and approval, an updated EMP / site environmental management plan (SEMP) including (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; and (iii) monitoring program as per EMP. No works can commence prior to approval of SEMP. A copy of the EMP/approved SEMP will be always kept on site during the construction period.

Implementation Arrangements. Government of Rajasthan's Local Self Government Department

(LSGD) acting through the Rajasthan Urban Drinking Water, Sewerage and Infrastructure Corporation (RUDSICO) will be the Project Executing Agency. The project management unit (PMU) is housed in RUDSICO's division for externally aided projects (EAP). There will be two Zonal Offices in Jaipur and Jodhpur, and project implementation units (PIUs) in each project town/Urban Local Body (ULB). PMU will be responsible for submitting environmental assessment and monitoring reports to ADB, monitoring of safeguards compliance, addressing safeguards issues, providing support and guidance to PIUs. The PIUs will be responsible for day-to-day monitoring of EMP implementation, information disclosure, consultations and other field-level activities. PMU has appointed a Project Officer for Environment and each PIU will deputize Assistant Safeguard Officers (ASOs). The PMU Environment Project Officer will be assisted by specialists from Project Management and Capacity Building Consultants (PMCBC) and Construction Management and Supervision Consultants (CMSC).

Consultation, Disclosure and Grievance Redress. The stakeholders were involved in developing the IEE through discussions on-site and a public consultation workshop at city level, after which views expressed were incorporated into the IEE and in the planning and development of the project. Apart from on-site public consultations, a stakeholder meeting of City Level Committee (CLC) was held and CLC has appreciated and approved the subproject. The IEE will be made available at public locations and will be disclosed to a wider audience via the ADB and RUDSICO-EAP websites. The consultation process will be continued and expanded during project implementation to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation. A grievance redress mechanism (GRM) is described within the IEE to ensure any public grievances are addressed quickly.

Monitoring and Reporting. The PMU, PIU and consultants will be responsible for monitoring and reporting. During construction, results from internal monitoring by the DBO contractor will be reflected in their monthly EMP implementation reports to the PIU. PIU with the assistance of CMSC, will monitor the compliance of Contractor, prepare a quarterly environmental monitoring report (QEMR) and submit to PMU. The PMU will oversee the implementation and compliance and will submit Semi-Annual Environmental Monitoring Reports (SEMR) to ADB. ADB will post the environmental monitoring reports on its website. Monitoring reports will also be posted RUDSICO-EAP/PMU websites.

Conclusions. The citizens of the Pratapgarh will be the major beneficiaries. The subproject is primarily designed to improve environmental quality and living conditions of Pratapgarh town through provision sewerage system. The benefits arising from this subproject include: (i) better public health particularly reduction in waterborne and infectious diseases; (ii) reduced risk of groundwater contamination; and, (iii) reduced dependence on fresh water resource due to reuse of treated wastewater, and (iv) improvement in quality of water bodies due to disposal of treated effluent meeting disposal standards.

The subproject is therefore unlikely to cause significant adverse impacts. The potential impacts that are associated with design, construction and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures. Based on the findings of the IEE, there are no significant impacts and the classification of the project as Category "B" is confirmed. The subproject is not covered by the GOI EIA Notification (2006).

Recommendations. The following are recommendations applicable to the subproject to ensure no significant impacts:

- Obtain all statutory clearances at the earliest time possible and ensure conditions/provisions are incorporated in the detailed design;
- Include this IEE in bid and contract documents;
- Update and implement the recommendations from the biodiversity assessment report;
- Update/revise this IEE based on detailed design and/or if there are unanticipated impacts, change in scope, alignment, or location;
- Conduct safeguards induction to the contractor upon award of contract;
- Strictly supervise EMP implementation.
- Ensure contractor appointed qualified EHS officers prior to start of works;
- Documentation and reporting on a regular basis as indicated in the IEE;
- Continuous consultations with stakeholders;
- Timely disclosure of information and establishment of grievance redressal mechanism (GRM);
- Involvement of contractors, including subcontractors, in first-level GRM;
- Commitment from PMU, PIUs, project consultants, and contractors to protect the environment and the people from any impact during project implementation.

I. INTRODUCTION

A. Project Background

1. Rajasthan Secondary Towns Development Sector Project (RSTDSP), the fourth phase of investment projects financed by Asian Development Bank (ADB) and implemented by the Rajasthan Urban Drinking Water Sewerage and Infrastructure Corporation Limited (RUDSICO), previously known as Rajasthan Urban Infrastructure Development Project (RUIDP). RSTDSP will support the ongoing efforts of the Government of Rajasthan towards improving the water and wastewater services in about 14 towns.⁶ RSTDSP seeks to improve water supply and sanitation (WSS) services in secondary towns with populations between 20,000-115,000 through a sector loan modality. The project is aligned with the following impact(s): access to potable, affordable, reliable, equitable, and environmentally sustainable drinking water supply in all urban areas of Rajasthan improved;⁷ and health status of urban population, especially the poor and underprivileged improved.⁸ The project will have the following outcome: urban service delivery in secondary towns of Rajasthan improved. There are three outputs.

- (i) **Output 1:** Water supply infrastructure in project towns improved with climate-resilient and inclusive features. By 2027: (i) about 1,350 kilometers (km) of water supply pipelines will be commissioned through a district metered area approach for effective non-revenue water (NRW) management; (ii) about 100,000 households will be connected to an improved water supply system (including at least 95% below poverty line [BPL] households) with 100% functional meters allowing for the introduction of volumetric billing; (iii) 3 new water treatment plants (WTP) will be commissioned with total capacity of at least 28 million liters per day (MLD); and (iv) 2 WTPs will be rehabilitated.
- (ii) **Output 2:** Sanitation systems in project towns improved with climate-resilient, cost-effective and inclusive features.⁹ By 2027: (i) about 1,300 kilometers (km) of sewers will be constructed, (ii) 19 sewerage treatment plants (STPs) with co-treatment of wastewater and fecal sludge and with a total capacity of about 80 MLD will be commissioned and 3 existing STPs will be upgraded to meet current effluent standards, (iii) about 103,000 new household connections (including at least 95% BPL households) to sewer system will be installed, (iv) 1 fecal sludge treatment plant with total 10 kiloliters per day (KLD) capacity will be commissioned, and (v) agreements for reuse of wastewater mainly for industry or agriculture will be signed in at least 5 project ULBs.
- (iii) **Output 3:** Institutional and human capacities strengthened for service improvements, gender equality and sustainability. Under the sector project: (i) at least 500 women will gain professional experience through an internship program at RUDSICO (EAP), (ii) about 500 staff and 500 elected representatives of project

⁶ The project towns under consideration for the sector loan are: Abu Road, Banswara, Didwana, Fatehpur, Khetri, Kuchaman, Ladnu, Laxmangarh, Makrana, Mandawa, Pratapgarh, Ratangarh, Sardarshahar and Sirohi. Of these towns, Khetri and Mandawa are heritage towns.

⁷ Government of Rajasthan. 2018. Rajasthan: Urban Water Supply Policy. Jaipur.

⁸ Government of Rajasthan. 2016. State Sewerage and Wastewater Policy. Jaipur.

⁹ Climate resilient and inclusive features included are: improvements in the distribution system to reduce losses; rainfall water harvesting; energy-efficient pumps; solar panels at project facilities; pressure control mechanisms in the water system to help avoid losses through pipe bursts; and wastewater reuse for productive uses.

ULBs, including 80% of eligible women, will report increased knowledge on operation and maintenance (O&M) of WSS services, citywide inclusive sanitation (CWIS), financial sustainability and gender equality and social inclusion (GESI) action plan implementation, (iii) about 500 girls will report enhanced knowledge in conducting water audits in schools and households, and (iv) data platforms will be established in all project towns.¹⁰

2. A series of subprojects will be implemented under the Project, with each subproject providing improvements to water supply or sewerage or both in a project town. Pratapgarh Town water supply and sewerage subproject is one of the subprojects proposed under RSTDSP. At present no proper sewerage system exists in the town. Most of the households depend on septic tanks for disposal of sewage. Effluent from septic tanks and sullage water is let off into open drains which ultimately collect in low lying areas and natural drains in the outskirts of the town. It is therefore proposed to improve sewerage in the town. ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguards Policy Statement (2009). Accordingly, this Initial Environmental Examination (IEE) has been conducted to assess the environmental impacts and provide mitigation and monitoring measures to ensure that there are no significant impacts because of the subproject.

B. Purpose of Initial Environmental Examination Report

3. ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguard Policy Statement (SPS), 2009. The potential environmental impacts of the subproject have been assessed using ADB Rapid Environmental Assessment (REA) Checklist for sewerage treatment (Appendix 1). Then potential negative impacts were identified in relation to pre-construction, construction and operation of the improved infrastructure, and results of the assessment show that the subproject is unlikely to cause significant adverse impacts. Thus, this initial environmental examination (IEE) has been prepared in accordance with ADB SPS's requirements for environment category B projects.

4. The Pratapgarh sewerage subproject is proposed for implementation under the design-build-operate (DBO) modality, where in which the detail design will be carried out by the selected bidder based on the feasibility/preliminary project report prepared prior to bidding. Thus, this IEE is based on the preliminary project report prepared by RUDSICO (EAP). The IEE was based mainly on field reconnaissance surveys and secondary sources of information. No field monitoring (environmental) survey was conducted, however, the environmental monitoring program developed as part of the environmental management plan (EMP) will require the contractors to establish the baseline environmental conditions prior to commencement of civil works. The results will be reported as part of the environmental monitoring report and will be the basis to ensure no degradation will happen during subproject implementation. Stakeholder consultation was an integral part of the IEE.

5. This IEE will be updated and finalized during detailed design stage to reflect if there is any change in scope of works, change in location of component and change in cost due to addition or subtraction of components which can change the environmental impacts, and revised IEE shall

¹⁰ Includes supervisory control and data acquisition system, hydraulic model, geographic information system, and drinking water and treated wastewater quality monitoring system.

supersede the earlier version of IEE. and shall be contractually applicable to the contractor after approval from RUDSICO (EAP) and ADB.

6. The implementation of the subprojects will be governed by Government of India and State of Rajasthan and other applicable environmental acts, rules, regulations, and standards. Environmental safeguards will be followed in accordance with the ADB SPS, 2009. During the design, construction, and operation of the project the borrower/client will apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines).¹¹

C. Report Structure

7. This Report contains the following eleven (11) sections excluding the executive summary at the beginning of the report:

- (i) Executive Summary
- (ii) Introduction
- (iii) Description of the Project
- (iv) Analysis of Alternatives
- (v) Policy, Legal and Administrative Framework
- (vi) Description of the Environment
- (vii) Anticipated Environmental Impacts and Mitigation Measures
- (viii) Public consultation and information disclosure
- (ix) Grievance Redress Mechanism
- (x) Environmental management plan
- (xi) Conclusions and Recommendations

¹¹ www.ifc.org/ehsguidelines

II. DESCRIPTION OF THE PROJECT

A. Introduction of Pratapgarh Town

8. Pratapgarh district is the 33rd district of Rajasthan, created on 26 January 2008, comprising five Tehsils/ sub-divisions- Pratapgarh, Chhoti Sadri, Dhariyawad, Arnod and Peepalkhoont. It is a part of Udaipur Division and has been carved out from the erstwhile tehsils of Chittorgarh, Udaipur and Banswara districts. Pratapgarh town is the administrative headquarters of the district. As of 2011 it is the second least populous district of Rajasthan (out of 33), after Jaisalmer. Pratapgarh is one of the project towns selected for implementation of the ADB funded RUDSICO (EAP) Phase-IV project.

B. Present Situation

9. **Water Supply.** In 1972-1973, 3 nos. of new open wells were constructed at village Cheniyakheri and rising pipeline 200 mm AC/CI was laid up to new RCC SR 675 kL capacity and 18M staging. Distribution system was designed for the year 1985 with designed population of 25000 souls. In the last reorganization in the year 1994 due to reduction in the production from open wells/ ground water sources and increased demand a surface source "Jakham dam" was taken as source of water to meet out the demand of town Pratapgarh for the year up to 2011. The capacity of Jakham dam is 5015 MCFT. Other provisions for improving distribution system, storage facilities, filter plant 3. 6 MLD were also taken for the design year. Ultimate reservation for town is 14. 68 MLD which is sufficient to supply water at 135 lpcd at consumer end.

10. Current service level in WS: Water is supplied for one and half hour on daily at 100 to 110 lpcd. Water supply is currently intermittent. Current water supply is 7 MLD from Jakham Dam will be increased to 135 lpcd after full commissioning of Jakham dam water supply scheme.

11. Presently a water supply scheme is also under execution and at commissioning. In that proposal raw water will be taken from the Jakham Dam through intake well. Through this intake well, raw water shall be pumped by Sub. Cet. pump and shall be carried through 450 mm. dia DI K-9, 10. 25 km long rising main pipeline and shall be collected into a raw water reservoir cum sedimentation tank of 8 hrs. From this RWR settled raw water shall be pumped by centrifugal pumping sets through rising main of 450 mm. dia (DI K-9 & K-7 up to Rapid Gravity Filter Plant in existing water works campus. After filtration at RGF the clear water will be taken into CWRs (existing 1000 KL and proposed 500 kl.). To get better arrangements for cleaning purposes or other repairs etc. total storage for CWR has been splitted. On each CWR, OHSR's have been connected and accordingly capacity of each OHSR's has been designed. Existing filter plant of 3. 60 MLD capacity and CWR and Pump house in the E. E. office campus is proposed to be used for filling 3 nos. OHSRs. The capacity of the RGF has been upgraded to additional 3. 0 MLD with provision for its rejuvenation. Construction of 25 km pumping main, Raw Water Reservoir, WTP, 2 CWRs, 6 OHSRs, 97 km distribution system 2 Pumping system including SCADA & PLC & 10-year O&M is in the scope.

12. **Sewerage.** There is no functional sewerage system in place in Pratapgarh. Presently the wastewater from kitchens & bathrooms is discharged into storm water drains culminating finally to the Nallah or on ground, which pollutes the environment and contaminates the ground water. Open defecation is not uncommon. Most of the residential and commercial buildings and educational institutions have on-site septic tanks and soak pits. Though septic tanks is an accepted onsite treatment, as the septic tanks are not designed and maintained properly, the effluent does not confirm to the standards. The effluent from the septic tanks is directly let into

the open drains.

C. Infrastructure Improvements Proposed in Pratapgarh under RSTDSP

13. **Sewerage works.** Under RSTDSP, it is proposed to develop a sewerage system in Pratapgarh Town to collect, treat, and dispose/reuse the domestic wastewater safely. This is being provided in a combination of underground sewerage system including treatment facility, and Fecal Sludge and Septage Management (FSSM) system in areas that are not fully developed at present and not feasible to provide sewer network. The objectives of the proposed sewerage works are:

- (i) Construction of sewerage network, including house sewer connection and collection of wastewaters from point of generation.
- (ii) Construction of energy efficient and mechanized STP and electromechanical machinery;
- (iii) Septage management and decentralized wastewater treatment systems in suitable areas;
- (iv) Provision for reuse of treated effluent etc.;
- (v) To ensure 100 % house service connections for wastewater collection; and
- (vi) To ensure sustainability of the project by implementing a comprehensive asset management plan focusing on an integrated approach to O&M to minimize lifecycle costs.

14. The sewer system will be designed as a separate sewer system that carries only the domestic wastewater. The open drain system that exists in the town will cater only to storm runoff. No industrial wastewater will be allowed into the sewers. Excavation for the sewer laying works will be undertaken through open trenching as well as trenchless technology. The open trench will be having maximum width of 1 m only on one side of the road ROW with maximum length, an average, of 70 m per day. Excavation, laying of sewers and backfilling will be completed within the 3 days. Subsequent to completion of works, road reinstatement will be undertaken by the contractor as part of the civil works. The same shall be mentioned in the bid document to make it binding on the contractor. Trenchless technology will be practiced mainly in congested areas, railway crossing and heavy traffic roads to reduce negative impacts.

15. **Sewage treatment.** It is proposed to develop sequential batch reactor (SBR) based sewage treatment facility that will treat the incoming sewage to stringent discharge standards specified in this IEE and included in the bid documents. SBR is a cyclic activated sludge treatment process and provides highest treatment efficiency possible in a single step biological process. STP of 7.0MLD is proposed as part of the project in Pratapgarh to meet the demand.

16. **Proposal for SBR type of sewage treatment plant.** Sewage shall be fed into the Cyclic Activated Sludge Process/SBR Process Basins for biological treatment to remove BOD, COD and Suspended Solids. SBR is a Cyclic Activated Sludge Treatment process. It provides highest treatment efficiency possible in a single step biological process. The SBR System is operated in a batch reactor mode. This eliminates all the inefficiencies of the continuous processes. A batch reactor is a perfect reactor, which ensures 100% treatment. Two modules are provided to ensure continuous treatment. The complete process takes place in a single reactor, within which all biological treatment steps take place sequentially. No additional settling unit, Secondary Clarifier is required.

17. **Reuse of treated effluent.** The Rajasthan State Sewerage and Wastewater Policy, 2016, promotes the reuse of treated sewage for non-potable applications, and also to make sewerage projects environmentally sustainable. This policy:

- (i) aims to ensure improved health status of urban population, specially the poor and under privileged, through the provision of sustainable sanitation services and protection of environment.
- (ii) promotes the reuse and provides guidance on the same;
- (iii) prioritizes reuse in irrigation (agriculture, forestry, and landscaping), followed by fish farming, industry and non-potable domestic reuse;
- (iv) requires monitoring of treated wastewater quality, soil quality etc.;
- (v) prohibits artificial recharge of aquifers using treated wastewater, and promotes construction of storage tanks to store treated wastewater to facilitate reuse;
- (vi) prescribes that the detailed project report (DPR) of a sewerage project should clearly define the best reuse option specific to the town and prepare a reuse action plan part of the DPR duly following the water quality norms and legal implications; and
- (vii) suggests use of sludge produced from the treatment as fertilizer and soil conditioner after processing.

18. To further the implementation of the Policy, to promote the reuse and provide guidance to the stakeholders, the LSGD is currently in the process of publishing “Guidelines for Reuse of Treated Wastewater in Rajasthan, 2019. These guidelines:

- (i) promote the use the treated wastewater and envisages to maximize the collection and treatment of sewage generated and reuse of treated wastewater on a sustainable basis, thereby reducing dependency on freshwater resources; and
- (ii) promotes the use of treated wastewater as an economic resource.

19. Under the subproject, following the State Policy, treated effluent will be reused in applications such as agriculture, horticulture, development of urban forestry and industry, as appropriate. A Treated Effluent Reuse Plan will be prepared by the DBO Contractor during the detailed design phase as envisaged by the State Policy, and reuse modalities will be firmed up. To facilitate reuse and supply of treated effluent, a TESR, effluent pumping station and a TEER are proposed at the STP in the subproject. Total storage capacity of TESR and TEER at each STP is 15% of respective STP treatment capacity. Treated effluent will be chlorinated prior to its entry into TESR/TEER.

20. **Discharge of treated wastewater.** It is proposed to reuse the treated effluent for use of agriculture, horticulture, development of urban forestry etc. and remaining treated effluent is proposed to be discharged into nearby River. To safeguard the interest of downstream users it is proposed to apply technology/process to achieve very low BOD (BOD 10) and suspended solids in the treated effluent. The excess / surplus treated wastewater that is not reused will be discharge into Areva River, and necessary facilities – pipelines and pumping requirements, will be developed.

21. **Sludge treatment and disposal.** A Sludge Sump shall be provided to collect thickened sludge from SBR basins. Supernatant from the sump will be returned toilet/equalization tank for treatment. Sludge from sump will be pumped to sludge thickener, and the thickened sludge will be pumped to mechanical sludge dewatering system (such as centrifuge). Dewatered sludge cake will further air dried in a sludge storage shed for 15 days and disposed in an identified site.

22. **Operation & maintenance of sewerage system.** The DBO contractor will operate and maintain the system for a period of 10 years after completion of construction and commissioning the new system. This will include the following:

- (i) Sewage pumping system to pump sewage to STP including maintenance of entire system and maintaining the infrastructure (power charges to be paid by the Employer);
- (ii) STP including maintenance of entire system and maintaining the infrastructure (power charges to be paid by the Employer);
- (iii) Managing the sewerage network for collection of sewage including maintenance of entire system from property chambers up to disposal outfall of Sewage to STP;
- (iv) Sampling treated effluent to ensure that it meets the guaranteed treatment parameters;
- (v) Provide house connections for collection of sewage from house properties on approval or sanction by Employer;
- (vi) Contractor will provide continuous on-the-job trainings that will start from the day the contractor gets mobilized, and other capacity building programs by the contractor as important regular activities for staff of the Employer and Municipal Council Pratapgarh; and
- (vii) Maintaining environmental norms at entire system components.

23. **Fecal Sludge and Septage Management.** It is proposed to provide FSSM system in areas where the population density is low (less than 100 persons per hectare) and will not generate sewage in adequate quantity to convey by sewer network. FSSM will provide low cost sanitation in areas where sewer network is not an immediate requirement, will make septage collection, treatment and effluent management environment- friendly. There are 7 wards (Wards 2, 19, 20, 21, 22, 23 and 25) that have areas with scattered development and low population density. Total base year (2021) population of these wards is 23568, of which about 17% (4161 persons) will be covered with FSSM and rest will be covered by sewer network. This is about 10% of total town population.

24. Under the FSSM, fecal sludge / septage will be collected from the household level septic tanks using truck mounted mobile desludging equipment and transported to STP for treatment. STP will have necessary provisions to receive and treat the septage along with the wastewater received via sewer network. STP will be designed accordingly by the successful bidder during the detailed design phase to comply with the treated effluent discharge standards specified in the bidding documents.

25. **Operation & maintenance of Fecal Sludge and Septage Management.** The DBO contractor will operate and maintain the system for a period of 10 years. This will include the following:

- (i) Desludging the septic tanks/pits from the individual houses using mobile truck mounted desludging equipment;
- (ii) Transportation of the vehicle to STP, dispose-off septage to Inlet chamber/screen chamber of STP; and
- (iii) Cleaning of the tank, and proper garaging of the vehicle at designated place.

D. Proposed Subproject Components

26. Subproject is proposed for implementation under DBO modality, wherein which the

successful bidder will design the sewerage systems and components (based on the feasibility/preliminary design/standards/guidelines provided in the bid document), construct, commission, and operate for 10 years, after which it will be transferred to Pratapgarh Municipality. Therefore, at this stage, subproject is designed only in outline, and the details of components of the subproject provided in the table below are as finalized at this stage based on the preliminary designs and as included in the bid documents. This IEE is based on the subprojects and components detailed in the below table, and the IEE will be further updated during the detailed design phase.

27. Table 1 shows the nature and size of the various civil works components of this sewerage subproject in Pratapgarh. Conceptual layout plans and alignments are shown in Figures 1 to 8.

Table 1: Proposed Subproject Components

S. No	Components	Function	Description	Location
1	Sewage Treatment Plant (STP)	Treatment of collected wastewater to meet stipulated discharge standards	New – 1 STP • 7.0 MLD Components • SBR (sequential batch reactor) based STP with primary, secondary, tertiary treatment • Disinfection of treated wastewater for reuse – chlorination tank • sludge management (sludge collection, thickening, dewatering and disposal) • Laboratory, and online testing facilities for BOD, COD, TSS etc.) • Instrumentation, automation, SCADA etc.	Village Talabkheda
2	Sewage Pumping Station and MWP- Manhole with Pump (MWP)	Sewer pumping stations are used to move wastewater to higher elevations in order to allow transport by gravity flow until the sewage reaches treatment plant. Manhole with pumping (MWP) are used where sewage from smaller areas needs to be pumped to another trunk main.	1 New 7.0 MLD SPS 2. one 0.10 WP (main hole with pump)	1. SPS- near Deepeshwar Talab 2. MWP- at Ward 19 near Govt. Secondary School, Gautam Nagar

S. No	Components	Function	Description		Location
3	Sewage Collection network of various sizes with Other related works- such as Manholes property chamber, precast RCC (M20) Vent shaft with cowl, ordinary/drop manhole connection, near upstream of sewerage pumping station	Collect wastewater from houses and convey by a combination of gravity and pressure pumping to pumping station and ultimately to the STP	HDPE DWC SN8 -89. 47 km RCC pipes NP4 -3. 30 km, Trenchless Method adopting with HDPE PE-100 / PN-6 -9. 35 km		Sewers will be laid underground in the roads and internal streets in the town. Sewers will be located in the centre of the road. The existing/proposed water pipes are/will be located on one or either side of the roads, and therefore sewers will be laid in the centre without distributing the water pipes. No Railway crossing and 60 m of National Highway – crossing is also designed
4	House sewer connections	For collection of sewage from houses within municipal boundary	9500 nos. of house sewer connections		Houses within municipal limit
5	Provisions for Reuse of Treated Effluent	Temporary storage of treated effluent for further reuse or safe disposal to designated disposal point	Effluent Pumping Station (EPS) Treated Effluent Elevated Reservoir (TEER)- Treated Effluent Storage Reservoir (TESR)-		STP campus
6	Disposal of Treated Effluent –civil works.	Treated Sewage disposal through pipes from STP effluent chamber to River Areva	Total length of disposal pipes of 600 m of DI material		Reuse/Disposal as per disposal plan to be submitted by DBO contractor
7	Sludge Management and Disposal	Reuse/disposal of treated sludge from STP	Reuse or Safe Disposal of sludge up to designated places provided by the Employer or line agency within 10 km distance from STP		Reuse/Disposal as per disposal plan to be submitted by DBO contractor
8	Fecal Sludge and Septage Management (FSSM)- Truck mounted mobile desludging equipment	Desludging of septage from household pits/ septic tanks, transportation & discharge to STP	mobile tankers with suction and discharge arrangements – one tanker with 1000 liter capacity and one with 4000 liter capacity Fecal sludge shall be collected from following wards-		Ward no. 2, 19, 23 and 25
			Ward no.	Population covered	

S. No	Components	Function	Description		Location
			2	795	
			19	1830	
			23	507	
			25	1229	
			Total Population covered	4361	

E. Subproject Benefits

28. The subproject is primarily designed to improve environmental quality and living conditions of citizens of Pratapgarh through provision of sewerage system. The benefits arising from this subproject include: (i) better public health particularly reduction in waterborne and infectious diseases; (ii) reduced risk of groundwater contamination; (iii) reduced risk of contamination of treated water supplies; and, (iv) improvement in quality of water bodies due to disposal of treated effluent meeting disposal standards.

F. Investment Program Implementation Schedule

29. The project will be implemented on a DBO contract. The total period of design and construction is 36 months after which operation and maintenance for a period of 10 years. After award of contract, contractor will undergo full survey of town and will submit Service Improvement Plan (SIP) including reuse of treated wastewater and sludge.

Figure 1: Location of Proposed STP Land in Google Map

Latitude- 24° 1'11. 18"N
Longitude- 74°45'42. 18"E



Figure 2: Location of Proposed SPS site near Ward 19 near Govt. Secondary School

Latitude- 24° 1'47. 26"N

Longitude- 74°46'50. 23"E



Figure 3: Location of Proposed SPS Land near Depeshwar Talab in Google Map

Latitude $24^{\circ}1'30.93''$ N
Longitude $74^{\circ}46'23.68''$ E



Figure 4: Location of Proposed STP, SPS, MWP and Treated Effluent Discharge point in Sol Toposheet

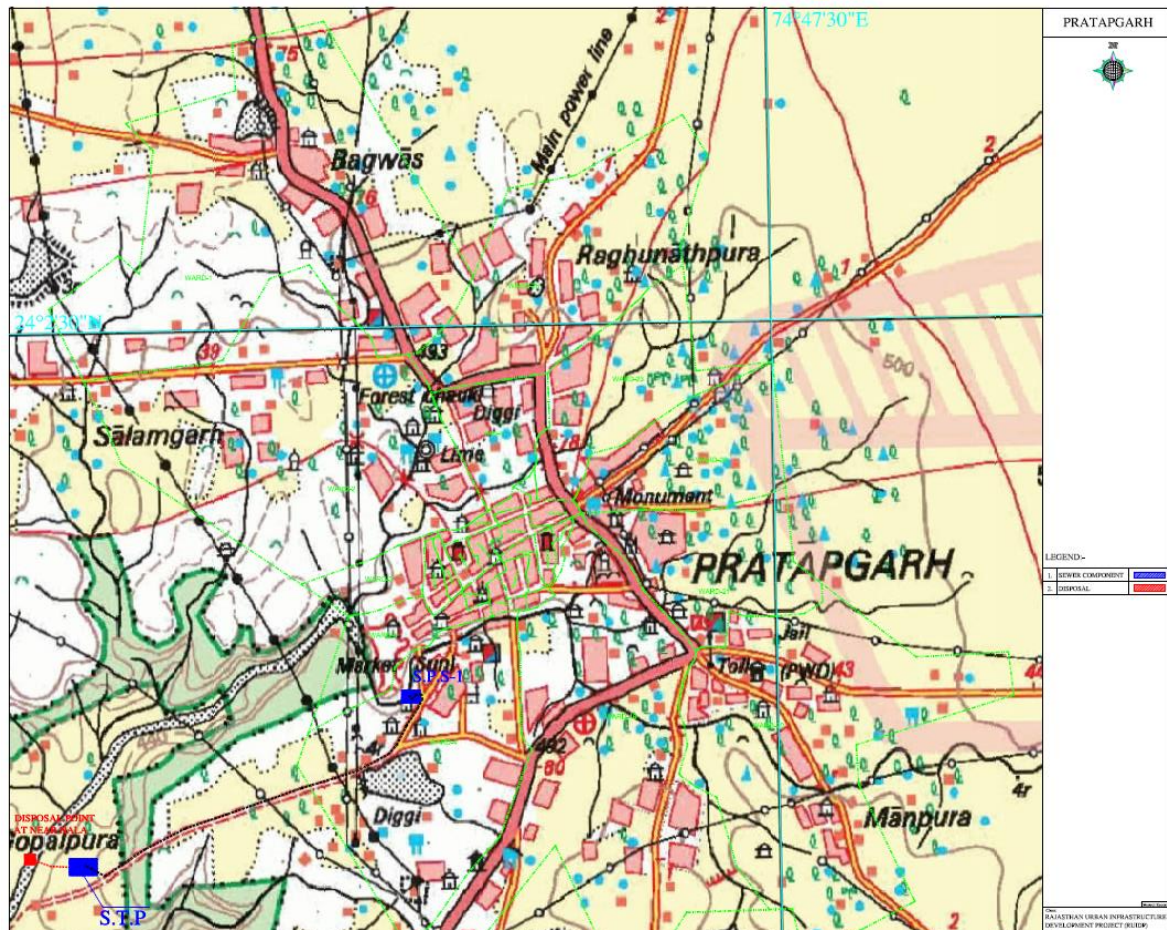


Figure 5: Layout of Sewerage Networks in Pratapgarh

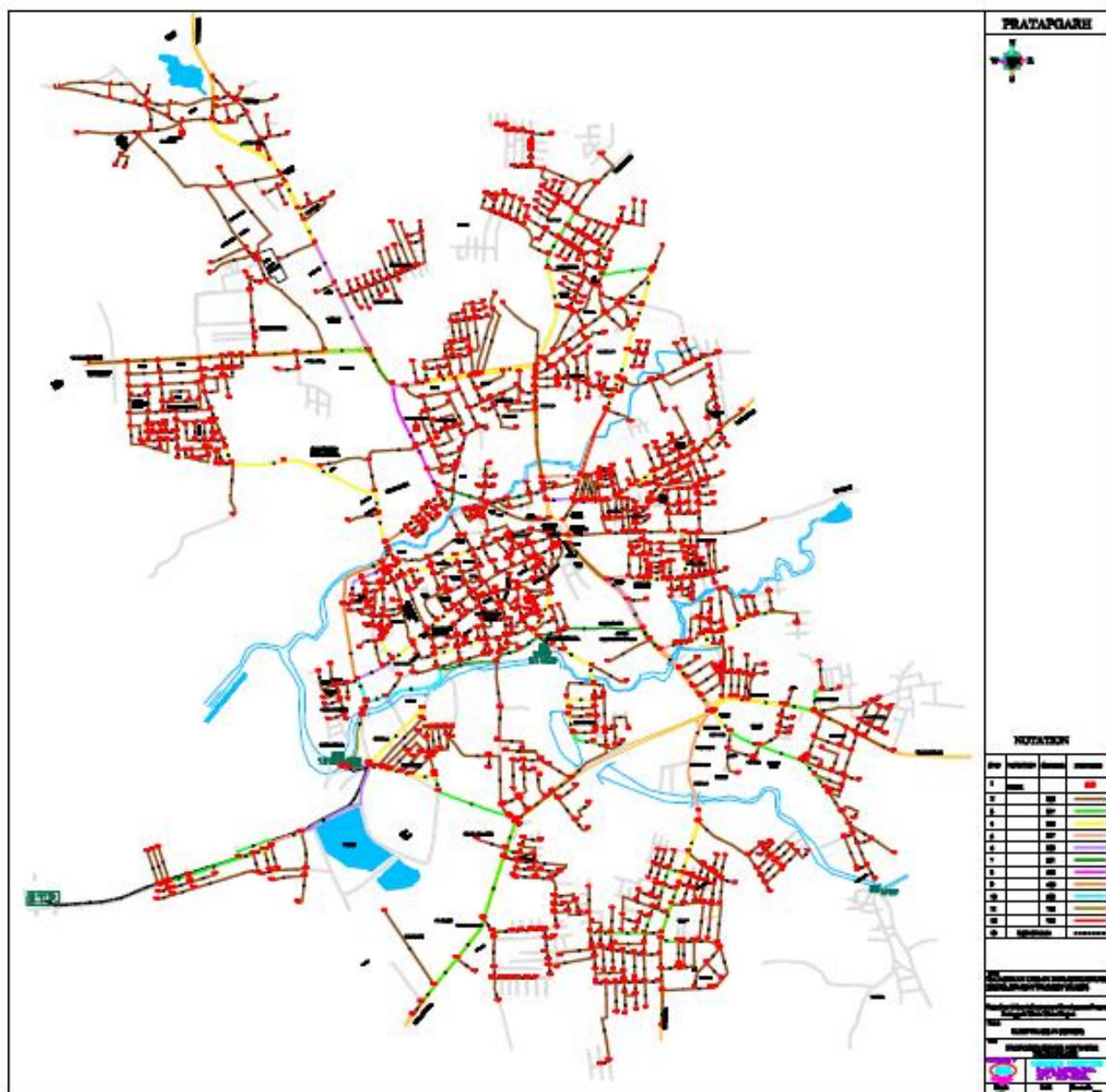


Figure 6: Areas proposed for FSSM

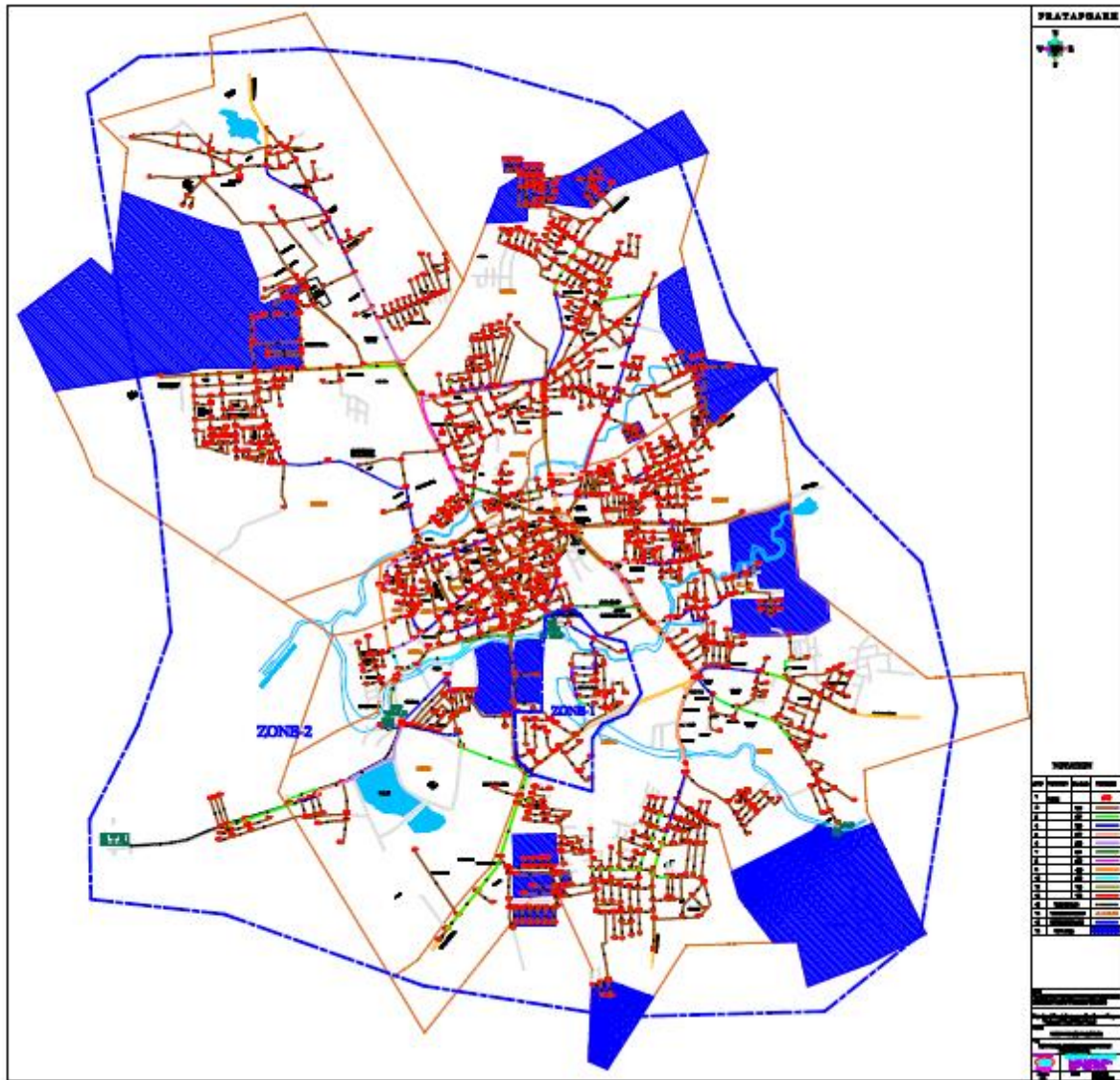


Figure 7: Schematic flow diagram for the proposed SBR Technology STP

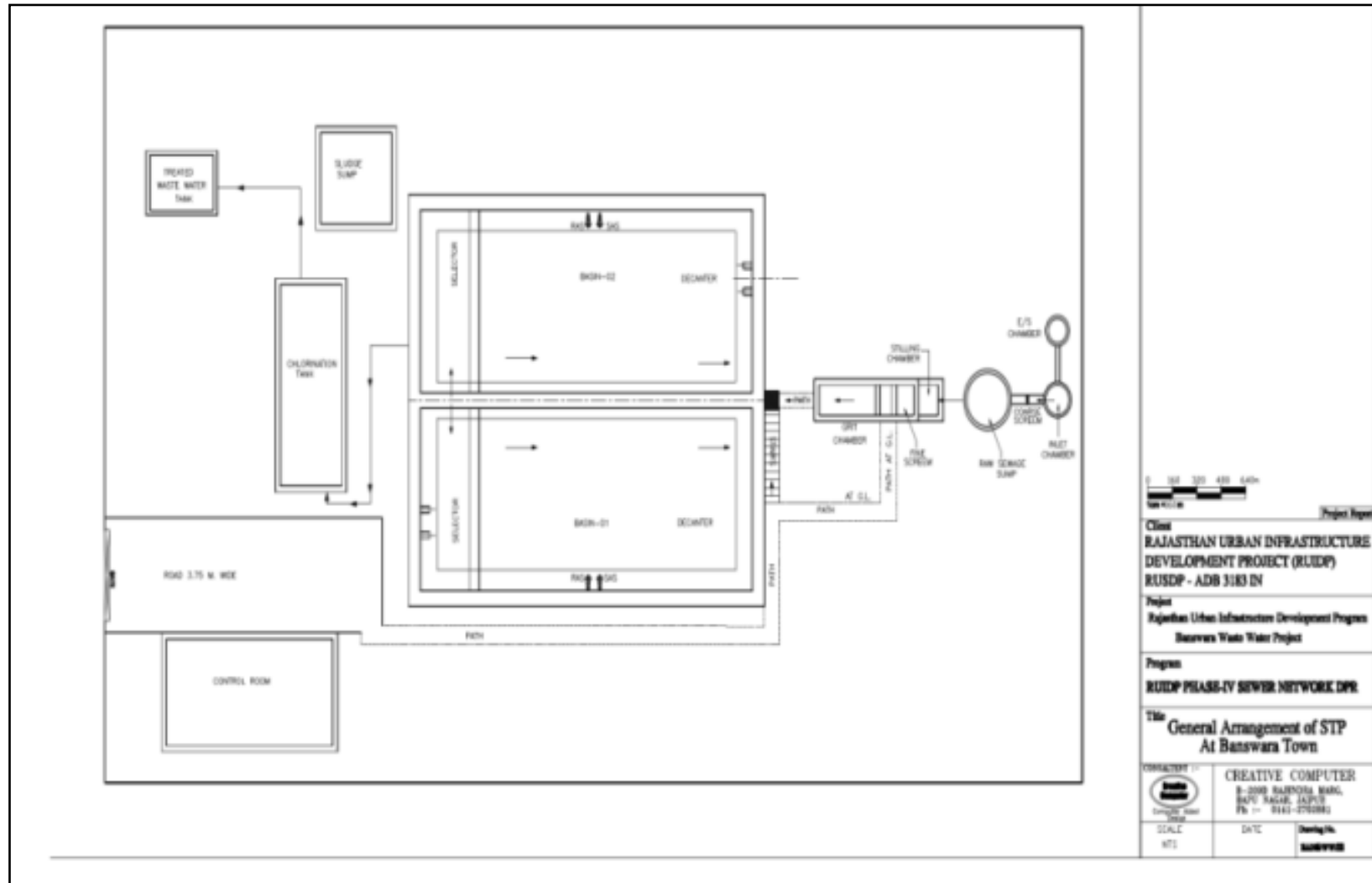
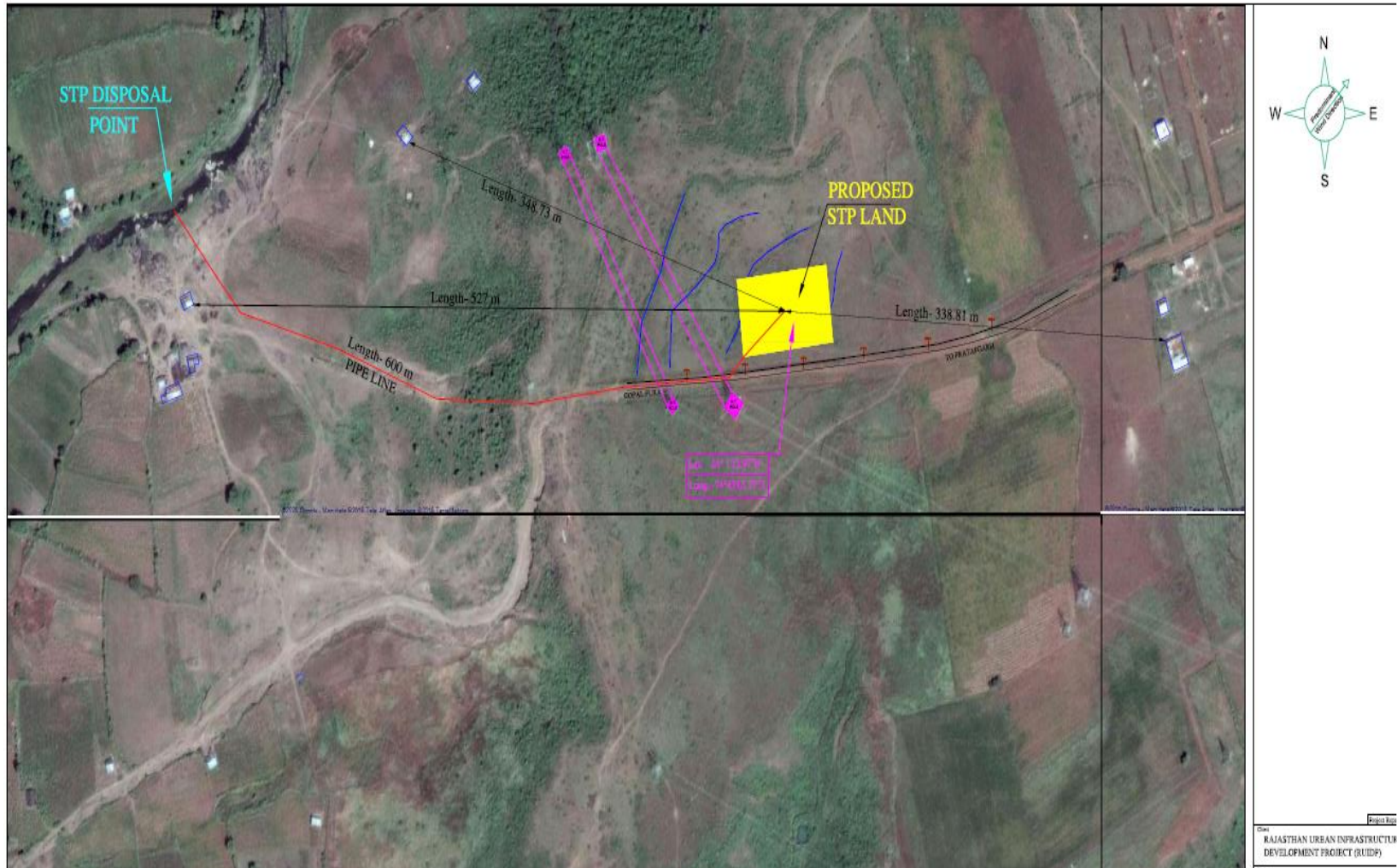


Figure 8: Location of Discharge point on Google Map and sensitive locations near STP site



III. ANALYSIS OF ALTERNATIVES

30. ADB SPS requires an analysis of project alternatives to determine the best method of achieving project objectives (which is safely collecting and disposing the human waste generated, in Pratapgarh town, in this case) while minimizing environmental impacts. Alternative analysis provides opportunity to integrate environmental considerations into early stages of project (i. e. pre-feasibility or feasibility study), so that adverse environmental impacts can be avoided or minimized by various alternatives. It also provides opportunity to study various options vis a vis costs, provides a logical base, via transparent process, assist in decision making, gaining public support and ultimately in project approvals and timely implementation.

31. The proposed sewerage component includes sewage collection network, transmission, treatment and treated wastewater reuse and disposal. Descriptions of various alternatives considered for critical components such as water source, sewage treatment, treated wastewater disposal etc., are presented in the following Table 2.

Table 2: Analysis of Alternatives

1.	Project Need – No Project Alternative
Type of alternative	'No project' alternative
Description of alternatives	Pratapgarh subproject is proposed to improve the service levels of sewerage system in town. At present, there is no functional sewerage system in place in Pratapgarh. Presently the wastewater from kitchens & bathrooms is discharged into storm water drains culminating finally to the Nallah or on ground, which pollutes the environment and contaminates the ground water. Open defecation is not uncommon. Most of the residential and commercial buildings and educational institutions have on-site septic tanks and soak pits. Outlets of these septic tanks and the effluent discharge into open drains. The untreated / partially treated sewage flow in the open drains through habitation areas and discharged into rivers/streams. Living conditions due to lack of proper sewerage, are poor, unhealthy, unhygienic. Lack of infrastructure is also causing environmental pollution, overall poor quality of life. Poor environmental quality affects the urban poor more. The project intends to provide following benefits to the town population, and the "no project" alternative will deprive people of these benefits: • better public health particularly reduction in waterborne and infectious diseases; • reduced risk of groundwater contamination; • reduced risk of contamination of treated water supplies; and, • improvement in quality of water bodies due to disposal of treated effluent meeting disposal standards
Selected Alternative	Without subproject would yield the town to be continuously under-served that puts the health of the general public at an increasing risk and could potentially worsen the living environment. This 'no project' scenario would impede further social and economic development of the district and the defer commitments to improve the proportion of the population with sustainable access to clean water and basic sanitation. Given the large-scale benefits to the population and environment, 'with project' alternative is considered appropriate
2	Sewage treatment process
Type of alternative	Sewage treatment technology

Description of alternatives	Various secondary treatment technologies have been considered in the sewage treatment process after the primary treatment consisting of screening and grit removal. Secondary treatment is the critical process that removes the organic putrescible organic matters and brings down the BOD of the effluent to meet the discharge standards. Following process technologies considered: Waste Stabilization Ponds; Aerated Lagoons; Up Flow Anaerobic Sludge Blanket (UASBR) + FAL; Conventional Activated Sludge Process; and Cyclic Activated Sludge Process/Sequential Batch Reactor (SBR)			
	A comparison of various treatment technologies is presented below in terms of merits of the process over key parameters like quality characteristics and land requirement:			
	Item	Conventional Activated Sludge	Extended Aeration	UASB followed by Facultative Aerobic Lagoon
	Performance (Typical)	Mostly stable	Mostly stable	Varying with temperature variations
	BOD	<30 ppm	<30 ppm	<30 ppm
	COD	<250 ppm	<250 ppm	<250 ppm
	Suspended solids	<50 ppm	<50 ppm	<100 ppm
	Total Nitrogen	No Treatment	No Treatment	No Treatment
	Total Phosphorous	No Treatment	No Treatment	No Treatment
	Coliform removal, %	60-90	60-90	-
	Re-use Options	can only be used for low end usages like flushing and gardening tertiary treatment required for high and usages like construction water, industrial usages, cooling water etc.	can only be used for low end usages like flushing and gardening tertiary treatment required for high and usages like construction water, industrial usages, cooling water etc.	can only be used for low end usages like flushing and gardening tertiary treatment required for high and usages like construction water, industrial usages, cooling water etc.
	Land requirement (m ² /person)	0. 1-0. 18	0. 08-0. 15	0. 2-0. 25
	Process Power requirement (kWh/person/year)	12-15	16-19	4-5
	Sludge handling	Sludge needs digestion prior	Digested sludge, dry	Digested sludge, dry on

		to drying on beds or use mech. devices	on beds or use mech. devices	beds or use mech. Devices	beds or use mech. devices													
	Equipment requirement (excluding screening and grit removal)	Aerators, recycle pumps, scrapers, thickeners, digester, dryers, gas equipment	Aerators, recycle pumps, sludge scrapers, (for large settlers)	Nil (gas collection optional)	Diffuse aeration system, recycle sludge and waste sludge pumps, decanters													
	Operational characteristics	Skilled Operation required	Simpler than activated sludge	Simpler than activated sludge	Complete automatic operation by computer and PLC. Negligible manpower Intervention required													
	Special features	Considerable equipment and skilled operation required especially if gas collection and usage involved. Method considered mainly for large sized plants	BOD removal high, effluent nitrified relatively high power requirement, favoured for small and medium sized plants	Minimal to negligible power requirement of the system makes it an economical alternative if gas revenue is neglected land requirement is also relatively small but depends on type of past treatment adopted	Highest treatment efficiency with crystal quality power requirement is 50% of conventional technologies land requirement is less than 50% of conventional technologies													
Selected Alternative	Selected processes: Sequential batch reactor (SBR)																	
	The genesis of selecting a suitable treatment process is primarily correlated with degree of treatment aimed to be achieved. In India, the latest court Order of April 2019 (NGT Order dated 30-04-2019) mandates all the civic authorities to adopt the treated sewage characteristics applicable are as shown in table below: <table><tr><th>Paramater</th><th>Standards</th></tr><tr><td>BOD, mg/l</td><td>10</td></tr><tr><td>TSS, mg/l</td><td>20</td></tr><tr><td>COD, mg/l</td><td>50</td></tr><tr><td>Nitrogen-Total, mg/l</td><td>10</td></tr><tr><td>Phosphorus- Total, , mg/l</td><td>1</td></tr><tr><td>Faecal Coliform (MPN/ 100 ml)</td><td>100 Desirable 230 (Permissible)</td></tr></table> SBR provides highest treatment efficiency possible in a single step biological process. The system is operated in a batch reactor mode this eliminates all the inefficiencies of					Paramater	Standards	BOD, mg/l	10	TSS, mg/l	20	COD, mg/l	50	Nitrogen-Total, mg/l	10	Phosphorus- Total, , mg/l	1	Faecal Coliform (MPN/ 100 ml)
Paramater	Standards																	
BOD, mg/l	10																	
TSS, mg/l	20																	
COD, mg/l	50																	
Nitrogen-Total, mg/l	10																	
Phosphorus- Total, , mg/l	1																	
Faecal Coliform (MPN/ 100 ml)	100 Desirable 230 (Permissible)																	

	the continuous processes. A batch reactor is a perfect reactor, which ensures 100% treatment. Separate modules are provided to ensure continuous treatment. The complete process takes place in a single reactor, within which all biological treatment steps take place sequence. The complete biological operation is divided into cycles. Each cycle is of 3 – 5-hour duration, during which all treatment steps take place.
3	Treated wastewater disposal
Type of alternative	Treated wastewater disposal – reuse applications
Description of alternatives	(i) Discharge of treated wastewater into ponds / on land (ii) Reuse the treated wastewater in non-potable uses Rajasthan is a water scarce region and receives low rainfall. Recognizing the importance of treated wastewater in reducing the demand on water, Sewerage and Wastewater Policy, 2016, of Rajasthan promotes the reuse of treated sewage for non-potable applications, and to make sewerage projects environmentally sustainable. This policy prioritizes reuse in irrigation (agriculture, forestry, and landscaping), followed by fish farming, industry and non-potable domestic reuse. Policy suggests construction of storage tanks to store treated wastewater to facilitate reuse. Policy prescribes that the detailed project report (DPR) should clearly define the best reuse option specific to the town and prepare a Reuse Action Plan part of the DPR following water quality norms and legal implications. Accordingly, it is proposed to utilize the treated wastewater for non-potable uses. A detailed Reuse Action Plan will be prepared during the detailed design phase, and, implemented. It is also proposed that the excess / surplus treated wastewater which is not being utilized in reuse will be discharge into local drains/streams and necessary facilities – pipelines and pumping facilities, will be developed.
Selected Alternative	Reuse in non-potable applications and discharge excess/surplus into local pond/ drain
4	Project Locations
Description of alternatives	STP location. Based on the technical feasibility of gravity flow system, sewerage system in Pratapgarh is designed and optimized with one sewage treatment plant (STP). Site selection is guided by technical suitability, availability of government owned vacant land, adequate land parcel, site away from habitation, and where there is a nallah to discharge the treated wastewater. The selected site (at Village Talab kheda) is away from habitations and surrounded by agricultural lands (nearest house is 340 m from STP site. Although a 500 m distance away from habitation is desirable as far as possible, due to lack of suitable lands, and also considering the selected superior and compact sewage treatment technology (SBR), this site is selected. Sewer Networks. Sewer networks are proposed along the roads/streets in the town within the road right of way (ROW). Sewers will be mostly laid in the center of the road, away from water pipes. No pipes will be laid in any private piece of lands.

IV. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. ADB Policy

32. ADB SPS, 2009 requires that during the design, construction and operation of the project necessary compliance to all applicable laws and international conventions / treaties along with pollution prevention and control technologies and practices consistent with international good practice, are ensured.

33. **Screening and Categorization with that of ADB SPS 2009.** ADB uses a classification system to reflect the significance of a project's potential environmental impacts. A project's category is determined by the category of its most environmentally sensitive component, including direct, indirect, cumulative, and induced impacts in the project's area of influence. Each proposed project is scrutinized as to its type, location, scale, and sensitivity and the magnitude of its potential environmental impacts. Projects are assigned to one of the following four categories:

- (i) **Category A.** A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required.
- (ii) **Category B.** A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for Category A projects. An initial environmental examination is required.
- (iii) **Category C.** A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.
- (iv) **Category FI.** A proposed project is classified as category FI if it involves investment of ADB funds to or through a FI.

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

35. **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.

36. **Environmental Audit of Existing Facilities.** ADB SPS requires an environmental audit, if a subproject involves facilities and/or business activities that already exist or are under construction, including an on-site assessment to identify past or present concerns related to impacts on the environment. The objective of this compliance audit is to determine whether actions were in accordance with ADB's safeguard principles and requirements for borrowers/clients, and to identify and plan appropriate measures to address outstanding compliance issues.

37. **Public Disclosure.** The IEE will be put in an accessible place (e. g., local government offices, libraries, community centers, etc.), and a summary translated into local language for the project affected people and other stakeholders. The following safeguard documents will be put up in ADB's website so that the affected people, other stakeholders, and the public can provide meaningful inputs into the project design and implementation:

- (i) For environmental category A projects, a 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 the Project Management Unit (PMU) during project implementation upon receipt.

38. **Consultation and Participation.** ADB SPS require borrower to conduct meaningful consultation¹² with affected people and other concerned stakeholders, including civil society, and facilitate their informed participation. The consultation process and its results are to be documented and reflected in the environmental assessment report.

39. **Grievance Redress Mechanism.** ADB SPS require borrowers to establish a mechanism to receive and facilitate resolution of affected people's concerns, complaints, and grievances about the subproject's performance. The grievance mechanism shall be scaled to the risks and adverse impacts of the subproject.

40. **Monitoring and Reporting.** Borrower shall monitor, measure and document the implementation progress of the EMP. If necessary, the borrower shall identify the necessary corrective actions, and reflect them in a corrective action plan. Borrower shall prepare and submit to ADB semi-annual environmental monitoring reports that describe progress with implementation of the EMP and compliance issues and corrective actions, if any. For subprojects likely to have significant adverse environmental impacts during operation, reporting will continue at the minimum on an annual basis until ADB issues a project completion report.

41. **Unanticipated Environmental Impacts.** Where unanticipated environmental impacts become apparent during subproject implementation, ADB SPS requires the borrower to update the environmental assessment and EMP or prepare a new environmental assessment and EMP to assess the potential impacts, evaluate the alternatives, and outline mitigation measures and resources to address those impacts.

42. **Occupational Health and Safety.** ADB SPS requires the borrower¹³ to ensure that workers¹⁴ are provided with a safe and healthy working environment, taking into account risks inherent to the sector and specific classes of hazards in the subproject work areas, including physical, chemical, biological, and radiological hazards. Borrower shall take steps to prevent accidents, injury, and disease arising from, associated with, or occurring during the course of work, including: (i) identifying and minimizing, so far as reasonably practicable, the causes of potential hazards to workers; (ii) providing preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances; (iii) providing appropriate equipment to minimize risks and requiring and enforcing its use; (iv) training workers and providing them with appropriate incentives to use and comply with health and safety procedures and protective equipment; (v) documenting and reporting occupational accidents,

¹² Per ADB SPS, 2009, meaningful consultation means a process that (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle; (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.

¹³ In case where responsibility is delegated to subproject contractors during construction phase, borrower shall ensure that the responsibilities on occupational health and safety are included in the contract documents.

¹⁴ Including nonemployee workers engaged by the borrower/client through contractors or other intermediaries to work on project sites or perform work directly related to the project's core functions.

diseases, and incidents; and (vi) having emergency prevention, preparedness, and response arrangements in place.

43. **Community Health and Safety.** ADB SPS requires the borrower to identify and assess risks to, and potential impacts on, the safety of affected communities during the design, construction, operation, and decommissioning of the subproject, and shall establish preventive measures and plans to address them in a manner commensurate with the identified risks and impacts.

44. **Physical Cultural Resources.** Borrower is responsible for siting and designing the subproject to avoid significant damage to physical cultural resources. ADB SPS requires that such resources likely to be affected by the subproject are identified, and qualified and experienced experts assess the subproject's potential impacts on these resources using field-based surveys as an integral part of the environmental assessment process. When the proposed location of a subproject component is in areas where physical cultural resources are expected to be found as determined during the environmental assessment process, chance finds procedures shall be included in the EMP.

45. **ADB SPS International Best Practice Requirements.** ADB SPS requires that, during the design, construction, and operation of the project, the executing agency shall apply pollution prevention and control technologies and practices that are consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines. (IFC's General EHS Guidelines¹⁵ and Sector Specific [Water and Sanitation] Guidelines).¹⁶ These standards contain performance levels and measures that are normally acceptable and applicable to projects. These standards contain performance levels and measures that are normally acceptable and applicable to projects. When Government of India regulations differ from these levels and measures, the PMU and PIUs will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the PMU and PIUs will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

46. The IEEs shall also reflect meaningful consultation and disclosure process with a provision for grievance redress mechanism.

B. National and State Laws

47. The implementation of the subprojects will be governed by Government of India and State of Rajasthan and other applicable environmental acts, rules, regulations, and standards. These regulations impose restrictions on the activities to minimize or mitigate likely impacts on the environment. It is the responsibility of the project executing and implementing agencies to ensure subprojects are consistent with the legal framework, whether applicable international, national, state or municipal or local. Key standards include those related to drinking water quality, air quality, effluent discharge, and protected areas. Compliance is required in all stages of the subprojects including design, construction, and operation and maintenance.

¹⁵<https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES>

¹⁶<https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B-%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES>

48. **Environmental assessment.** 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 (EC) is required for specified activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorized as A or B depending on the scale of the project and the nature of its impacts.

49. **Category A** projects require EC from the central Ministry of Environment, Forests and Climate Change (MoEFCC). The proponent is required to provide preliminary details of the project in the prescribed manner with all requisite details, after which an Expert Appraisal Committee (EAC) of the MoEFCC prepares comprehensive Terms of Reference (TOR) for the EIA study. On completion of the study and review of the report by the EAC, MoEFCC considers the recommendation of the EAC and provides the EC if appropriate.

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

51. None of the components of this underground sewerage system subproject falls under the ambit of the EIA Notification 2006, and, therefore EIA Study or EC is not required for the subproject.

52. Applicable environmental regulations. Besides EIA Notification 2006, there are various other acts, rules, policies and regulations currently in force in India that deal with environmental issues that could apply to infrastructure development. The specific regulatory compliance requirements of the subproject are shown in Table 3.

Table 3: Applicable Environmental Regulations

Law	Description	Requirement	Relevance to Project Phase
National Environment Policy (NEP), 2006.	NEP is a comprehensive guiding document in India for all environmental conservation programs and legislations by Central, State and Local Government. The dominant theme of this policy is to promote betterment of livelihoods without compromising or degrading the environmental resources. The policy also advocates collaboration method of	RSTDSP should adhere to NEP principle of “enhancing and conservation of environmental resources and abatement of pollution”.	All phases of project

Law	Description	Requirement	Relevance to Project Phase
	different stakeholders to harness potential resources and strengthen environmental management.		
Rajasthan State Environment Policy, 2010 And Rajasthan Environment Mission and Climate Change Agenda for Rajasthan (2010-14)	Follows the National Environment Policy, 2006 and core objectives and policies are: -Conserve and enhance environmental resources; assure environmental sustainability of key economic sectors; and, improve environmental governance and capacity building - it recommends specific strategies and actions to address the key environmental issues: water resources, desertification and land degradation, forest and biodiversity, air quality, climate change: adoption and mitigation, mining, industry, tourism, energy, urban development, etc. - Establishment of Environment Mission under the chairpersonship of the Chief Minister and a Steering Committee under the chairpersonship of Chief Secretary, Government of Rajasthan Tasks force set up for six key areas	Project implementation should adhere to the policy aims of: conservation and enhancement of environmental resources, integration of environmental concerns into projects/plans, and capacity building in environmental management. Under water sector, major concerns, as the policy notes, are huge water losses and wastage, declining water availability, pollution. Relevant recommendations for the project include control of losses, integrated water resources management, control of raw water pollution ¹⁸ , reuse and recycling. Avoid/ minimize use of forest lands. With reference to climate change adoption and mitigation following should be considered in the project: (i) diminishing flows in surface water bodies, and groundwater depletion, and revival traditional water bodies as water sources (lakes/tanks); (ii) equal stress on demand side management in water; and (iii) minimize energyuse - design energy efficiency systems.	All phases of project
EIA Notification	Projects indicated in the schedule of this notification requires EIA study and environmental clearance.	None of the components of this subproject falls under the ambit of the notification; no EIA study or environmental clearance required	-
Water (Prevention and Control of Pollution) Act of 1974, Rules of	Act was enacted to provide for the prevention and control of water pollution and	Designed STP will require CTE (prior to start of construction works) and CTO (prior to start of operation) from Rajasthan State Pollution Control Board (RSPCB)	Construction and Operation

Law	Description	Requirement	Relevance to Project Phase
1975, and amendments (1987)	the maintaining or restoring of wholesomeness of water, by Central and State Pollution Control Boards and for conferring on and assigning to CPCB/SPCBs powers and functions relating to water pollution control. Control of water pollution is achieved through administering conditions imposed in consent issued under provision of the Water (Prevention and Control of Pollution) Act of 1974. These conditions regulate the quantity and quantity of effluent, the location of discharge and the frequency of monitoring of effluents. Any component of the subproject having the potential to generate sewage or trade effluent will come under its purview. Such projects have to obtain Consent to establish (CTE) under Section 25 of the Act from Rajasthan State Pollution Control Board (RSPCB) before starting implementation and Consent to Operate (CTO) before commissioning.	All relevant forms, prescribed fees and procedures to obtain the CTE and CTO can be found in the RSPCB website. (http://environment.rajasthan.gov.in)	
Air (Prevention and Control of Pollution) Act of 1981, Rules of 1982 and amendments.	This Act was enacted to achieve prevention, control and abatement of air pollution activities by assigning regulatory powers to Central and State boards for all such functions. The Act also establishes ambient air quality standards. The projects having potential to emit air	The following will require CTE and CTO from RSPCB: (i) Diesel generators; (ii) Batching Plant hot mix plants; and (iii) stone crushers, if installed for construction. All relevant forms, prescribed fees and procedures to obtain the CTE and CTO can be found in the RSPCB website (http://environment.rajasthan.gov.in) If ready mix concrete and hot mix bitumen is procured from third party, contractor to ensure that the plants, from where material is being	Construction and operation

Law	Description	Requirement	Relevance to Project Phase
	pollutants into the atmosphere have to obtain CTE and CTO under Section 21 of the Act from RSPCB. The occupier of the project/facility has the responsibility to adopt necessary air pollution control measures for abating air pollution.	purchased is having CTE/CTO and copy should be collected from third party and submitted in PIU	
Biodiversity Act of 2002	This Act primarily addresses access to genetic resources and associated knowledge by foreign individuals, institutions or companies, to ensure equitable sharing of benefits arising out of the use of these resources and knowledge to the country and the people.	Not Applicable	-
Wildlife Protection Act, 1972 and amendment 1991	This overarching Act provides protection to wild animals, birds, plants and matters connected with habitat protection, processes to declare protected areas, regulation of wildlife trade, constitution of state and national board for wildlife, zoo authority, tiger conservation authority, penalty clauses and other important regulations.	Not applicable – none of the project components are located in or near protected areas. Nearest protected areas is <i>Sitamata Wildlife Sanctuary</i> , about 45 km (aerial distance) from Pratapgarh Town	Construction
Forest (Conservation) Act, 1980	The Forest (Conservation) Act prohibits the use of forest land for non-forest purposes without the approval of Ministry of Environment Forests and Climate Change (MoEFCC), Government of India	Not applicable; none of the components of the subproject are located in forest.	Construction
Environmental (Protection) Act, 1986 amended in	This is an “umbrella” legislation that empowers the Central	There are rules / notifications that have been brought out under this Act, which are relevant to RSTDSP, and are listed below	Construction and operation

Law	Description	Requirement	Relevance to Project Phase
1991 and the following rules/notifications:	Government to take all necessary measures to protect and improve the quality of the environment and prevent, control and abate environmental pollution. Empowers central government to enact various rules to regulate environmental pollution, including standards for quality of air, water, noise, soil; discharge standards or allowable concentration limits for environmental pollutants, handling of hazardous substances, locating/prohibiting industries, etc. ,		
Environmental Standards (ambient and discharge).	Emissions and discharges from the facilities to be created or refurbished or augmented shall comply with the notified standards	Appendix 3 provides applicable standards for ambient air quality, emission limits and emission stack height requirements for diesel generators Appendix 4 provides STP discharge standards	Construction and operation
Noise Pollution (Regulation and Control) Rules, 2000 amended up to 2010.	Rule 3 of the Act specifies ambient air quality standards in respect of noise for different areas/zones.	Appendix 5 provides applicable noise standards, and noise limits for diesel generators	Construction and operation
Solid Waste Management Rules 2016	Responsibility of Solid Waste Generator segregate and store the waste generated in three separate streams namely bio-degradable, non- biodegradable and domestic hazardous wastes in suitable bins and handover segregated wastes to authorized waste pickers or waste collectors as per the direction or notification by the local authorities from time to time; store separately construction and	Contractor to follow all the rules during construction works	Construction and operation

Law	Description	Requirement	Relevance to Project Phase
	demolition waste, as and when generated, in his own premises and shall dispose off as per the Construction and Demolition Waste Management Rules, 2016; (iii) No waste generator shall throw, burn or bury the solid waste generated by him, on streets, open public spaces outside his premises or in the drain or water bodies.		
Construction and Demolition Waste Management Rules 2016	Every waste generator shall segregate construction and demolition waste and deposit at collection centre or handover it to the authorized processing facilities. Shall ensure that there is no littering or deposition so as to prevent obstruction to the traffic or the public or drains. Large generators (who generate more than 20 tons or more in one day or 300 tons per project in a month) shall submit waste management plan and get appropriate approvals from the local authority before starting construction or demolition or remodeling work. Large generators shall have environment management plan to address the likely environmental issues from construction, demolition, storage, transportation process and disposal / reuse of C and D Waste. Large generators shall segregate the waste into	Construction waste shall be collected at stockpile area for 8-10 days and will be sent to disposal site. Disposal site shall be identified and allotted by Municipal Council after mobilization of contractor (during SIP period) and can't be mentioned at this time. Contractor to follow all the rules during construction works. Sludge or any material if classified as hazardous waste / material is to be handled and disposed according to this Rules. Excerpts from C and D Rules are provided in Appendix 6.	Construction

Law	Description	Requirement	Relevance to Project Phase
	four streams such as concrete, soil, steel, wood and plastics, bricks and mortar, Large generators shall pay relevant charges for collection, transportation, processing and disposal as notified by the concerned authorities;		
Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016,	Responsibilities of the occupier for management of hazardous and other wastes. - (1) For the management of hazardous and other wastes, an occupier shall follow the following steps, namely:- (a) prevention; (b) minimization; (c) reuse, (d) recycling; (e) recovery, utilization including co-processing; (f) safe disposal. (2) The occupier shall be responsible for safe and environmentally sound management of hazardous and other wastes. (3) The hazardous and other wastes generated in the establishment of an occupier shall be sent or sold to an authorized actual user or shall be disposed of in an authorized disposal facility. (4) The hazardous and other wastes shall be transported from an occupier's establishment to an authorized actual user or to an authorized disposal facility in accordance with the provisions of these rules. (5) The occupier who intends to get its	Contractor to comply all the requirements of this Act during construction works. There are asbestos cement (AC) in the existing water supply system. As per these Rules, any waste with asbestos concentration limit exceeding 10,000 mg/kg (i. e. 1%), and is in the form of friable, powdered or finely divided state, is classified as hazardous waste. As per Bureau of Indian Standards (BIS), "AC pipes generally contain about 10-15% asbestos fibers in a cement matrix that comprises the rest of the materials and are termed as locked in asbestos products as these products have the asbestos fibers bound in cement. There is very little possibility of generation of airborne asbestos fibers during any reasonable handling, storage, and use of such products. However, during storing and installation, recommended work practices shall be followed to avoid harmful exposure".	Construction and operation

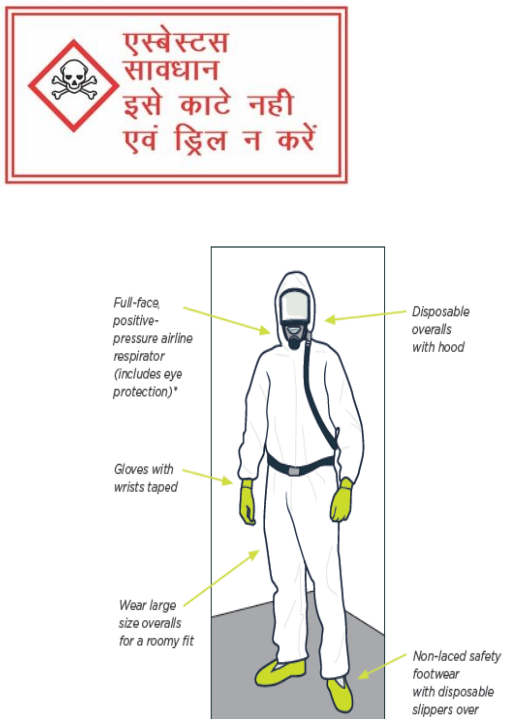
Law	Description	Requirement	Relevance to Project Phase
	hazardous and other wastes treated and disposed of by the operator of a treatment, storage and disposal facility shall give to the operator of that facility, such specific information as may be needed for safe storage and disposal. (6) The occupier shall take all the steps while managing hazardous and other wastes to- 6 (a) contain contaminants and prevent accidents and limit their consequences on human beings and the environment; and (b) provide persons working in the site with appropriate training, equipment and the information necessary to ensure their safety.		
Wetlands (Conservation and Management) Rules, 2017	The Rules specify activities which are harmful and prohibited in the wetlands such as industrialization, construction, dumping of untreated waste and effluents, and reclamation. The Central Government may permit any of the prohibited activities on the recommendation of Central Wetlands Regulatory Authority.	Not applicable as subprojects components are not located in or near to designated wetland area.	
Ancient Monuments and Archaeological Sites and Remains Act, 1958 and Ancient Monuments and Archaeological Sites and Remains (Amendment and	The Act designates areas within 100 meters (m) of the “protected monument/area” as “prohibited area” and beyond that up to 200 m as “regulated area” respectively. No “construction” is permitted in the “prohibited area” and	Not applicable - there are no protected monuments / places of archeological / historical places in or near Partapgarh town In case of chance finds, the contractor/ PIU will be required to follow a protocol as defined in the Environmental Management Plan (EMP)	Construction

Law	Description	Requirement	Relevance to Project Phase
Validation) Act, 2010.	any construction activity in the “regulated area” requires prior permission of the Archaeological Survey of India (ASI).		
The Building and Other Construction Workers (BOCW) Act 1996 and Rajasthan Building and Construction Workers Rules 2009	Employer shall- Provide and maintain, at suitable point, sufficient quantity of wholesome drinking water, such point shall be at least 6 meters away from any washing areas, urinals or toilets Provide sufficient urinals and latrines at convenient place, easily accessible by workers Provide free of charge, temporary living accommodations near to work sites with separate cooking place, bathing and lavatory facilities and restore the site as preconditions after completing the construction works Provide crèche with proper accommodation, ventilation, lighting, cleanliness and sanitation if more than fifty female workers are engaged Provide first aid facilities in all construction sites For safety of workers employer shall provide- Safe access to site and workplace Safety in demolition works Safety in use of explosives Safety in operation of transporting equipment and appoint competent person to drive or operate such vehicles and equipment Safety in lifting	Contractors are required to follow all the provisions of BOCW Act and Rajasthan BOCW Rules. Salient features of Rajasthan BOCW Rules are- Chapter III, section 17- Registration of establishments Chapter VIII, section 61- Hours of works, intervals or rest and spread over, overtime Section 62- weekly rest Section 63- night shift Section 67- registers of workers Section 68- Muster roll, wages register Section 70- latrine and urinal facilities Chapter XI- Safety and Health Section 78- fire protection Section 79- emergency action plan Section 80- fencing of motors Section 81- lifting and carrying of weight Section 82- HS policy Section 83- dangerous and harmful environment Section 84- Overhead protection Section 88- eye protection Section 89- PPEs Section 90- electrical hazards Section 97- use of safety helmets and shoes Chapter XIII-lifting appliances and gears Chapter XV- transport and earth moving equipment Chapter XVI- concrete works Chapter XVII- demolition works Chapter XVIII-Excavation and tunneling Chapter XX- ladders and step ladders Chapter XXII- structural frame and formworks Chapter XXIV- medical facilities and first aid box	Construction

Law	Description	Requirement	Relevance to Project Phase
	appliance, hoist and lifting gears Adequate and suitable lighting to every workplace and approach Prevention of inhalation of dust, smoke, fumes, gases during construction works and provide adequate ventilation in workplace and confined space Safety in material handling and stacking/unstacking Safeguarding the machinery with flywheel of moving parts Safe handling and use of plants operated by compressed air Fire safety Limit of weight to be lifted by workers individually Safety in electric wires, apparatus, tools and equipment Provide safety net, safety sheet, safety belts while working at height (more than 1. 6 m as per OSHA) Providing scaffolding, ladders and stairs, lifting appliances, chains and accessories where required Safety in pile works, concrete works, hot asphalt, tar, insulation, demolition works, excavation, underground construction and handling materials Provide and maintain medical facilities for workers Any other matters for the safety and health of workers		
Contract Labor	Provides for welfare	Applicable to all construction works in the	Construction

Law	Description	Requirement	Relevance to Project Phase
(Regulation and Abolition) Act, 1970; The Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979	measures to be provided by the Contractor to contract labor and in case the Contractor fails to provide, the same are required to be provided by the Principal Employer by Law. The principal employer is required to take Certificate of Registration and the Contractor is required to take a License from the designated Officer. The Act is applicable to the establishments or Contractor of principal employer if they employ 20 or more contract labor. The inter-state migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home up to the establishment and back, etc.	project Principle employer (RUDSICO-EAP) to obtain Certificate of Registration from Department of Labour, as principle employer Contractor to obtain license from designated labor officer Contractor shall register with Labor Department, if Inter-state migrant workmen are engaged Adequate and appropriate amenities and facilities shall be provided to workers including housing, medical aid, traveling expenses from home and back, etc. Appendix 7 provides applicable labor laws including amendments issued from time to time applicable to establishments engaged in construction of civil works.	and operation
The Child Labour (Prohibition and Regulation) Act, 1986	Prohibits employment of children below 14 years of age in certain occupations and processes Employment of child labor is prohibited in building and construction Industry.	No child labour shall be employed	Construction and operation
Minimum Wages Act, 1948	Minimum wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of buildings, roads and runways are scheduled employment.	Applicable to all construction works in the project All construction workers should be paid not less than the prescribed minimum wage	Construction and operation

Law	Description	Requirement	Relevance to Project Phase
Workmen Compensation Act, 1923	Provides for compensation in case of injury by accident arising out of and during employment.	Compensation for workers in case of injury by accident	Construction and operation
Equal Remuneration Act, 1979	Provides for payment of equal wages for work of equal nature to male and female workers and not for making discrimination against female employees in the matters of transfers, training and promotions etc.	Equal wages for work of equal nature to male and female workers	Construction and operation
The Rajasthan Monuments, Archaeological Sites and Antiquities Act, 1961; the Rajasthan Monuments, Archaeological Sites and Antiquities (amendment) Act 2007	Any construction/excavation work in the 'protected area' (as declared by GoR under the Act) requires priori permission of Department of Archeology and Museums -Application under the Rules shall be submitted to Director, State Archeological Department, at least 3 months prior to the work. Department provides conditional permission, including time for completion, procedures to be followed during the work and for chance finds etc.	Not applicable - there are no protected monuments in the town In case of chance finds, the contractor/ PIU will be required to follow a protocol as defined in the Environmental Management Plan (EMP).	Construction
Rajasthan Forest Act, 1953, and Rajasthan Forest Rules, 1962	This Act makes the basis for declaration of Reserved Forests, constitution of village forest committees, management of reserved forests and penalties and procedures.	Not applicable; none of the components / pipeline alignment are in forest areas.	Construction
IS 11768: 1986/2005: Recommendations for disposal of asbestos waste material	The standard emphasizes that every employer who undertakes work which is liable to generate asbestos containing waste, shall undertake	The crux is waste avoidance: the practice inculcated should focus on minimal waste generation. Waste Collection: In the project circumstance, the waste is referred to the damaged power	Construction

Law	Description	Requirement	Relevance to Project Phase
	adequate steps to prevent and /or reduce the generation of airborne dust during handling, storing, transportation and final disposal of final disposal of asbestos and asbestos containing products.	asbestos which will be collected in the Permissible plastic bags to be disposed to the nearest TSDF facilities.	
IS 12081: Pictorial Warning to be implemented on equipment containing Asbestos Contaminated Products.	The objective of the caution is to make the person handling to take all pre-cautionary measures and make them aware of all the possible risk.	The following signs and personal protective equipment shall be used in handling ACM. 	Construction
IS 11451: Safety and Health Requirements related to Occupational Exposure to Asbestos contaminated Products.	These standard details the occupational exposure allowable and safety at workplace to be enforced.	In the project the norms pertaining to limiting number of hours working with ACM will be 8. 0 hrs/48 hrs a week and the medical examination has to be periodic, the environmental monitoring has to be done as per the protocol. The safety at workplace shall be enforced.	Construction
IS 11768: Waste Disposal Procedure for Asbestos Containing Products.	The protocol pertaining to disposal of the waste is emphasized.	The collection of ACM powered will be in permissible plastic bags, which will be twisted tight at the neck so that the wear and tear due to abrasion will be minimum and the transportation of the asbestos waste has to be done by the authorized vendor to the	Construction

Law	Description	Requirement	Relevance to Project Phase
		approved landfill site.	
International conventions and treaties			
Ramsar Convention, 1971	The Ramsar Convention is an intergovernmental treaty that provides the framework for national action and international co-operation for the conservation and wise use of wetlands and their resources. India is one of the signatories to the treaty. The Ramsar convention made it mandatory for the signatory countries to include wetland conservation in their national land use plans.	There are no Ramsar sites in or near Pratapgarh. Not applicable to Pratapgarh sewerage subproject.	-
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973	India is a signatory of this convention which aims to control international commercial trade in endangered species	Not applicable in this project as no endangered species of wild fauna and flora is found in project town.	-
Montreal Protocol 1992	India is a signatory of this convention which aims to reduction in the consumption and production of ozone-depleting substances (ODS), while recognizing differences in a nation's responsibilities. Ozone depleting substances are divided in two groups Chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbon carbons (HCFCs)	Not applicable in this project as no ODS are involved in construction works	-
Basel Convention on Trans-boundary Movement of Hazardous Wastes, 1989	India is a signatory of this convention which aims to reduce trans-boundary movement and creation of hazardous wastes	Contractor to follow the provisions of Hazardous Waste Rules 2016 for storage, handling, transport and disposal of any hazardous waste emerged during construction works Under this Convention, asbestos or asbestos waste in the form of dust and fibers is classified as hazardous waste.	-

Law	Description	Requirement	Relevance to Project Phase
Convention on Migratory Species of Wild Animals (CMS), 1979 (Bonn convention)	CMS, also known as Bonn convention, was adopted in 1979 and entered into force on 1 November 1983, which recognizes that states must be the protectors of migratory species that live within or pass through their national jurisdictions, and aims to conserve terrestrial, marine and avian migratory species throughout their ranges. Migratory species threatened with extinction are listed on Appendix I of the Convention. CMS Parties strive towards strictly protecting these species, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them. Migratory species that need or would significantly benefit from international cooperation are listed in Appendix II, and CMS encourages the Range States to conclude global or regional agreements.	Not applicable to this project as no migratory species of wild animals are reported in the project areas.	-

53. Clearances / permissions to be obtained prior to start of construction. Table 4 shows the list of clearances/permissions required for project construction. This list is indicative, and the contractor should ascertain the requirements prior to start of the construction and obtain all necessary clearances/permission prior to start of construction.

Table 4: Clearances and permissions required for Construction activities

S. No	Construction Activity	Statute under which Clearance is Required	Implementation	Supervision
1.	Construction of new STP	Consent to establish and consent to operate under Water Act, 1974 from RSPCB	CMSC& Contractor	PIU
2.	Land for project activity	Allotment and approval for specific land use	ULB	PMU

S. No	Construction Activity	Statute under which Clearance is Required	Implementation	Supervision
3.	Use of construction area	Approval for use of city roads and shifting of utilities	ULB, PWD and other utility agencies such as BSNL, electricity department	PIU
4.	Establishment of construction camps	Allotment and approval for specific land use	Contractor	PIU
5.	Tree Cutting	State forest department/ Revenue department	PIU	PMU
6.	Hot mix plants, DG sets (>15 KVA) Crushers and Batching plants	Consent to establish and consent to operate under Air Act, 1981 from RSPCB	Contractor	PIU
7.	Storage, handling and transport of hazardous materials	Hazardous Wastes (Management and Handling) Rules, 2016 Manufacturing, Storage and Import of Hazardous Chemicals Rules, 1989 from RSPCB	Contractor	PIU
8.	Sand mining, quarries and borrow areas	Permission from District Collector/ State Department of Mining	Contractor	PIU
9.	New quarries and borrow areas	Environmental clearance under EIA Notification 2006	Contractor/service provider	PIU
10.	Swear pipe laying and Temporary traffic diversion measures	Road cutting permission from PWD/Nagar Parishad Traffic diversion from District traffic police	Contractor/PIU	PMU
11.	Construction Waste and Demolition Debris Management	Approval from Municipal Council for disposal site is required per Construction and Demolition Waste Management Rules 2016	Contractor	PIU
12.	Use of vehicle and equipment	Pollution under control certificate (PUC) form RTO	Contractor	PIU
13.	Temporary traffic diversion measures	Temporary traffic diversion measure including use of alternate road from District traffic police	Contractor	PIU

54. PMU will be overall responsible for supervision in getting all clearances and provide details to ADB through semi-annual report. PMU will ensure all necessary regulatory clearances and approvals are obtained prior to commencement of works. Respective PIUs, with support of project consultants and DBO contractors, are responsible for obtaining the clearances/permits and ensuring conditions/specifications/provisions are incorporated in the subproject design, costs, and implementation. The PIUs shall report to PMU the status of compliance to clearances/permits as part of the regular progress reporting.

V. DESCRIPTION OF THE ENVIRONMENT

A. Physical Resources

1. Location, Area & Connectivity

55. **Location.** Pratapgarh is located at 24.03°N 74.78°E with an average elevation of 580 meters (1610 feet above mean sea level). It is said to be the second highest place in Rajasthan after Mount Abu. Situated on the junction of the Aravali mountain ranges and the Malwa Plateau its unique location prominently carries the geological characteristics of these both. Location of Pratapgarh town in Rajasthan is presented in Figure 9 below.

Figure 9: Location Map of Pratapgarh



Source : http://pratapgarh.rajasthan.gov.in/content/dam/doitassets/Pratapgarh/Maps/Pratapgarh_District_Map.jpg

56. **Area.** The geographical area of Pratapgarh is 4, 11,736 hectares, out of which forest area is 1, 20,976 hectares (2009-2010).

57. **Connectivity.** Pratapgarh is well connected with major cities in Rajasthan, Gujarat and Madhya Pradesh by road. Daily Bus Services connect Pratapgarh with Chittaurgarh (110 km),

Banswara (80 km), Udaipur (165 km), Dungarpur (95 km), Rajsamand (200 km), Jodhpur (435 km), Jaipur (421 km) Neemach (62 km) Ratlam (85 km), Mandsaur (32 km) and Delhi (705 km) and many other cities in Rajasthan. Private Bus operators are also providing regular connectivity to Pratapgarh from nearby places. The total length of roads in the district is 1879 km, with more than 7,500 registered light and heavy vehicles. There is no rail connectivity in Pratapgarh. Infact it is the only district without rail-connectivity in Rajasthan state. Nearest railway station is Mandsaur (M. P.) which is 32 km and Chittorgarh is a railway station in Rajasthan which is 110 km away from Pratapgarh. Dabok (Udaipur) is the nearest Airport which is 145 km away from Pratapgarh.

2. Topography, Soils and Geology

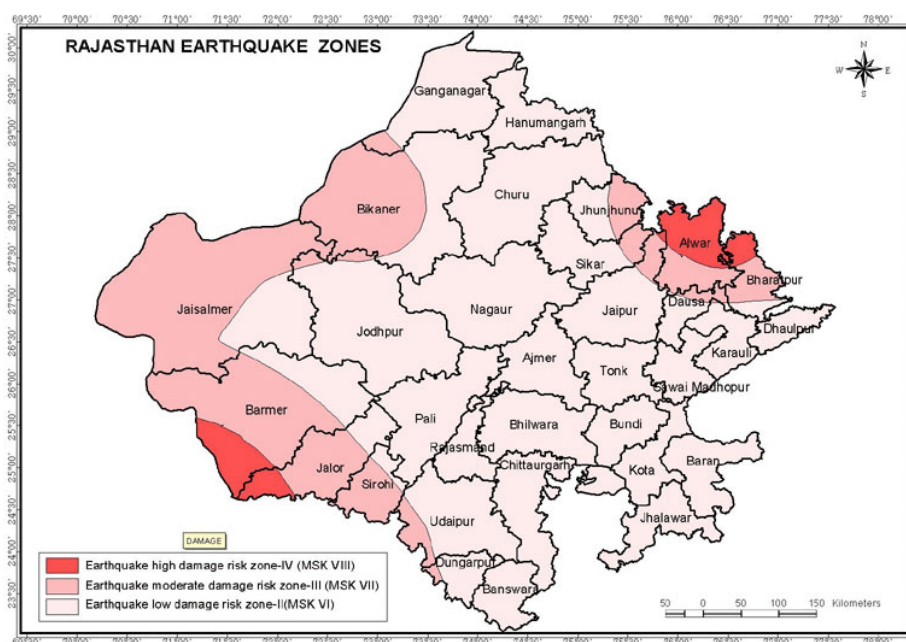
58. **Topography.** Pratapgarh is situated in the southeastern part of Rajasthan in Chittorgarh district. The area adjoins Udaipur and Bhilwara districts of Rajasthan and Mandsaur district of Madhya Pradesh. Pratapgarh district includes the tehsil area Arnod, Pratapgarh and Chotisadri from Chittorgarh district, Dhariawad from Udaipur district and Pipalkhoont from Banswara district. It is situated in the junction of the Aravali mountain ranges and the Malwa Plateau; hence the characteristics of both prominently feature in the area. The project area is characterized by undulating topography. The eastern part is the extension of Malwa plateau & is comprising of high hills with intervening long and narrow valleys. In central part of the district undulating to rolling topography prevails. While in western part plain and rolling topography prevails. The general slope of the areais from east to west.

59. **Soil.** The soil is mainly highly fertile Black Cotton Soil made of magma of volcanos. Black soil found predominantly in the district mostly in eastern, southern, central and eastern part. Red soil mostly found in western portion of district from north to south.

60. **Geology.** It has high geographical and physical diversity ranging from highly dense forests to hilly terrain and plateau. The western, southern and northern parts are generally plain area. Hills are scattered in Chhoti Sadri, Bari Sadri and Pratapgarh tehsils. Hill ranges towards east of Chittaurgarh town runs north-south with intervening valleys parallel to each other. Predominant geological formations in district are Gneiss (Bhilwara Super group), Shale, Schist /phyllite (Aravalli Super group), Basalt, Limestone & Sandstone (Vindhyan Super group)

3. Seismology

61. As per the seismic zoning map of India, Pratapgarh falls under the Zone II, which is the lowest earthquake risk zone in India. This zone is termed as "low damage risk zone" (Figure 10).

Figure 10: Earthquake Zoning Map of Rajasthan Showing Project Area

4. Climatic Conditions

62. Pratapgarh experiences semi-arid hot climate with dry hot summers and cold winters. The cold season is from December to February and is followed by hot summers from March to the last week of June. The south west Monsoon season which follows, last till about mid-September. The period from mid-September to about the end of November constitutes the post monsoon season. Winter seasons are normally pleasant, and January is the coldest month.

63. The project area has a climate which is very milder than that in the desert regions in further north and north-west with an average annual rainfall of 722 mm, the maximum being 1183 mm. The minimum temperature in the district ranges between 10°C to 20°C and maximum between 35°C to 46°C. The mean maximum temperature in the region reaches 43. 7°C in the warmer months from March to June. During the winter season, in December-January, the minimum temperature dips to 7. 4°C and the maximum temperature remains around 31. 9°C. The lowest average monthly minimum temperature is around 21. 6°C.

64. Pratapgarh receives rainfall mainly under the influence of southwest monsoon between July and September. The average annual rainfall is 856 mm. Almost 95% of the total annual rainfall is received during the southwest monsoon, which enters the district in the last week of June and withdraws in the middle of September. Temperature drops with the onset of monsoon and rises again in the month of September. The summer temperature reaches 46°C in May / June and average temperature is about 32° C.

5. Surface Water

65. The major rivers of the district are Jakham, Mahi and Siwana or Shiv. Other seasonal rivers are Som, Eraw and Karmoi. Jakham Dam is a dam located in Pratapgarh District in Rajasthan in India. It is located in Anuppura village of Pratapgarh Tehsil, 32 km from Dhariawad and 35 km from Pratapgarh town. The dam is a main irrigation project of the area.

6. Groundwater

66. Ground water is the major source of irrigation in the project District. In Pratapgarh District, water is found at shallow depth i. e. 2 to 10 m bgl during pre-monsoon season and 2 to 5 m BGL during post monsoon season. Irrigation takes place mainly by dug wells, tube wells/bore wells, tanks/ponds and canals. In Pratapgarh District, the Mahi Bajaj Sagar Dam has been constructed on the Mahi River some 16 km away from Banswara town and helps in irrigation. Major Water bearing formations in the district are Limestone, Gneiss, Basalt, Schist/phyllite & Shale. Average depth to water level (Pre-monsoon, 2006) (mbgl) is 5 – 25, depth to water level (Post-monsoon, 2006) (mbgl) is 0.5 – 20. Long term decline water level trend (1997-2006) in m/yr is 0.12 – 0.96.

7. Air Quality

67. Air quality in the district is almost favorable and good as there are no major industries causing air pollution. Major source of air pollution is vehicles and agricultural practices nearby city.

68. Ambient air quality in Rajasthan is monitored by Rajasthan Pollution Control Board. However, at present there is no monitoring station in Pratapgarh and therefore no data on ambient air quality available. Baseline monitoring shall be done by contractor in pre-construction stage (SIP period) and shall be updated in IEE.

69. Air quality monitoring shall be conducted in the pre-construction phase (SIP period) by the contractor and shall be updated in IEE.

8. Noise Quality

70. As there are no major industries or other activities, which may create high noise in City, the main source of noise pollution in the city area is traffic only that also in main and busy roads and other inner and connecting roads are quite peaceful.

71. Environmental monitoring for ambient air, noise and water quality has not been conducted during design period. Baseline Monitoring shall be done during SIP period by contractor and shall be updated in IEE.

B. Ecological Resources

72. The geographical area of Pratapgarh is 4,11,736 hectares, out of which forest area is 1,20,976 hectares, i. e. 29.38% of the total district area. The thickly wooded Sita Mata Wildlife Sanctuary sprawls over the Aravali ranges and the Malwa plateau, with three seasonal rivers flowing through the forest. Located about 45 km from Pratapgarh and 100 km from the divisional headquarter. Udaipur, the sanctuary, covering 423 km² of mainly dry deciduous vegetation has exceptionally rich flora and fauna. It is the only forest region, where more than half the trees are high building value teak. Salar (*Boswellia Serrata Rox. ex coleb*), Tendu (*Diospyros melonoxylon Roxb.*), Bad (*Ficus bengalensis*), Peepal (*Ficus Religiosa Linn.*), Neem (*Azadiracta Indica*), Siras, Churail, Kachnar, Gulmohar, Amaltas, Bakayan, Ashok, Mahua, Semal, Goondi, Khejadi, Amla, bamboo, Sindoor, chironjee, Rudraksha and Bel trees are also found in abundance. (Source: Brief Industrial Profile of Pratapgarh District, Min. of MSME, Govt. of India).

73. *Sitamata Wildlife Sanctuary*. Since the early times the north-west part of this region had

dense forests consisting of valuable Sagwaan, Chandan, Sheesham, Saalar, Dhaak, Dhonk, Kadamb, Mahua, Babool, Imlee and Baans trees in abundance and therefore in 1828 AD, a separate state forest department was created to manage state's exceptionally rich forest wealth. The thickly wooded Sita Mata Wildlife Sanctuary sprawls over the Aravali ranges and the Malwa plateau, with three seasonal rivers flowing through the forest. Located about 45 km from Pratapgarh and 108 km from the divisional headquarter. Udaipur, the sanctuary, covering 423 km². of mainly dry deciduous vegetation has exceptionally rich flora and fauna. It is the only forest region, where more than half the trees are high building value teak. Salar (*Boswellia serrata* Rox. ex coleb), Tendu (*Diospyros melonoxy* Roxb.), Bad (*Ficus bengalensis*), Peepal (*Ficus Religiosa* Linn.), Neem (*Azadiracta indica*), Siras, Churail, Kachnar, Gulmohar, Amaltas, Bakayan, Ashok, Mahua, Semal, Goondi, Khejadi, Amla, bamboo, Sindoor, chironjee, Rudraksha and Bel trees are also found in abundance. Two new bird varieties for the first time in Rajasthan were noticed in Sita Mata WL sanctuary about five years ago, they are- White-thorated Ground thrush and Black-necked Monarch.

74. On the review of available information, no rare or endangered species of flora and fauna prescribed by IUCN or WPC, 1972 are found along the project areas. Biodiversity Assessment was done through Biodiversity Assessment report is attached as Appendix 8. As per this assessment, though some species of near threatened (NT), endangered (EN), critically endangered (CR) and Vulnerable (VU) are reported in Pratapgarh but project sites being in urban and developed areas, none of these are reported in project area.

75. Proposed subproject components are located in Pratapgarh City, an urban area located in semi-arid dry region. City area is mostly characterized by dense habitation, there is no natural habitat left in these places. None of proposed project components falls in any forest or protected area.

C. Economic Development

1. Land use

76. Area of Pratapgarh Municipality is around 24. 50 square kilometer (6053. 95 acre), out of which, 1135 acre is urbanized, and rest is under rural, agriculture or barren land. Out of 1135 urbanized area, 925 acre are developed urban areas and rest is under agriculture land or reservoirs. Residential area is around 29 % of the developed urban area. Table 5 below present the land use of Pratapgarh.

Table 5: Existing Land Use of Pratapgarh Town

S. No	Land Use (Acre)	Area in Acre	% of Developed Area	% of Urban Area
1.	Residential	270	29. 19	23. 79
2.	Commercial	65	7. 02	5. 73
3.	Industrial	25	2. 70	2. 20
4.	Govt and semi-government	60	6. 49	5. 28
5.	Public or Semi Public	250	27. 03	22. 03
6.	Entertainment	85	9. 19	7. 49
7.	Transport/ Circulation	170	18. 38	14. 98
	Developed Area	925	100	81. 5
8.	Reservoir	30		2. 64
9.	Agriculture and Vacant Land	180		15. 86
	Urban Area	1135		100

Source: Pratapgarh Master Plan.

2. Industry & Agriculture

77. Out of five sub-divisions except for Chhoti Sadri, are notified forest blocks, where no major industry or mining activity is allowed under law. However, in non-forest regions of Chhoti Sadri (and part of Pratapgarh and Dhariyawad), small scale mining activities are in operation extracting mainly Red Ochre, Calcite Dolomite, Quartz, Feldspar and Soapstone. Marble, Building-stone, and Limestone are also available in small quantities.

78. There are no medium or largescale industries in Pratapgarh. Total number of small scale industries registered in the district are 1074. There is one industrial area named Bagwas Industrial Area in the district. Most of industries are service and repairing and agricultural based industries. (Source: Brief Industrial Profile of Pratapgarh District, Min. of MSME, Govt. of India)

79. Pratapgarh is one of the greenest districts of Rajasthan. Major crops are wheat, Maize, Soya bean and opium. Agriculture is practiced both in the valleys and on the tableland on the hilltops. Common lands account for 40% of the total geographical area, nearly 30 % of the common lands fall in the forest land category. The area is a schedule V area, predominantly inhabited by the tribal communities. Meenas are the most numerous comprising about 55% of the entire population. Average landholdings are small and canal irrigation facilities are limited only to Dahriyawad and Peepal Khoont tehsils, therefore agriculture is mostly rain-fed. Besides farming, the tribal communities depend upon the forests for their food, fodder and fuel (wood requirements). Many of the members of tribal communities do migrate to nearby towns in Gujarat and Madhya Pradesh to find a job as farm-labourers or construction workers. (Source: Environmental and Social Safeguards Due Diligence Report of Accelerating Infrastructure Investment Facility in India –Chetak Tollways Ltd, ADB)

3. Infrastructure

80. **Water Supply.** In 1972-1973, 3 nos. of new open wells were constructed at village Cheniyakheri and Rising pipeline 200 mm AC/CI was laid up to new RCC SR 675 kl capacity and 18M staging. Distribution system was designed for the year 1985 with designed population of 25000 souls. In the last reorganization in the year 1994 due to reduction in the production from open wells/ ground water sources and increased demand a surface source “Jakham dam” was taken as source of water to meet out the demand of town Pratapgarh for the year up to 2011. The capacity of Jakham dam is 5015 MCFT. Other provisions for improving distribution system, storage facilities, filter plant 3. 6 MLD were also taken for the design year. Ultimate reservation for town is 14. 68 MLD which is sufficient to supply water at 135 lpcd at consumer end.

81. **Current** service level in WS: Water is supplied for one and half hour on daily at 100 to 110 lpcd. Water supply is currently intermittent. Current water supply is 7 MLD from Jakham Dam will be increased to 135 lpcd after full commissioning of Jakham dam water supply schemen.

82. **Sewerage.** At present there is no sewerage system in the town, due to which most of the households depend on septic tanks for disposal of sewage. Effluent from septic tanks and sullage, and sewage from houses without septic tanks is let off into open drains which ultimately collect in low lying areas in the outskirts of the town.

83. **Solid Waste Management:** Pratapgarh Nagar Parishad collects solid waste via door-to-door collection systems or municipal dust bins through an NGO and nagar Parishad staff from all

municipal wards. The un-segregated waste collected from the city is disposed-off by crude open dumping method at designated site and low-lying areas. There is no landfill facility in the city.

84. **Storm Water Drainage:** Drainage system in the town is in the form of road-side open drains, and major drains that convey runoff from the city collector; drains to natural water bodies in town which pollute the water sources.

85. **Power Supply:** Thermal power is the main source of energy in Rajasthan, followed by wind and solar. Total installed capacity of energy generation in Rajasthan is provided in Table 6 below

Table 6: Installed capacity (in MW) of power utilities (as on 31. 03. 2016)

Ownership/ Sector	Thermal			Renewable			
	Coal	Gas	total	Nuclear	Hydro	RES	Grand total
State	5190. 00	603. 80	5793. 80	0. 00	987. 96	23. 85	6805. 61
Private	3196. 00	0. 00	3196. 00	0. 00	0. 00	5378. 30	8574. 30
Central	1014. 72	221. 23	1235. 95	573. 00	731. 34	0. 00	2540. 29
Total	9400. 72	825. 03	10225. 75	573. 00	1719. 30	5402. 15	17920. 20

Source: http://www.cea.nic.in/reports/monthly/installedcapacity/2016/installed_capacity-03.pdf

86. State-level companies (Rajya Vidyut Utpadan Nigam Ltd, RVUN; and Rajya Vidyut Prasaran Nigam Ltd, RVPN) are responsible for power generation and transmission respectively, and distribution is provided by three regional companies, the Ajmer Vidyut Vitaran Nigam Limited (AVVNL), Jaipur Vidyut Vitaran Nigam Limited (JVVNL) and Jodhpur Vidyut Vitaran Nigam Limited (JDVVNL).

87. In Pratapgarh town electric distribution is being done by Rajasthan Rajya Vidyut Mandal and electrical supply is provided from RAPP Kota by grid substation of 33/11 KV. There are two grid sub stations for Pratapgarh; one of 132 KVA on Banswara Road and another of 33 kV at Chittorgarh road. There are about 4351 domestic electric connections in the town. Power supply is reliable and continuous in Pratapgarh.

88. **Transport:** The old city area is characterized by narrow roads that are frequently congested with traffic and pedestrians. In contrast the remainder of the town has a relatively good road system, particularly in the outer areas, where streets are wide and not heavily used by traffic. Transport in the city is mainly by personal vehicles (cars and motorcycles) and motor- and bicycle-rickshaws. The Rajasthan State Road Transport Corporation (RSRTC) runs public buses to neighboring villages and towns and to larger towns, such as Ajmer, Kota, Chittorgarh, Udaipur and Jaipur, with which there are good road connections. Private buses and taxis are also being operated in the town. (Source: Pratapgarh Master Plan)

D. Physical Cultural Resources

1. Demography

89. According to the 2011 census, Pratapgarh district (Rajasthan) has a population of 868,231. This gives it a ranking of 472nd in India (out of a total of 640). The district has a population density of 211 inhabitants per square kilometer (550/sq mi). Its population growth rate over the decade 2001-2011 was 22. 84%. Pratapgarh has a sex ratio of 982 females for every 1000 males, and a literacy rate of 56. 3%.

90. The Pratapgarh Town is divided into 25 wards for which elections are held every 5 years. The Pratapgarh Municipality has population of 42,079 of which 21,499 are males while 20,580 are females as per report released by Census India 2011. Population of Children with age of 0-6 is 5154 which is 12.25 % of total population of Pratapgarh (M). In Pratapgarh Municipality, Female Sex Ratio is of 957 against state average of 928. Moreover, Child Sex Ratio in Pratapgarh is around 887 compared to Rajasthan state average of 888. Literacy rate of Pratapgarh city is 85.81 % higher than state average of 66.11 %. In Pratapgarh, Male literacy is around 92.19 % while female literacy rate is 79.23 %.

2. History, Culture and Tourism

91. **History.** Pratapgarh principality (present day Pratapgarh Town) was established in the year 1699 by Maharawat Pratap Singh (The name of Pratapgarh is after Maharawat Pratap Singhand not Maharana Pratap, as commonly mistaken). In the 14th century, Maharana Kumbha (1433–1468) ruled Chittorgarh. Due to a dispute with his younger brother Kshem Karan (1437–1473), he expelled him from his territory. Kshemkaran's family was a refugee for some time and lived in the Aravali ranges in the southernmost part of Mewar regime. In 1514, Kshemkaran's son Prince Surajmal (1473–1530) became the ruler of Devalia (Devgarh) and this principality later came to be known as Pratapgarh principality. Prince Surajmal established his capital of 'Kanthal-Desh' at Dewaliya (also called Devgarh), a small town about 10km in the west from present Pratapgarh town, where old temples, cenotaphs, a historical palace and other ruins of bygone Pratapgarh regime still can be seen. Thus, historically, Pratapgarh has been an integral part of Mewar Rulers of Udaipur.

92. As the climate of Devgarh was not found to be suitable by the royal family, one of the descendants of Surajmal, Maharawat Pratap Singh of 10th generation (1673–1708) started to build a new town near native village Devgarh in 1689–1699 and later named it as Pratapgarh, with a fort wall around his new palace and small township with eight entry gates. At that time, the area of Pratapgarh was reported to be about 889 square miles, whereas Dhariyawad, another small town near Pratapgarh, was founded by Rana Sahasmal, the grandson of legendary Maharana Pratap in the mid-15th century.

93. Sisodia clan is amongst the ancient royal families in India. This family ruled Mewar for more than eight hundred years. The famous Rajputs- Maharana Sangram Singh (also known as Rana Sanga), Maharana Kumbha and Maharana Pratap all belonged to this family. The rulers of 'Pratapgarh' principality were descendants of Sisodia clan of Mewar Rajputs.

94. **Culture.** The major fairs of this region are- Ambamata Fair, Sita Mata Fair, Gautameshwara Fair (on 'Vaishak-Poornima') and Bhanwar Mata Fair. Fairs on stipulated dates are also held in small places like Shaulee-Hanumanjee, Gangeshwara-Parsola, Manaa-Gaon, and Gupteshwara Mahadev in and around Pratapgarh.

95. Although all major Hindu festivals like Diwali, Govardhan Puja, Holi, 'RangTeras', 'Raksha Bandhan', 'Mahashivratri', 'Hanuman Jayanti' and 'Vijayadashami' etc. are celebrated in Pratapgarh, yet 'Sharad Navratri' and 'Vasant Navratri' both are also celebrated in the city with fun and florid. "Doondhotsava" is celebrated on Holi. The people of city do not celebrate "Dhulendi" on the following day after Holi, as done all over India, but color holi is celebrated thirteen days after on the hindu day of "Rang Teras". 'Gair'-Dancers can be seen all over the villages during 'Dashaamaataa' festival. A procession of folk-God Baba Ramdevji is a regular feature on 'Bhag-DashmeeTeej'. 'Sheetalaa Saptmee' is also observed in the district, when only "Makki-Dhoklas"

(cooked before a day prior to the festival) are consumed. Some tribals have a tradition of 'second marriage' as an approved social-custom.

96. **Tourism.** The major attractions of the district are Sita Mata Wildlife Sanctuary and Jakham Dam. However, large number of visitors and pilgrims do visit the old temples at Ambamata Shaktipeethh, Bhanwar mata, Gautameshwara Mahadev Paapmochan Teertha, Sholi Hanuman Temple, DeepeshwarMandir and many other temples. The magnificent Tomb (Dargah) of Saiyadi Kaka Saheb is also a popular destination, especially amongst Daudee Bohra community of Muslims, who gather here in large numbers on the occasion of Annual Urs of Saiyadi Kaka Saheb.

E. Environmental Settings of Investment Program Component Sites

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

98. STP (7.0 MLD) will be constructed in the available vacant land near village Talabkheda. The proposed land is adjacent to river Aerava, which is seasonal river and remains almost dry during whole year except monsoon. Nallahs from city discharge their waste into it. There are only bushes and shrubs present in the land. Few habitations exist near the STP land but more than 500 meters away. No wildlife exists near the proposed site.

99. It is proposed to reuse the treated effluent for use of agriculture, horticulture, development of urban forestry etc. and remaining treated effluent is proposed to be discharged into a nearby river Aerava. The NOC of ULB for discharge is attached in Appendix 28. In order to safeguard the interest of downstream users it is proposed to apply technology/process to achieve very low BOD (BOD 10) and suspended solids in the treated effluent. Treated effluent shall be mostly reused for beneficial purposes for which proposal of construction of Treated Effluent Elevated Reservoir (TEER), Treated Effluent Storage Reservoir (TESR) and Effluent Pumping Station (EPS) has been taken. Contractor will propose the best methods of reuse of treated effluent and sludge as per guidelines of CPHEEO and best international practices in consultation with RUDSICO (EAP) and Municipal Council and submit a plan in RUDSICO (EAP) for approval.

100. Excess or unused treated effluent will be discharged into the adjacent river Aerava behind the STP at approx. distance of 600 metre. This river is seasonal river and no significant flora and fauna is reported from this river. Only in monsoon, run off water flows in this river in rest of the time only untreated sewage from the city is discharged into it at several points. Agricultural activities are noticed in the surrounding areas adjoining the river. About 4.5 km from the proposed STP disposal point on the Aerava River a check dam has been constructed near Bhanwar Semla.

101. One proposed site of SPS is near Deepeshwar Talab, which is vacant government land. No trees or habitations exist within or adjacent to proposed site. There is an earthen approach road available up to the site.

102. Proposed site of MWP is near Govt. Primary School at Gautam Nagar. There are old public toilets at this site which are abandoned, and vacant as new toilets have been constructed by municipality near to it. There is a vacant plot beside the land and deep nallah on the backside

of the land. Habitations exist near the proposed site. There is a bituminous road for approach to proposed site.

103. Environmental features of proposed sites are given in Table 7 below:

Table 7: Environmental Features of Proposed sites

S. No	Project Component	Environmental features of Site	Photo of proposed site
1	Construction of STP of 7MLD, Proposed in the Govt. land in village Talabkheda. Latitude- 24° 1'11. 18"N Longitude- 74°45'42. 18"E	Proposed site is vacant government land. No trees exist within site, only shrubs are visible. High tension electrical line is passing through site, which needs to be shifted before construction works. No habitation exists within or near to site. River Areva is flowing about 500 m away from site, where treated effluent can be disposed. No wildlife is reported at this site.	
2	Sewage pumping station (SPS) of- 7. 0 MLD, Near Depeshwar Talab Latitude 24°1'30. 93" N Longitude 74°46'23. 68	Proposed site is vacant government land. No trees, habitations or wildlife exist within or near to the site.	
3	Manhole with Pump (MWP) of 0. 10 mld Ward 19 near Govt. Secondary School Latitude- 24° 1'47. 26"N Longitude- 74°46'50. 23"E	Proposed site government land, where old and abandoned community toilet exist. Approach road is available to this site. A government primary school exist near to site and some residences are also present near to this site.	
4	Sewer Networks	Laying of pipes is proposed within ROW of existing city roads, where there are several utilities such as electricity, telecommunications, water posts etc. As per preliminary surveys, no tree cutting is required. Some vendors exist in areas where pipe laying is proposed.	

S. No	Project Component	Environmental features of Site	Photo of proposed site
5	Discharge point	Discharge of treated effluent shall be done in a river named Areva, which is a seasonal river and wastewater from catchment area is discharged into it without any treatment. (refer Appendix 28 for NOC of discharge point)	Map of discharge point given in Figure8

VI. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Introduction

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

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

- (i) **Location impacts** include impacts associated with site selection and include loss of on-site biophysical array and encroachment either directly or indirectly on adjacent environments. It also includes impacts on people who will lose their livelihood or any other structures by the development of that site.
- (ii) **Design impacts** include impacts arising from Investment Program design, including technology used, scale of operation/throughput, waste production, discharge specifications, pollution sources and ancillary services.
- (iii) **Pre-construction impacts** include impacts which are anticipated during construction works but planning are required for designed mitigation measures before start of construction works i. e. during SIP period such as taking consents from various departments, planning for construction and workers camps, deployment of safety officer, arrangement of required barricades and caution boards etc.
- (iv) **Construction impacts** include impacts caused by site clearing, earthworks, machinery, vehicles and workers. Construction site impacts include erosion, dust, noise, traffic congestion and waste production.
- (v) **O&M impacts** include impacts arising from the operation and maintenance activities of the infrastructure facility. These include routine management of operational waste streams, and occupational health and safety issues.

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

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

108. The ADB Rapid Environmental Assessment Checklist has been used to screen the project for environmental impacts and to determine the scope of the IEE.

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

B. Pre-Construction Impacts – Location and Design

1. Location Impacts

110. **Location of Sewage Treatment Plants.** STP of 7.0 MLD is proposed in the Govt. land in village Talabkheda which belongs to Nagar Parishad. There are no habitations within 500 m near to proposed site therefore no location impacts will arise. As for preliminary survey only shrubs and bushes are present at site therefore tree cutting is not required during construction of STP. There are no wildlife reported at this site. As the habitations located away from the sites and the proposed treatment technology, SBR, being an aerobic process and conducted in a compact and a closed system with automated operation, odour nuisance will be very minimal and negligible. Limited bad odors may be generated from wet well, primary treatment units and sludge treatment. Following mitigation measures shall be adopted during design and construction-

111. Provide a green buffer zone of 10-20 m wide all around the STP with local varieties of trees in multi-rows. This will act as a barrier and visual screen around the facility and will improve the aesthetic appearance. Treated wastewater shall be used for plantation. Develop layout plan of STP such that odour generating units (such as sludge / solids handling facilities) are located away from the surrounding area with future development potential.

112. There is high tension power (HT) transmission line passing through the proposed STP site. There will be risk of electrocution during construction works. Therefore, PIU should take following mitigation measures before start of construction activities at STP site-

- (i) Consult with electricity department for shifting of HT line from STP site before start of any construction activity at site
- (ii) Provide a board of high tension electricity hazards at site until HT line is not shifted
- (iii) Do not start any construction activity near the HT line and provide barricades below the electricity line to prevent entry of any worker or construction machineries in the impact area of hazards

113. **Location of Sewage Pumping Station and MWP.** In sewerage network of Pratapgarh town two sewage pumping stations has been proposed looking to the topography of the town.

114. **SPS.** Entire town's sewerage is coming to the lowest contour near Deepeshwar Talab. From here STP site is around 1.6 km. NGL near Deepeshwar talab is 488.315 m and STP site is 496.415 m also there is a ridge point having NGL around 498 m, therefore ground profile is 8 m higher. Invert level at SPS site is 480.120. Depth at SPS site is 8.105 m. There are two option

to lay sewer up to STP one is by gravity from this point and another one is by pumping. If gravity sewer is proposed, then depth goes up to 15 to 18m. Sewer laying up to this depth in rocky strata is challenging job also the maintenance of the sewer line will be difficult. This sewage pumping station has been proposed nearby this location to reduce the depth of sewer in this stretch. Capacity of SPS is 7 MLD and land has been identified by the local body near Depaswar talab. This SPS will transfer all the sewage to STP. The land required for the same is available for the construction by the ULB.

115. **MWP.** One manhole with pumping (MWP) has been proposed in Zone 1 for transportation of flow to Zone 2 Gravity Main. This is a small pumping station of 0. 10 MLD capacity required to avoid the deeper sewer. There is low lying area and sewage flow from habitation of this area accumulating to this MWP location at present. As per the topography this MWP cannot be avoided. Land has been identified by the local body near Govt. Secondary School in ward no. 19. There are residences and school near the site therefore all the precautions should be taken during construction to minimize the impacts on nearby residents. No vegetation exists (except bushes) at site therefore no tree cutting is anticipated. Being a DBO Contract, contractor is expected to explore design alternatives and avoid anticipated impact through careful planning.

116. **Locations impacts of Sewerage Networks.** The sewerage collection networks will traverse through different city roads within ROW. Therefore, no impacts shall be envisaged regarding location. These works will require advance permission from concerned authority for road cutting and traffic diversion etc. No tree cutting will be required as per preliminary design and if any tree cutting will be required during execution mitigation measures shall be adopted.

117. It must assure by contractor that desired consents from RPCB are obtained for construction of STP and treated effluent should meet the parameters as set by NGT/CPCB/RPCB. Contractor will also ensure compliances to all the conditions as mentioned in the CTE.

2. Design Impacts

118. **Design of the Proposed Components.** The Central Public Health and Environmental Engineering Organization (CPHEEO) manual suggests a design period of 15/30 years¹⁷ in general while designing the systems for water supply and sewerage components. It is proposed to consider 2051 as the design year for all the components in order to maintain unanimity in the design period and design population. Accordingly, 2017 shall be the base year and 2036 the intermediate year to cross check the designs pertaining to intermediate demand. The rate of water supply has been taken as 135 lpcd for 100% population. Sewage generation is 85% of water supply (including 5% to account for infiltration).

119. One of the critical aspects in sewerage system operation is, change in raw sewage characteristics at inlet of sewage treatment plant may affect the process and output quality. STPs are designed for municipal wastewater, which does not include industrial effluent. Characteristics of industrial effluent widely vary depending on the type of industry, and therefore disposal of effluent into sewers may greatly vary the inlet quality at STP and will upset process and affect the efficiency. Although legally the disposal of effluent meeting certain standards is allowed into municipal sewers (refer Appendix 4), the monitoring of the same is not practical. To prohibit the industrial discharge into municipal sewers following measures should be considered:

¹⁷ As per CPHEEO, pumps, motors, STP, storage reservoirs are to be designed for a life of 15 years.

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

120. Appropriate design of STP and pumping station are being adopted in the project which includes energy efficient pumps and technology suitable for treatment and disposal of sewage. Sequential Batch Reactor (SBR) is being adopted for sewage treatment which is the best suitable technologies proven for such treatments and locations. Therefore, no design impacts will arise during proposed works.

121. It is proposed to establish STP based on SBR (sequential batch reactor) process, followed by disinfection by chlorine. As the bid is DBO type, detailed design of the STP will be carried out by the contractor to the specific discharge standards as given in contract. Currently for STPs in India, the standards notified by NGT in April 2019 are applicable. However, under RSTDSP, PMU has decided to base the STP design on discharge standards for STPs suggested by NGT, which are more stringent. The strident standards also facilitate maximum utilization of treated wastewater for reuse in various purposes following the Sewerage and Wastewater Policy, 2016, of Rajasthan.¹⁸

122. **Treated wastewater Reuse / disposal.** Rajasthan is a water scarce region and receives low rainfall. Recognizing the importance of treated wastewater in reducing the demand on water, Sewerage and Wastewater Policy, 2016, of Rajasthan promotes the reuse of treated sewage for non-potable applications, and to make sewerage projects environmentally sustainable. Government of Rajasthan adopted this policy to ensure “improved health status of urban population, specially the poor and under privileged, through the provision of sustainable sanitation services and protection of environment”. To further promote the reuse and provide guidance, Policy prioritized reuse in irrigation (agriculture, forestry, and landscaping), followed by fish farming, industry and non-potable domestic reuse. Policy requires monitoring of treated wastewater quality, soil quality etc., Policy prohibits artificial recharge of aquifers using treated wastewater, and promotes construction of storage tanks to store treated wastewater to facilitate reuse. Policy prescribes that the detailed project report (DPR) should clearly define the best reuse option specific to the town and prepare a Reuse Action Plan part of the DPR following water quality norms and legal implications. LSGD is currently in the process of publishing Guidelines for Reuse of Treated Wastewater in Rajasthan 2019 to promote the reuse and provide guidance to the stakeholders. Guidelines promotes the use the treated wastewater and envisages to maximize the collection and treatment of sewage generated and reuse of treated wastewater on a sustainable basis, thereby reducing dependency on freshwater resources.

123. Policy provided priority to reuse in agricultural for unrestricted irrigation. It suggests blending of treated wastewater with fresh water to improve quality where possible, and crops to be irrigated shall be selected to suit the irrigation water, soil type and chemistry. Policy requires

¹⁸ “The use of treated wastewater in irrigation and industrial application shall be given the highest priority and shall be pursued with care. Effluent quality standards shall be defined based on the best attainable treatment technologies, and calibrated to support or improve ambient receiving conditions, and to meet public health standards for end users”.

monitoring of accumulation of heavy metals and salinity. It encourages farmers to use modern and efficient irrigation technologies, and to ensure protection of on-farm workers and crops. As a contingency measure, policy requires regular monitoring of treated water quality, and emergency alerts to users in any event of deterioration of quality. Policy prohibits use of treated wastewater for artificial recharge (Excerpts from Policy on Reuse is provided in Appendix 11).

124. During rainy season treated effluent will be disposed to nearby River Areva, provision of pipe from STP to ultimate disposal point is already taken as per location agreed by Municipal Board and Employer Representative.

125. **Reuse Options.** Following the Sewerage and Wastewater Policy, 2016, the draft Guidelines on Reuse provides the following reuse applications:

- (i) Agriculture, horticulture, irrigation
- (ii) Gardening in park
- (iii) Road washing and water sprinkling to reduce fugitive dust
- (iv) Industries including mining
- (v) Recreational ponds and lakes
- (vi) Social forestry
- (vii) Construction Activities
- (viii) Firefighting and other municipal uses
- (ix) Railway
- (x) Thermal power plants
- (xi) Cantonments
- (xii) Individual Users

126. **Reuse Plan.** The State Policy requires the Detailed Project Report provide reuse options and strategy to implement reuse, and detailed Reuse Action Plan. As the Pratapgarh subproject is proposed under DBO, the Reuse plan will be prepared by the DBO contractor during the detailed design phase in consultation with the stakeholders in Pratapgarh, and reuse modalities will be firmed up. Subproject includes following components as part of the STP to facilitate reuse: disinfection of treated wastewater, Treated effluent storage reservoir (TESR), effluent pumping station and a treated effluent elevated reservoir (TEER). Treated effluent will be chlorinated prior to its entry into TESR/TEER. Following needs to be considered in the preparation of reuse plan:

- (i) As part of the plan, identify potential reuse application in Pratapgarh and establish quality criteria for each of the use
- (ii) For applications that use treated wastewater directly (e.g., agriculture), the quality required for such application in safe manner considering health, environment and crop yield concerns shall be ensured;
- (iii) Prepare a reuse plan for agriculture/ horticulture, clearly indicating the limits (geographical / crops / type of application / type of soils etc.); adopt international good practice suggested by agencies like World Health Organization (WHO), Food and Agricultural Organization (FAO) of the United Nations.
- (iv) Plan should include awareness and training provisions and responsibilities; these can be conducted by concerned department (e.g., Agricultural Department, District Collectorate)
- (v) Carryout regular / online monitoring of critical quality parameters of treated wastewater to ensure that they meet the preset standards established for reuse

127. **Use of treated wastewater for irrigation.** Use of wastewater for irrigation is associated

with some health risks – from germs in wastewater, which may contaminate food and spread disease, health risk to farm workers from worms (helminths) and nematodes and chemical risk is associated if industrial wastewater enter the sewers. If the wastewater with bacteriological contaminants are used for food crops like lettuce, tomato, which are eaten without peeling or cooking, it will present a greater health risk if precaution such as such washing with chlorinated water or storing for adequate time in normal temperature before use (at least 10 days). According to the WHO, effluent which is used to irrigate trees, industrial/commercial (not food, like cotton) and fodder crops, fruit trees, and pasture should have less than one viable nematode egg per liter. Effluent used for the irrigation of food crops, sports fields, public parks, should have and less than one viable nematode egg per liter and less than 1000 fecal coliforms per 100 milliliters. These shall be considered in the Reuse Plan that will be prepared during the detailed design and complied accordingly.

128. Disposal of treated wastewater. Proposed STP site is located close to River Areva and the excess / surplus / unused treated wastewater will be discharge into this river. As the wastewater is treated to stringent disposal standards, no notable impacts envisaged. This River is mostly dry except during monsoon. It carries untreated wastewater from the surrounding areas of town. The disposal of treated wastewater meeting the set quality standards, in fact, will improve the quality of River water by dilution. There are no water intakes or abstraction points in the downstream proximity. STP site is surrounded mostly by agricultural and barren lands. Considering the existing status of river, and the degree of treatment, no significant impacts envisaged. Proper systems should be put in place at the proposed STP to ensure that treated wastewater always meet the stipulated standards prior to its disposal into river. Any change / lowering of treatment efficiency during operation may lead to poor quality of wastewater and may further pollute the water body. It is therefore important that STP treats the sewage as designed. Operation and maintenance of STP and change in incoming sewage quality will have impact on the treatment efficiency. This therefore requires following monitoring:

- (i) Obtain of consent of RSPCB for discharge of treated wastewater into nearby river.
- (ii) Regularly monitor the treated wastewater quality at STP and ensure that it meets the discharge standards
- (iii) Monitor water quality periodically during operation phase as per the Environmental Monitoring Plan

129. During rainy season treated effluent will be disposed to nearby available natural drain/ depression/ low lying area, provision of pipe from STP to ultimate disposal point is already taken as per location agreed by Municipal Board and Employer Representative.

130. Sludge treatment and disposal. Sewage sludge generally consists of organic matter, pathogens, metals and micro pollutants. The concentration of parameters such as metals can be influenced by input to the sewers system from industry. Since no industrial wastewater is allowed into sewers, it is unlikely that sludge contains heavy metals. Heavy metal concentration may not be ruled out completely as the chemicals used in treatment may potentially contains heavy metals, which will then leach into the sludge.

131. Subproject includes sludge management infrastructure in STP, including system for sludge collection, thickening, solar drying, and disposal at landfill/identified site. This includes a Sludge Sump to collect sludge from SBR basins; returning arrangement for supernatant from the sump to inlet/equalization tank for treatment; pumping sludge to sludge thickener and pumping thickened to mechanical sludge dewatering system (such as centrifuge). It also requires contractor to establish a shed where the dewatered sludge cake can be further air dried for 15

days. This is indicative sludge management system, and DBO contractor will design the system meeting these requirements. Bid indicates that “the sludge produced from the treatment process would be processed so it may be used as fertilizer and soil conditioner” and it requires DBO contractor “to conform to the regulations of public health and environment protection norms”. This follows the Sewerage and Wastewater Policy, 2016, which suggests “use of sludge produced from the treatment as fertilizer and soil conditioner after processing”.

132. The treatment and drying processes kill enteric bacteria and pathogens, and because of its high content of nitrates, phosphates and other plant nutrients the sludge is an excellent organic fertilizer for application to the land. Adequate drying is however necessary to ensure maximum kill of enteric bacteria. To achieve adequate drying minimum drying period (15 days) shall be ensured. The drying period, which will be varying depending on the season will be determined during operation and be followed. A sludge management plan will be developed by the DBO contractor during the detailed design phase. Proper sludge handling methods should be employed. Personal Protection Equipment should be provided to the workers.

133. Contractor will propose the sludge management plan with best methods for reuse of sludge as per guidelines of CPHEEO (guidelines are attached as Appendix 12) and best international practices in consultation with PMU and Municipal Council. Properly dried sludge can be used as soil conditioner. Periodic testing of dried sludge will be conducted to ensure that it does not contain heavy metals that make it unsuitable for food crops. Tests shall be conducted to confirm the concentrations below the following standards. As there are no specific standards notified for sludge reuse, the compost quality standards notified under the Solid Waste Management Rules, 2016 have been adopted here. Rules stipulate that “In order to ensure safe application of compost, the following specifications for compost quality shall be met” (Table 8).

Table 8: Standards for Sludge Reuse as Manure

Standards for Composting. As there are no specific standards notified for sludge reuse, the compost quality standards notified under the Solid Waste Management Rules, 2016 (Schedule II A, Standards for Composting) have been adopted here. According to the standards “In order to ensure safe application of compost, the following specifications for compost quality shall be met, namely:			
Parameters	Units	Organic Compost (FCO 2009)	Phosphate Rich Organic Manure (FCO 2013)
Arsenic	mg/kg	10	10
Cadmium	mg/	5	5
Chromium	mg/kg	50	50
Copper	mg/kg	300	300
Lead	mg/kg	100	100
Mercury	mg/kg	0. 15	0. 15
Nickel	mg/kg	50	50
Zinc	mg/kg	1000	1000
C/N ratio	-	<20	<20:1
pH	-	6. 5 – 7. 5	(1:5 solution) maximum 6. 7
Moisture, percent by weight, maximum		15. 0 – 25. 0	25. 0
Bulk density	g/cm3	<1	Less than 1. 6
Total Organic Carbon, per cent by weight, minimum	percent by weight	12	7. 9
Total Nitrogen (as N), per cent by weight, minimum	percent by weight	0. 8	0. 4

Total Phosphate (as P2O5) percent by weight, minimum	percent by weight	0. 4	10. 4
Total Potassium (as K2O), percent by weight, minimum	percent by weight	0. 4	-
Odour		Absence of foul Odor	
Particle size		minimum 90% material should pass through 4. 0 mm is sieve	minimum 90% material should pass through 4. 0 mm is sieve
Conductivity, not more than	dsm-1	4	8. 2

* compost (final product) exceeding the above stated concentration limits shall not be used for food crops. however, it may be utilized for purposes other than growing food crops.

FCO = Fertilizer Control Order, Department of Agriculture, Government of India

134. In order to ensure the safe use of dried sludge, following should be followed:

- (i) Prepare a dried Sludge utilization plan for Pratapgarh with the help of Agriculture Department / CLC; plan should also include if any additional processing is required for sludge to use as soil conditioner
- (ii) Plan should clearly various potential uses and demand in town and surroundings
- (iii) Establish usage limits, where required, (geographical / crops / type of application / type of soils etc.); adopt international good practice suggested by agencies like World Health Organization (WHO), Food and Agricultural Organization (FAO) of the United Nations.
- (iv) Identify a landfill / suitable site for disposal of surplus dried sludge
- (v) Monitor sludge quality during operation phase as per the Environmental Monitoring Plan, ensure that it meets the quality parameters established by FCO
- (vi) In case of sludge not meeting the quality parameters, it shall not be used as soil condition, and shall be disposed at appropriate disposal site (if it falls under hazardous category, it shall be disposed as per the Hazardous Waste Management Rules, 2016).

135. **Mixing of industrial effluent in wastewater.** One of the critical aspects in sewerage system operation is, change in raw sewage characteristics at inlet of sewage treatment plant may affect the process and output quality. STP are designed for municipal wastewater, which does not include industrial effluent. Characteristics of industrial effluent widely vary depending on the type of industry, and therefore disposal of effluent into sewers may greatly vary the inlet quality at STP and will upset process and affect the efficiency. Various types of small to medium-scale industries are in Pratapgarh. Most of these industries generate wastewater from the process, which is generally treated at effluent treatment plants specifically established for the purposes and are not allowed into municipal sewers. While the project does not provide sewerage system in established industrial areas, there is a risk of industrial effluent joining municipal sewers from the small/household units established in town areas where sewers are being provided. Mixing of industrial effluent will severely deteriorate the quality of treated wastewater, and therefore the proposed reuse. Reuse of such water may have significant impact on public health and on land and water. Following measures should be incorporated to safeguard the sewerage system and the intended reuse:

- (i) No industrial wastewater shall be allowed to dispose into municipal sewers
- (ii) As there is a risk of potential mixing of industrial waste, no domestic wastewater from industrial units shall be allowed into municipal sewers

- (iii) Ensure that there is no illegal discharge through manholes or inspection chambers
- (iv) Conduct public awareness programs in coordination with RSPCB and CLC
- (v) Conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated wastewater quality complies with the effluent standards

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

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

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

- (i) Limit the sewer depth where possible
- (ii) Sewers shall be laid away from water supply lines and drains (at least 1 m, wherever possible);
- (iii) In all cases, the sewer line should be laid deeper than the water pipeline (the difference between top of the sewer and bottom of water pipeline should be at least 300 mm)
- (iv) If unavoidable, where sewers are to be laid close to storm water drains, appropriate pipe material shall be selected (stoneware pipes shall be avoided)
- (v) For shallower sewers and especially in narrow roads, use small inspection chambers in lieu of manholes.
- (vi) Design manhole covers to withstand anticipated loads & ensure that the covers can be readily replace if broken to minimize silt/garbage entry
- (vii) Ensure sufficient hydraulic capacity to accommodate peak flows & adequate slope in gravity mains to prevent buildup of solids and hydrogen sulfide generation
- (viii) Equip pumping stations with a backup power supply, such as a diesel generator, to ensure uninterrupted operation during power outages, and conduct regular maintenance to minimize service interruptions. Consider redundant pump capacity in critical areas

139. **Design of SPS and MWP.** As explained earlier, one MWP is proposed near to a Govt. School and residential areas and another near a talab Therefore, care should be taken while designing for this SPS and MWP to avoid impacts during construction and operation phases. Design engineers should take following mitigation measures to reduce impacts due to proposed SPS-

- (i) Incorporate in design pumps of low noise
- (ii) Provide dedicated power supply to SPS, if possible, otherwise DG set to be used during power failure, should be soundproof and having acoustic enclosures with low/permitted air emission standards
- (iii) Firm barricades should be provided during construction works all around the SPS site

- (iv) Boundary wall of sufficient height with barbed wire fencing should be provided during operation phase so that no children/residents can enter in the SPS premises
- (v) Odour control system should be provided in SPS
- (vi) Plantations should be provided if space available to reduce foul smell of sewer during operation
- (vii) No workers camps should be allowed during construction works at SPS site
- (viii) Entry should be restricted through provision of gate and guard during operation of SPS

140. **Fecal Sludge and Septage Management (FSSM).** The proposed FSSM will help the ULB to cover entire population with safe disposal of human excreta by serving areas which are not feasible to be provided with a sewerage system. Under the FSSM, fecal sludge / septage will be collected from the household level septic tanks using truck mounted mobile desludging equipment and transported to Sewage Treatment Plant (STP) for treatment. At this stage, the quantity of septage generated from this area is not available. This will be estimated during the detailed design phase, and number of mobile tankers required to collect the transport the septage to STP, frequency of collection depending on the size of septic tanks etc., will be worked out accordingly. IEE needs to be updated during the detailed design phase to reflect the final project design. Although handling, transportation, and disposal into STP is completely mechanized, the system will however be operated by the workers, therefore proper precautions will be required as workers will be dealing with highly harmful septage. Accessibility of septic tanks to mobile suction tankers to collect septage is critical for success of the septage management system. At STP, the septage will be mixed with the sewage and will be co-treated in the STP. Septage will be in concentrated and partially degraded form, and disposal of the same into STP inlet stream may upset the sewage treatment process, may generate bad odours, and may ultimately affect the quality of treated wastewater. Treatment process needs to be professionally designed. Following measures are suggested for implementation

- (i) Conduct detailed survey of the households to be covered with FSSM to design the system to suit the local conditions, such as type of septic tanks and their location in the houses
- (ii) Create awareness program on the FSSM from collection to treatment system that will be adopted
- (iii) Design the sewage treatment process duly considering mixing of septage
- (iv) Ensure that the FSSM system is completely mechanized no human touch, even accidentally, from collection at household to discharge into STP, and in periodic cleaning of tankers
- (v) Demarcate a proper area for cleaning of mobile tankers in STP premises, and ensure that the wastewater shall be discharged into STP
- (vi) Provide proper training to the workers, and staff in safe handling of FSSM tasks, provide all necessary personal protection equipment
- (vii) Ensure proper facilities for workers including showers, wash areas, toilets, drinking water, eating and resting places
- (viii) Conduct regular health checks
- (ix) Prepare Health and Safety Plan for FSSM

C. Pre-construction Impacts

141. **Utilities.** Telephone lines, electric poles and wires, water lines within the proposed project locations may require to be shifted in few cases. To mitigate the adverse impacts due to relocation of the utilities, the contractor, in collaboration with ULB will:

- (i) identify the locations and operators of these utilities to prevent unnecessary disruption of services during construction phase; and
- (ii) instruct construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.

142. Site selection of construction work camps, stockpile areas, storage areas, and disposal areas. Priority is to locate these near the project location. However, if it is deemed necessary to locate elsewhere, sites to be considered will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems. Residential areas will not be considered for setting up construction camps to protect the human environment (i.e., to curb accident risks, health risks due to air and water pollution and dust and noise and to prevent social conflicts, shortages of amenities and crime). Extreme care will be taken to avoid disposals near forest areas, water bodies, swamps or in areas which will inconvenience the community. Construction sites will be selected by DBO contractor in compliance with these conditions and the same will be reflected in Site Environmental Management Plan (SEMP) which is to be prepared by DBO contractor prior to start of construction and approved by PIU. Material stockpiles will be protected by bunds during the monsoon season to prevent silt runoff into drains. The subproject is likely to generate soil from excavations, which needs to be disposed of safely. The following measures should be considered for disposal of surplus and/or waste soil:

- (i) The excavated soil should be removed from construction area at the earliest for beneficial reuse such as land raising / filling of excavated areas.
- (ii) Soil should be covered with tarpaulin sheets during the transportation.
- (iii) Soil transportation should not be done during the peak hours and should avoid narrow and heavy traffic routes and important religious or tourist sites

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

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

- (i) consult Department of Archaeology and Museums to obtain an expert assessment of the archaeological potential of the site;
- (ii) consider alternatives if the site is found to be of high risk;
- (iii) include state and local archaeological, cultural, and historical authorities, and interest groups in consultation forums as project stakeholders so that their expertise can be made available; and

- (iv) develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognized and measures are taken to ensure they are protected and conserved.

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

146. Mitigation measures at SPS. SPS is proposed near to residential areas. Therefore, care should be taken during pre-construction phase, for this SPS to avoid impacts during construction and operation phases. Contractor should take following mitigation measures to reduce impacts due to proposed SPS:

- (i) Construction and workers camps should not be established at SPS site
- (ii) Workers should be made aware about the inconvenience caused to nearby school and habitations and mitigation measures and good practices to minimize/avoid these impacts
- (iii) Planning should be done to finish the works quickly at SPS site to avoid prolonged disturbance to school and residents near the SPS site
- (iv) No night works should be conducted at SPS site
- (v) Only soundproof equipment should be used during construction such as DG sets etc., should be having acoustic enclosures and maintained so that no smoke should be emerged beyond prescribed limit. No disturbance in respect of noise and air pollution should be caused to nearby school and habitations.

D. Construction Impacts

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

148. Laying of Sewer Networks. The maximum depth for sewers depends on the design, and in Pratapgarh most of the sewers will be laid 1.2 to 2 m below the ground, and some sewers will be laid deeper (> 2m) and maximum depth will be 5m. Sufficient care will be taken while laying so that existing utilities and cables are not damaged and pipes are not thrown into the trenches or dragged, but carefully laid in the trenches. Trenches deeper than 2 m will be protected by bracings to avoid collapse of trenches, and to avoid any risk to surrounding buildings. Once they are laid, pipes will be joined as per specification and then tested for any cracks or leakages. The minimum working hours will be 8 hours daily, the total duration of each stage depends on the soil condition and other local features. The excess excavated soil shall be used for filling low lying area or stored/ dumped in approved debris disposal sites.

149. Although construction of these project components involves quite simple techniques of

civil work, the invasive nature of excavation and the project locations in the built-up areas of the town where there are a variety of human activities, will result in impacts to the environment and sensitive receptors such as residents, businesses, and the community in general. The anticipated impacts are temporary and for short duration.

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

151. **Construction of STP (7.0 MLD) and SPS.** STP and SPS are proposed in the Govt. land which are under ownership of Nagar Parishad. Construction impacts are the common impacts of any construction works like site clearance, demolition of old structures, excavation, erection of building/structures, health and safety of workers and nearby residents etc. which can be mitigated as per the best practices prevailing in the country which includes but not limited to health and safety arrangements for workers and nearby habitants, operation and maintenance of construction equipment, protection of air, water and noise pollution due to construction works etc. Contractor is required to adopt all the measures as per best international practice and standards.

152. There is high tension overhead electricity line is passing through the STP site. PIU should not give permission to contractor to start any construction activity before shifting of this electricity line.

153. **Proposed pipeline.** A detail survey is needed after finalization of alignment to access the feasibility of the alignment for need of any tree cutting, demolition of any structure, road and railway crossings, pipe laying in any private land, presence of any sensitive receptor along alignment, disturbance to public or business etc. Mitigation measures have been prepared for potential adverse impacts. Prior consent from landowners (if pipe laying is required in private land) and NOC from concerned departments (for pipe laying in roads, road/railway crossings etc.) prior to start of construction works, is required. To mitigate the impacts of disturbance to road users during pipe laying works on road, it is strongly recommended that contractor dig only those length of road, up to which extent he can lay pipe on the same day and can back fill the trench and restore the road up to motorable conditions. All the safety measures for work on road such as barricades, road signage, traffic assistance etc. is required to be adopted by contractor during construction works. Further if night works are required (however unlikely, applicable only in extreme conditions) all the mitigation measures to reduce impacts of disturbance to minimum level to nearby habitants and road users should be ensured by contractor.

154. **Demolition works.** In the initial stage of project planning it is accessed that there is requirement of demolition of old/abandoned structures (toilets) in proposed SPS site. For this and if any demolition works are required, proper work plan and Mitigation measures will be required for demolition works. Structures to be demolished should be wetted through water sprinkling to reduce dust emission. Appropriate site for storage and disposal of demolished materials should be selected prior to start of demolition activities with prior permission/approval of PIU/ULB. All the safety measures should be adopted during demolition activities.

155. **Storage and Disposal of excavated earth.** A large quantity of soil will be excavated for pipe laying, construction of STP and SPS. Some part of this excavated soil will be reused for backfilling and/or surface leveling; rest of the soil will be needed to be disposed in other locations. Proper storage and disposal plan from contractor is required before start of the work. Prior permission from landowner/concerned authority for storage and disposal of excess earth is

required. Prior to the commencement of works, Contractor will follow all the prescribed rules¹⁹ and shall identify a debris disposal site in consultation with the PIU/ULB and adhering to following criteria:

- (i) The site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, top-soil stripping, stacking and preservation should be undertaken prior to initiation of any activities.
- (ii) Debris disposal site shall be at least 200 m away from any surface water body.
- (iii) No residential areas shall be located within 200 m downwind side of the site.
- (iv) The site is minimum 250 m. away from sensitive locations like hospitals, religious places, ponds/lakes or other water bodies.
- (v) The local governing body and community shall be consulted while selecting the site.
- (vi) Soil storage site should be properly demarcated by fencing and information board should be placed at entrance
- (vii) At soil storage site soil should be covered by tarpaulin or regular water sprinkling should be done to reduce dust emission
- (viii) At soil disposal site the disposed soil should be leveled on daily basis and no heap or mound should be left at end of the day.

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

- (i) Use material sources permitted by government;²⁰
- (ii) Verify suitability of all material sources and obtain approval of PIU; and
- (iii) Submit to PIU on a monthly basis documentation of sources of materials. If contractor is purchasing ready mix concrete, asphalt/macadam and aggregates from third party, contractor will assure that all the parties/ suppliers are having CTE/CTO from RPCB and will collect the copy of these certificates and submit to PIU/consultants.

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

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

¹⁹ Construction and Demolition Waste Management Rules 2016 and Solid Waste Management Rules

²⁰ CTE and CTO will be required for batching plant, hot mix plant, crushers etc. if specifically established for this project. If contractor is purchasing raw material or ready-mix concrete, asphalt/macadam and aggregates from third party, he has to be assured that third party is having CTE/CTO from RPCB and should collect the copy of these and submit to PIU/consultants. Quarry sites should also have the desired permissions.

- (vi) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly, DGs should have proper stake height as per norms;
- (vii) Ensure all the equipments are having PUC certificates
- (viii) Do regular water sprinkling in dusty areas to reduce dust emission during works
- (ix) Damp down the structures before demolishing to reduce dust emission
- (x) Damp down on regular basis all the access ways
- (xi) Maintain all the equipments and vehicles to reduce emission of smoke and keep pollution under control and keep records of periodic maintenance
- (xii) Conduct ambient air quality monitoring periodically as per Environmental Management Plan

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

- (i) Prepare and implement a spoils management plan;
- (ii) Avoid constructing any construction camps and labour camps away from any water body and do not allow to dispose any waste or sullage into any water body
- (iii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
- (iv) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with PIU on designated disposal areas;
- (v) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
- (vi) Place storage areas for fuels and lubricants away from any drainage leading to water bodies and provide impermeable lining under the storage yard of fuels and lubricants
- (vii) Dispose any wastes generated by construction activities in designated sites;
- (viii) Keep oil tray or pans under the DG set or during maintenance of mechanical equipments to avoid oil spillage resulting soil and water pollution, and
- (ix) Conduct surface water quality Monitoring according to the Environmental Management Plan (EMP)

159. **Noise and Vibration Levels.** Construction works will be conducted along the roads Pratapgarh urban area, where there are houses, schools and hospitals, religious places and small-scale businesses. The sensitive receptors are the general population in these areas. Increase in noise level may be caused by excavation, particularly breaking of cement concrete or bitumen roads, operation of construction equipment like concrete mixers, and the transportation of equipment, materials, and people. Vibration generated from construction activity, for instance from the use of pneumatic drills, will have impact on nearby buildings. This impact is negative but short-term, and reversible by mitigation measures. The construction contractor will be required to:

- (i) Plan activities in consultation with PIU so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance;
- (ii) Use road cutters instead of breaker/hammer for cutting the road before excavation for pipe laying on roads
- (iii) Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach;
- (iv) Minimize noise from construction equipment by using vehicle silencers, fitting

- jackhammers with noise-reducing mufflers, and use portable street barriers to minimize sound impact to surrounding sensitive receptor;
- (v) DGs being used at site should have sound reducing enclosures, preferably silent DGs should be used at site;
 - (vi) Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s and equipments;
 - (vii) Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity;
 - (viii) Consult the custodians of important buildings, cultural and tourism authorities and local communities in advance of the work to identify and address key issues, and avoid working at sensitive times, such as religious and cultural festivals;
 - (ix) Provide all workers appropriate PPEs like ear plug/muff, working in high noise conditions;
 - (x) Keep all vehicles and equipments in good conditions to avoid excessive noise generation;
 - (xi) Provide noise barriers near sensitive receptors like schools, hospitals, temples, courts etc., and consult in advance with sensitive receptors about the working hours (specially schools, hospitals, offices, courts etc.) and avoid noisy works in those hours;
 - (xii) Avoid noisy works in nights in inhabited areas to avoid any disturbance to habitants; and
 - (xiii) Consult in advance with habitants and inform them about the nature and duration of works
 - (xiv) Conduct noise monitoring according to the Environmental Management Plan (EMP)

160. Management Plan for Night works at Project Sites (if required). Following requirements should be fulfilled for construction works at night hours-

- (i) Night works should be avoided at construction sites specially in residential areas and should be performed only when day works are not possible due to excessive traffic/public/pedestrian movement, site of cultural or religious importance, where there is huge crowd during day hours or any other unavoidable circumstances.
- (ii) Contractor should plan for night works only after directions from PMU/PIU/DSC
- (iii) Contractor should submit plan for night works for approval from PIU.
- (iv) PIU should ensure that prior written information should be given to local authorities such as district administration, Police/traffic police, line agencies concerned, residents welfare association/business association/vyaparmandal of the affected areas and their consents/permissions should be taken prior to start of night works.
- (v) PIU/DSC engineers should check and ensure that all the preparation as per management plan is done by contractor and contractor is having all the necessary equipments and materials for night works.
- (vi) Contractor is required to have following equipments/arrangements for night works-
 - Contractors should have handheld noise level meter for measurement of noise during night hours
 - Contractors should have handheld lux meter for the measurement of illumination during night hours
 - Preferably electrical connections is available for running equipments otherwise sound proof/super silent Diesel Generator set should be available

- Sound level should not increase as permissible by CPCB-
- Illumination should be as follows-

Minimum illumination (lx)	Areas to be illuminated	Type of work activity
54	Illumination throughout the work area	General work area lighting, and performance of visual tasks of large size, or medium contrast, or low require accuracy
108	Illumination of work area and areas adjacent to equipment	Performance of visual tasks of medium size, or low to medium contrast, or medium required accuracy
216	Illumination of task	Performance of visual tasks of small size, or low contrast or high required accuracy or fine finish

- As far as possible ready-mix concrete from batching plant to be used, otherwise the concrete should be prepared away from residential areas and brought to the site
 - All the noise activity like hammering, cutting, crushing, running of heavy equipments should be done in daytime and avoided in nighttime
 - Workers engaged in night works should have adequate rest/sleep in daytime before start of night works
 - Worker engaged for night works should have previous experience of night works and should be physically fit for such works including clear vision in night
 - All the necessary provisions of traffic aids such as traffic signals, road signage, barricades, cautions boards, traffic diversion boards etc. should be available with fluorescent/retro-reflective arrangements
 - Workers should be trained before start of night works about risks and hazards of night works and their mitigation measures and should be provided all the protective aids (PPEs) including fluorescent/retro-reflective vests
 - Horns should not be permitted by equipments and vehicles
 - Workers should not shout and create noise
 - First aid and emergency vehicles should be available at site
 - Emergency preparedness plan should be operative during night works
 - Old persons and pregnant women and women having small kids should not work in night time
 - All the vehicles and equipments being used at night works should have adequate type of silencers/enclosures/mufflers to reduce noise
 - All the vehicles should be checked for working head lamps, tail lamps, inner lights etc. before start of night works
- (vii) PIU/DSC site engineers and contractors safety personnel should closely monitor the safety of works continuously and noise and illumination levels on hourly basis and maintain photographic and video graphic records as well as register the observations
- (viii) Night works should be stopped early in the morning at least one hour before start of pedestrian/traffic movement
- (ix) After completion of night works all the site should be cleaned and maintained obstruction free for daytime movement of vehicles and pedestrians
- (x) Drivers and workers should be alert and responsive during night works

- (xi) All the wages to workers working in night hours should be as per the applicable labour acts
- (xii) Avoid any nuisance which may create problems to nearby habitants and work peacefully during night hours
- (xiii) Night works should not be conducted near hospitals and during peak seasons such as peak tourist season, students' exam times etc.

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

- (i) Prepare and implement spoils management plan;
- (ii) Avoid stockpiling of excess excavated soils;
- (iii) Coordinate with ULB for beneficial uses of excess excavated soils or immediately dispose to designated areas;
- (iv) Recover used oil and lubricants and reuse or remove from the sites;
- (v) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- (vi) Remove all wreckage, rubbish, or temporary structures which are no longer required;
- (vii) Request PIU to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.
- (viii) Minimize removal of vegetation and disallow cutting of trees;
- (ix) If tree-removal will be required, obtain tree-cutting permit from the Revenue Department; and
- (x) Plant three native trees for every one that is removed.

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

- (i) Prepare and implement a spoils management plan (Appendix 14);
- (ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
- (iii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with PIU on designated disposal areas;
- (iv) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
- (v) Place storage areas for fuels and lubricants away from any drainage leading to water bodies;
- (vi) Dispose any wastes generated by construction activities in designated sites; and
- (vii) Conduct periodical surface quality water quality and ground water quality monitoring according to the Environmental Management Plan (EMP).

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

- (i) Prepare and implement a Traffic Management Plan (Appendix 15)
- (ii) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
- (iii) Schedule transport and hauling activities during non-peak hours;
- (iv) Locate entry and exit points in areas where there is low potential for traffic congestion;
- (v) Keep the site free from all unnecessary obstructions.
- (vi) Drive vehicles in a considerate manner.
- (vii) Coordinate with Traffic Police for temporary road diversions and for provision of traffic aids if transportation activities cannot be avoided during peak hours; and
- (viii) Notify affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.

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

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

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

- (i) Prepare and implement spoils management plan (Appendix 14);
- (ii) Leave spaces for access between mounds of soil;
- (iii) Provide walkways and metal sheets where required to maintain access across for people and vehicles;
- (iv) Increase workforce in the areas with predominantly institutions, place of worship, business establishment, hospitals, and schools;
- (v) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and
- (vi) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.
- (vii) Notify community/ water users in advance about likely interruptions in water supply.
- (viii) Provide alternate sources of clean water until water supply is restored.
- (ix) Provide all mitigation measures as given in resettlement plan (RP) prepared for the project to mitigate impacts on vendors and shopkeepers

166. **Socio-Economic - Employment.** Manpower will be required during the 36-months construction stage. This can result in generation of temporary employment and increase in local

revenue. Thus, potential impact is positive and long-term. The construction contractor will be required to:

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

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

- (i) Comply with all national, state and local labor laws (see Appendix 7);
- (ii) Following best practice health and safety guidelines: IFC's General EHS Guidelines²¹ WHO Interim Guidance (and its updates) on Water, Sanitation, Hygiene and Waste management for the COVID-19 virus (Appendix 29), and Sector Specific (Water and Sanitation) Guidelines;²²
- (iii) Develop and implement site-specific occupational health and safety (OHS) 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) OHS Training²³ for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;
- (iv) Conduct work in confine spaces, trenches, and at height with suitable precautions and using standards and safe construction methods; do not adopt ad hoc methods; all trenches deeper than 1.5 m shall be provided with safety shoring/braces; and avoid open cutting method for trenches deeper than 3.5 m by adopting trenchless technology
- (v) Ensure that qualified first aid is always provided. Equipped first-aid stations shall be easily accessible throughout the site;
- (vi) Provide medical insurance coverage for workers;
- (vii) Secure all installations from unauthorized intrusion and accident risks;
- (viii) The project area experiences extreme temperature during summer months of April and May, which may affect the health of workers engaged in construction work. Contractor should take necessary measures during summers including the following:
- (ix) Work schedule should be adjusted to avoid peak temperature hours (12 – 3 PM)
- (x) Provide appropriate shade near the workplace; allow periodic resting and provide adequate water

²¹<https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES>

²²<https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B-%2BWater%2BAnd%2BSanitation.pdf?MOD=AJPERES>

²³ Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

- (xi) Provide necessary medicine and facilities to take care of dehydration related health issues
- (xii) Provide supplies of potable drinking water;
- (xiii) Provide clean eating areas where workers are not exposed to hazardous or noxious substances;
- (xiv) Provide HS 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;
- (xv) 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;
- (xvi) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
- (xvii) Ensure moving equipment is outfitted with audible back-up alarms;
- (xviii) 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
- (xix) 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.
- (xx) Conduct regular health check-ups for workers
- (xxi) Provide periodical awareness camps and special trainings for workers for health issues and risks in construction sites

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

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

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

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

trenches

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

- (i) Consult PIU before locating project offices, sheds, and construction plants;
- (ii) Minimize removal of vegetation and disallow cutting of trees;
- (iii) Provide drinking water, water for other uses, and sanitation facilities for employees;
- (iv) Provided temporary rest and eating area at all work sites
- (v) Ensure conditions of liveability at work camps are maintained at the highest standards possible at all times; living quarters and construction camps shall be provided with standard materials (as far as possible to use portable ready to fit-in reusable cabins with proper ventilation); thatched huts, and facilities constructed with materials like GI sheets, tarpaulins, etc. , shall not be used as accommodation for workers; accommodation shall meet the IFC standards for workers accommodation²⁴ which include: provision of safe housing, availability of electricity, plumbing, water and sanitation, adequate fire protection and dormitory/room facilities; accommodation shall be in the range from 10 to 12. 5 cubic meters (volume) or 4 to 5. 5 square meters (surface) per worker, a minimum ceiling height of 2. 10 meters; a reasonable number of workers are allowed to share the same room – (standards range from 2 to 8 workers); workers with accompanying families shall be provided with a proper and safe accommodation (IFC benchmark standards for workers accommodation is provided in Appendix 16) Prohibit employees from poaching wildlife and cutting of trees for firewood;
- (vi) Train employees in the storage and handling of materials which can potentially cause soil contamination;
- (vii) Recover used oil and lubricants and reuse or remove from the site;
- (viii) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- (ix) Remove all wreckage, rubbish, or temporary structures which are no longer required; and
- (x) Report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.

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

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

²⁴

https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/publications/publications_gpn_workersaccommodation

172. **Debris disposal.** Prior to the commencement of works, contractor shall identify a debris disposal site in consultation with the PIU and Consultant. Contractor will follow all the prescribed rules²⁵ during construction and adhering to following criteria (including but not limited to)

- (i) The site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, top-soil stripping, stacking and preservation should be undertaken prior to initiation of any activities.
- (ii) The local governing body and community shall be consulted while selecting the site.
- (iii) Contractor shall prepare a construction and demolition waste management plan in pre-construction phase for safe disposal of construction and demolition wastes as per applicable rules and submit to Municipal Council through PIU for approval
- (iv) Debris disposal site shall be at least 200 m away from surface water bodies.²⁶
- (v) No residential areas shall be located within 100 m downwind side of the site.
- (vi) The site is minimum 250 m. away from sensitive locations like hospitals, religious places, ponds/lakes or other water bodies.

173. **Traffic diversion and/or road closure-** If traffic diversion and/or road closure is required for the proposed works, prior consent from traffic department will be required and prior information to affected areas and public should be disseminated through consultations by CAPC. Proper road signage and traffic aids should be provided at site. Excavation along the roads, hauling of construction materials and operation of equipment on-site can cause traffic problems. Potential impact is negative but short term and reversible by mitigation measures. The construction contractor will be required to:

- (i) Prepare and implement a Traffic Management Plan
- (ii) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
- (iii) Schedule transport and hauling activities during non-peak hours Locate entry and exit points in areas where there is low potential for traffic congestion;
- (iv) Keep the site free from all unnecessary obstructions;
- (v) Drive vehicles in a considerate manner;
- (vi) Coordinate with Traffic Police for temporary road diversions and 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.
- (ii) Maintain sufficient access to houses and shopkeepers (commercial establishments) during pipe laying work through metal sheets and temporary bridges
- (iii) Locate entry and exit points in areas where there is low potential for traffic congestion;

174. Wherever road width is minimal; there will be temporary loss of access to pedestrians and vehicular traffic including two wheelers during the laying of pipes. Under those circumstances, contractor shall adopt following measures:

- (i) Inform the affected local population 1-week in advance about the work schedule

²⁵Construction and Demolition Waste Management Rules 2016.

²⁶ In the absence of site meeting the stipulated criteria, an alternate site can be selected specifying the reasons. In such a case, the construction camp management plan should incorporate additional measures specific to the site as suggested by the Construction Manager.

- (ii) Plan and execute the work in such a way that the period of disturbance/ loss of access are minimum.
- (iii) Provide pedestrian access in all the locations until normalcy is restored. Provide wooden/metal planks over the open trenches at each house to maintain the access
- (iv) Excavate only that stretch in a day that could be finished in the same day by laying of pipes and backfilling

E. Operation and Maintenance Impacts

175. **Sewerage System.** Operation and Maintenance of the sewerage system will be carried out by DBO contractor for 10 years and then by Pratapgath Municipality directly or through an external operator. The sewerage system is intended to collect, convey, treat and dispose the sewage from the town areas safely. Operation will involve collection and conveyance of wastewater from houses to STP; treatment of sewage at STP to meet the disposal standards; and final disposal of treated wastewater, and treatment and disposal of sludge.

176. Treated wastewater is designed to be utilized in reuse applications following the Sewerage and Wastewater Policy 2016 of Rajasthan, and accordingly Reuse Plan will be prepared by the DBO contractor during the detailed design phase. As stated previously, subproject will be implemented under design-build-operate (DBO), and the successful bidder / DBO contractor will carry out detailed designs, therefore at present the subproject is designed in outline only. The treated wastewater if utilized for reuse purposes as per the Reuse Plan there will be no negative impacts, and in fact it will enhance environmental benefits in the form of water savings. Various measures to safeguard environment and health environment in utilizing the treated wastewater, including required quality for various process will be established in the reuse plan and will be implemented accordingly. All necessary safety, mitigation and monitoring measures as suggested in the reuse plan shall be implemented. The excess / surplus / unused wastewater, if any, will be discharged into local drains/streams. These run dry except during monsoon. It carries untreated wastewater from habitations along its course. Considering the existing status of streams, and the degree of treatment designed, no significant impacts envisaged. However, any change / lowering of treatment efficiency during operation may lead to poor quality of wastewater and affect the reuse. Mixing of industrial effluents in sewers may affect the inlet quality of sewage. It is therefore critical that STP receives the sewage with intended quality and treats the same to design discharge standards.

177. STP operational procedures will be firmed up during the detailed design phase, including the amount of automated or manual operation. It must be ensured that the facility is operated with standard operating procedures and only by trained staff. Ensuring uninterrupted power supply with back-up facility is a must. Standard operating procedures and operation manual will be prepared by the DBO contractor. Besides routine operation, this should cover all necessary items such as preventive maintenance, periodic maintenance and emergency maintenance, replacement of pumps, motors, and other electro-mechanical parts as per the design life to optimize energy use and system efficiency etc. , Adequate resources – technical and financial, has been taken into consideration in the project design. Manual will also include safety awareness and mock drills for worker safety.

178. **Safe disposal of treated effluent and sludge from STP.** In conventional treatment process, risks from STP operation are mainly hazards of disposal of treated effluent and sludge in unscientific manner and risk of infection due to these. Under proposed project, treated effluent from STP will be reused in beneficial purposes and a plan shall be developed by Municipal council for beneficial uses of treated effluent. Treated effluent shall meet the minimum criteria set by

NGT/RPCB/CPCB/MOEF&CC and disinfected treated effluent shall be stored in elevated service reservoir for further reuse under this project. Digested and disinfected sludge can be used as manure (as quality of sludge from SBR process can be used in agriculture practices after testing of sludge for toxicity and heavy metals), keeping in mind that there are vast agricultural practices nearby the STP site. Municipal Council will develop a mechanism of reuse of treated sludge and its safe disposal (if not reused) before start of operation of STP. Excess or unused treated effluent will be discharged into the adjacent river Aerava behind the STP (approx. distance 600 m). This river is seasonal river and no significant flora and fauna is reported from this river. Only in monsoon, run off water flows in this river in rest of the time only untreated sewage from the city is discharged into it at several points. Guidelines for reuse of treated effluent and its safe handling and disposal are given in Appendix 12.

179. STP operational procedures will be firmed up during the detailed design phase, including the amount of automated or manual operation. It must be ensured that the facility is operated with standard operating procedures and only by trained staff. Ensuring uninterrupted power supply with back-up facility is a must. Standard operating procedures and operation manual will be prepared by the DBO contractor. Besides routine operation, this should cover all necessary items such as preventive maintenance, periodic maintenance and emergency maintenance, replacement of pumps, motors, and other electro-mechanical parts as per the design life to optimize energy use and system efficiency etc. , Adequate resources – technical and financial, has been taken into consideration in the project design. Manual will also include safety awareness and mock drills for worker safety.

180. Subproject includes sludge management infrastructure in STP, including system for sludge collection, thickening, solar drying, and disposal at landfill/identified site. This includes a Sludge Sump to collect sludge from SBR basins; returning arrangement for supernatant from the sump to inlet/equalization tank for treatment; pumping sludge to sludge thickener and pumping thickened to mechanical sludge dewatering system (such as centrifuge). It also requires contractor to establish a shed where the dewatered sludge cake can be further air dried for 15 days. This is indicative sludge management system and DBO contractor will design the system meeting these requirements and prepare sludge management plan. Bid indicates that “the sludge produced from the treatment process would be processed so it may be used as fertilizer and soil conditioner” and it requires DBO contractor “to conform to the regulations of public health and environment protection norms”. The norms for safe use of processed sludge as fertilizer and soil conditioner are already discussed in this IEE. This follows the Sewerage and Wastewater Policy, 2016, which suggests “use of sludge produced from the treatment as fertilizer and soil conditioner after processing”. A sludge disposal site will be identified during the detailed design phase to dispose unutilized dried sludge in reuse applications. The updated IEE will include the details of disposal site. If the sludge is managed accordingly, there will no impacts.

181. During the operation phase, it is necessary that the facility is operated by trained staff as per the standard operating procedures. Following measures are suggested for implementation / compliance during the operation phase:

- (i) Ensure that treated wastewater meets the established discharge standards all times; Conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated effluent quality complies with design standards;
- (ii) Ensure implementation of Reuse Plan, and ensure intended quality for each direct reuse

- (iii) Assess composition and characteristics of sludge from the first batch operation at the initial phases, and confirm the handling, management and disposal/reuse actions suggested in the management plan
- (iv) Conduct periodic testing of dried sludge/compost to check presence of heavy metals and confirming the concentrations to use as compost as specified in the Standards for Composting, Schedule II A, Solid Waste Management Rules, 2016, FCO = Fertilizer Control Order, 1985, amendments in 2009 and 2013. It shall not be used for food crops.
- (v) Ensure valid consent to operate (CTO) from RSPCB for operation of STP
- (vi) Ensure that all conditions/standards prescribed by RSPCB are complied duly
- (vii) Ensure that chlorinator facility is operated only by trained staff and as per the standard operating procedures; in case of any accident and/or maintenance activity, ensure that the staff follows documented procedures only
- (viii) Implement Emergency Response System (ERS) for the chlorine leakage; Guidelines and Emergency plan for handling and storing chlorine is attached as Appendix 17
- (ix) Ensure proper knowledge transfer, hands-on training to municipal staff engaged in STP operation has been provided by contractor prior to handover of facility;
- (x) Operate and maintain the facility following standard operating procedures of operational manual;
- (xi) Undertake preventive and periodic maintenance activities as required;
- (xii) Conduct periodic training to workers; ensure that all safety apparatus at STP including personal protection equipment are in good condition all times; and are at easily accessible and identifiable place; periodically check the equipment, and conduct mock drills to deal with emergency situations;
- (xiii) No wastewater from industrial premises (including domestic wastewater) shall be allowed to dispose into municipal sewers; monitor regularly and ensure that there is no illegal discharge through manholes or inspection chambers; conduct public awareness programs; in coordination with RSPCB.

182. There are also certain environmental risks from the operation of the sewer system, most notably from leaking sewer pipes as untreated fecal material can damage human health and contaminate both soil and groundwater. It will be imperative therefore that the operating agency establishes a procedure to routinely check the operation and integrity of the sewers, and to implement rapid and effective repairs where necessary. There is an occupation health risk to workers engaged in sewer maintenance activities. Following measures should inter alia be followed:

- (i) Establish regular maintenance program, including:
- (ii) Regular cleaning of grit chambers and sewer lines to remove grease, grit, and other debris that may lead to sewer backups. Cleaning should be conducted more frequently for problem areas.
- (iii) Inspection of the condition of sanitary sewer structures and identifying areas that need repair or maintenance. Items to note may include cracked/deteriorating pipes; leaking joints or seals at manhole; frequent line blockages; lines that generally flow at or near capacity; and suspected infiltration or exfiltration; and
- (iv) Monitoring of sewer flow to identify potential inflows and outflows
- (v) Conduct repairs on priority based on the nature and severity of the problem. Immediate clearing of blockage or repair is warranted where an overflow is

- currently occurring or for urgent problems that may cause an imminent overflow (e.g., pump station failures, sewer line ruptures, or sewer line blockages);
- (vi) Review previous sewer maintenance records to help identify “hot spots” or areas with frequent maintenance problems and locations of potential system failure, and conduct preventative maintenance, rehabilitation, or replacement of lines as needed;
 - (vii) When a spill, leak, and/or overflow occurs, keep sewage from entering the storm drain system by covering or blocking storm drain inlets or by containing and diverting the sewage away from open channels and other storm drain facilities (using sandbags, inflatable dams, etc.). Remove the sewage using vacuum equipment or use other measures to divert it back to the sanitary sewer system.
 - (viii) Prohibit/prevent disposal of wastewater/effluent from industrial units in the sewers; ensure regular checking to ensure no illegal entry of industrial wastewater into sewers
 - (ix) Develop an Emergency Response System for the sewerage system leaks, burst and overflows, etc.
 - (x) Provide necessary health and safety training to the staff
 - (xi) Provide all necessary personnel protection equipment
 - (xii) During cleaning/clearing of manholes and sewer lines great precautions should be taken for the safety of workers conducting such works.
 - (xiii) As far as possible use remote / CCTV mechanism to identify/detect the problems in sewers and do not engage persons for this purpose
 - (xiv) As far as possible use mechanized cleaning of manholes and sewers by using modern techniques and machines and do not engage persons for this purpose
 - (xv) Ensure that maintenance staff and supervisors understand the risks; provide proper instructions, training and supervision.
 - (xvi) Use gas detector to detect any hazardous or inflammable gas in confined areas like sewers /manholes prior to maintenance process
 - (xvii) Provide suitable personal protective equipment that may include waterproof / abrasion-resistant gloves, footwear, eye and respiratory protection. Face visors are particularly effective against splashes. Equipment selection and a proper system for inspection and maintenance are important.
 - (xviii) Provide adequate welfare facilities, including clean water, soap, nail brushes, disposable paper towels, and where heavy contamination is foreseeable, showers.
 - (xix) For remote locations portable welfare facilities should be provided.
 - (xx) Areas for storage of clean and contaminated equipment should be segregated and separate from eating facilities.
 - (xxi) Provide adequate first-aid equipment, including clean water or sterile wipes for cleansing wounds, and a supply of sterile, waterproof, adhesive dressings.
 - (xxii) Make effective arrangements for monitoring the health of staff.
 - (xxiii) Keep emergency preparedness plan ready before starting the work of sewage system cleaning

183. Operation of FSSM. About 10% of total households will be covered with FSSM system wherein which septage from individual septic tanks at houses will be collected via mobile / vehicle mount tankers with suction equipment, transport and discharged into STP for safe treatment and disposal. Although system will be completely mechanized, given the very harmful nature of septage, following precautionary measures shall be implemented:

- (i) Create awareness program on the FSSM in general public
- (ii) Implement Health and Safety Plan for FSSM

- (iii) Provide proper training to the workers, and staff in safe handling of FSSM tasks, provide all necessary personal protection equipment and ensure their usage;
- (iv) Ensure that the system is operated completely mechanically, with least involvement of workers; there shall be no direct contact of septage to any worker or staff
- (v) Ensure proper facilities for workers including showers, wash areas, toilets, drinking water, eating and resting places
- (vi) Conduct regular health checks
- (vii) Ensure that tankers cleaning is done mechanically, and in the demarcate area at STP, and the wastewater generated in the process shall be discharged into STP

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

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

185. There are also certain environmental risks from the operation of the sewer system, most notably from leaking sewer pipes as untreated fecal material can damage human health and contaminate both soil and groundwater. It will be imperative therefore that the operating agency establishes a procedure to routinely check the operation and integrity of the sewers, and to implement rapid and effective repairs where necessary. There is an occupation health risk to workers engaged in sewer maintenance activities. Following measures should be followed:

- (i) Establish regular maintenance program, including:
 - Regular cleaning of grit chambers and sewer lines to remove grease, grit, and other debris that may lead to sewer backups. Cleaning should be conducted more frequently for problem areas.
 - Inspection of the condition of sanitary sewer structures and identifying areas that need repair or maintenance. Items to note may include cracked/deteriorating pipes; leaking joints or seals at manhole; frequent line blockages; lines that generally flow at or near capacity; and suspected infiltration or exfiltration; and
 - Monitoring of sewer flow to identify potential inflows and outflows
 - Conduct repairs on priority based on the nature and severity of the problem. Immediate clearing of blockage or repair is warranted where an overflow is currently occurring or for urgent problems that may cause an imminent overflow (e.g., pump station failures, sewer line ruptures, or sewer line blockages);
- (ii) Review previous sewer maintenance records to help identify "hot spots" or areas with frequent maintenance problems and locations of potential system failure, and conduct preventative maintenance, rehabilitation, or replacement of lines as needed;
- (iii) When a spill, leak, and/or overflow occurs, keep sewage from entering the storm drain system by covering or blocking storm drain inlets or by containing and diverting the sewage away from open channels and other storm drain facilities

- (using sandbags, inflatable dams, etc.). Remove the sewage using vacuum equipment or use other measures to divert it back to the sanitary sewer system.
- (iv) Prohibit/prevent disposal of wastewater/effluent from industrial units in the sewers; ensure regular checking to ensure no illegal entry of industrial wastewater into sewers
- (v) Develop an Emergency Response System for the sewerage system leaks, burst and overflows, etc.
- (vi) Provide necessary health & safety training to the staff in sewer cleaning & maintenance
- (vii) Provide all necessary personnel protection equipment
- (viii) For personnel cleaning underground sewers there is a risk due to oxygen deficiency and harmful gaseous emissions (hydrogen sulphide, carbon monoxide, methane, etc.); provide for adequate equipment (including oxygen masks) for emergency use

186. It has to assured by contractor that desired consents from RPCB are obtained for operation of STP and treated effluent should meet the parameters as set by NGT/CPCB/RPCB. Contractor will also ensure compliances to all the conditions as mentioned in the CTO Latest standards for discharge of effluent are given in Appendix 4. Municipal Council should have responsible supervision of the effluent discharge standards.

187. There is an occupation health risk to workers engaged in sewer maintenance activities. During cleaning/clearing of manholes and sewer lines great precautions should be taken for the safety of workers conducting such works. Therefore O&M contractor will be required to:

- (i) As far as possible use CCTV mechanism to detect the problems in pipelines and do not engage persons for this purpose
- (ii) As far as possible use mechanized cleaning of manholes and pipelines by using modern techniques and machines and do not engage persons for this purpose and engage persons only if mechanized cleaning is not possible in any way
- (iii) Ensure that employees and line management understand the risks through proper instruction, training and supervision.
- (iv) Use gas detector before entering any person inside manhole to detect any hazardous or inflammable gas present inside the manhole.
- (v) Provide suitable personal protective equipment that may include waterproof / abrasion-resistant gloves, footwear, eye and respiratory protection. Face visors are particularly effective against splashes. Equipment selection and a proper system for inspection and maintenance are important.
- (vi) Provide adequate welfare facilities, including clean water, soap, nail brushes, disposable paper towels, and where heavy contamination is foreseeable, showers.
- (vii) For remote locations portable welfare facilities should be provided.
- (viii) Areas for storage of clean and contaminated equipment should be segregated and separate from eating facilities.
- (ix) Provide adequate first-aid equipment, including clean water or sterile wipes for cleansing wounds, and a supply of sterile, waterproof, adhesive dressings.
- (x) Make effective arrangements for monitoring the health of staff.
- (xi) Keep emergency preparedness plan ready before starting the work of sewage system cleaning

188. Biological hazards are among the environmental risks that may adversely impact the health and wellness of the workers and the community. Breakouts of diseases such as diarrhea,

flu or pandemics such as the coronavirus disease (COVID-19) shall be avoided. Designs and implementation of treatment systems shall ensure that disease-causing pathogens or viruses are disinfected and will not cause any health issues. The World Health Organization has released an interim guidance on Water, Sanitation, Hygiene and Waste Management for the COVID-19 virus (see Appendix 29). Measures on managing wastewater and fecal waste and keeping water supplies safe is critical to avoid the start or spread of any disease.

189. In the project, in a large portion of the project town areas, the septic tank system in individual households is replaced with direct connections to the new sewerage network. The impacts and mitigation measures from the existing septic tank that need to be closed should be identified in the Operation Phase.

F. Cumulative Impacts

190. Cumulative impacts are those that result from the successive, incremental, and/or combined effects of a project or activity when added to other existing, planned, and/or reasonably anticipated future ones. In Pratapgarh Sewerage project only sewer works are proposed which include construction of STP, SPS, MWP and sewer networks.

191. In Pratapgarh, which is a small town congested with people, traffic and activities, there are sensitive places like hospitals, schools, and religious places. Works will be spread over entire town, covering all the roads and streets. Although no other notable public works are anticipated during the project implementation on public roads, there will be usual construction activities, such as building construction, as this is a developing town. Given dry and windy weather conditions, dust generation from cumulative construction activities may be significant, and this may increase the particulate matter concentration in ambient air. Dust control measures suggested in the EMP aim to minimize the dust generation from the subproject construction activities. Suggested trenchless method, by avoiding excavation, will also help in reducing the overall dust generation from the subproject activities. If there are any road improvement works proposed to be implemented in Pratapgarh, scheduling of works needs to be coordinated with the respective road agency (ULB or Public Works Department [PWD]) so that improved roads are not subjected for excavation. The increase in road traffic, disturbance to traffic, public safety and worker safety issues, damage to existing utilities, influx of outstation workers, etc., due to various simultaneous construction works will be notable. However, the measures suggested in the EMP will minimize these impacts greatly, and therefore effective implementation of EMP must be ensured. Thus, the net impacts are unlikely to be significant.

192. **Project Benefits.** The citizens of the Pratapgarh will be the major beneficiaries of the improved sewerage system, as the human waste from the homes will be removed rapidly, which otherwise would flow in open drains. In addition to improved environmental conditions, the project will improve the over-all health condition of the town as diseases of poor sanitation will be reduced. This should improve the environment, should deliver major improvements in individual and community health and well-being. Diseases of poor sanitation, such as diarrhea and dysentery, should be reduced, so people should spend less on healthcare and lose fewer working days due to illness, so their economic status should also improve, as well as their overall health.

VII. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Overview

193. The active participation of stakeholders including local community, NGOs/CBOs, and the

media in all stages of project preparation and implementation is essential for successful implementation as well as operation of the project. It will ensure that the subprojects are designed, constructed, and operated with utmost consideration to local needs, ensures community acceptance, and will bring maximum benefits to the people. Public consultation and information disclosure is a must as per the ADB's SPS, 2009.

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

B. Public Consultation

195. The public consultation and disclosure program is a continuous process throughout the project implementation, including project planning, design and construction. Public consultations were done near different locations of sewerage works (STP and SPSs). The proposed STP facilities will cover the entire Pratapgarh town and the people consulted were all residents of Pratapgarh town who will be the direct beneficiaries. Consultations were also held at SPS sites near Bhatpura gate and Deepeshwar Talab (photographs attached in the IEE). STP site is located in the available vacant Govt. land near village Talabkheda. Few habitations exist near the STP land but more than 500 meters away. Details of public consultations done are given in Appendix 18.

1. Consultation during Project Preparation

196. Institutional consultations were conducted with the Governmental Departments such as Local Self Government Department, Public Works Department, Pollution Control Board, Public Health Engineering Department, Partapgarh Nagar Parishad, etc. The project designs are formulated in consultation with Partapgarh Nagar Parishad and the proposals have been finalized only after certification of Nagar Parishad that the proposals suit the requirements of the ULB.

197. Focus-group discussions with affected persons and other stakeholders were conducted to learn their views and concerns. Public consultation had been conducted to assess the impact of proposed civil work on the livelihood of the people, local environmental set up and also to prepare Initial Environmental Examination (IEE). The site verification reveals that, all the components of the sewerage works are either located on vacant government land or along the existing right-of-way (ROW) of the city as well as en route villages. The subproject details have been explained in detail to the people who are involved in public consultation and also asked their suggestions and willingness to complete the proposed civil work. It is observed that people shown their willingness in favour of the sewerage project at Pratapgarh. They are agreed to take up house service sewer connections. Few environmental issues like availability of access during construction, generation of dust and noise are for short period and not a major concern for

villagers. Report of public consultations is attached as Appendix 18 with this report main 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) Climatic Conditions
- (viii) Drinking water problem
- (ix) Sewerage system
- (x) Forest and sensitive area nearby the project site
- (xi) Movement of wild animal etc.
- (xii) Pollution level during construction period specially dust and noise pollution
- (xiii) Health and Hygiene
- (xiv) Reuse of treated effluent
- (xv) Disposal of treated effluent in natural waterbody
- (xvi) Safety of residents during construction phase
- (xvii) Solid waste disposal system
- (xviii) Requirement of enhancement of other facilities

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

199. The old city area is very congested, and traffic is mostly light vehicle. The proposed project is a need to this town. Locals are very much in favor of the project and they want that this should be completed as early as possible. These local people are suffering from present water supply, sewerage and solid waste disposal management in this town. People are ready to extend all types of support to during execution of the project.

200. Consultations were also carried out during preparation of IEE and will continue throughout the subproject cycle. During Preparation stage, public consultations were done near different site locations of sewerage network to access the awareness of general public, present water supply situations, environmental and health conditions in town, their opinion about the proposed project and suggestions (if any). It was found that water supply in the town is unreliable and water is supplied once in two days for 0.5 hours. The sanitation conditions are very poor and no sewerage system exists in town. Most of the households are dependent on individual septic tanks and dispose their sewer directly in to drains, which ultimately mix with river through municipal nallas.

201. A town-level City Level Committee (CLC) has been formed in Pratapgarh City by Government orders. City Level Committee meeting was organized during the detailed design stage to which representatives of primary and secondary stakeholders were invited. City stakeholder committee meeting was organized in Pratapgarh on dtd. 26 August 2017 to discuss the matter of proposed sewerage works in Pratapgarh under the chairmanship of District

Collector, Pratapgarh in presence of consultants, RUDSICO (EAP) officials, PHED officials and other invitee members. Proposed scope of works and technology was discussed in the meeting and it was decided that treated effluent shall be reused by Municipal Council in beneficial uses. The feedback and concerns of the stakeholders was taken into consideration for finalization of design and scope of works. The project was agreed by the committee for further course of action of RUDSICO (EAP). Details of CLC meeting, minutes and photographs are attached in Appendix 19.

2. Consultation during construction

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

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

C. Information Disclosure

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

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

206. Local communities will be continuously consulted regarding location of construction camps, access and hauling routes and other likely disturbances during construction. The road closure together with the proposed detours will be communicated via advertising, pamphlets, radio broadcasts, road signage, etc.

207. Project related information shall be disclosed through public consultation and making relevant documents available in public locations. PMU and PIUs shall provide relevant safeguards information in a timely manner, in an accessible place and in a form and languages understandable to affected person and other stakeholders. For illiterate people, other suitable

communication methods will be used.

208. At minimum, the following documents shall be made available at the offices of project agencies - PMU, PIU and Block level offices for public reference, and shall also be uploaded on respective websites.

- (i) Summary of project and draft IEE (in Hindi and English)
- (ii) Draft IEE Report (in English)
- (iii) Final IEE Report (in English)
- (iv) Updated/amended IEE (in English)
- (v) Corrective action plan prepared during project implementation (English)
- (vi) Semi-annual Environmental Monitoring Reports (English)

209. A concise summary of project and draft IEE report (in Hindi), providing all necessary details of proposals, implementation arrangements, subproject locations, likely issues and mitigation and monitoring measures and grievance redress mechanism, shall be made available to the stakeholders at consultation meetings. This should also provide contact information of project agency. This summary shall also be displayed at the notice boards of PMU, PIU and other public places. During project implementation, relevant information about any major changes to project scope will be shared with beneficiaries, affected persons, vulnerable groups, and other stakeholders. The following documents will be submitted to ADB for disclosure on ADB website. PMU will send written endorsement to ADB for disclosing these documents:

- (i) final IEE;
- (ii) a new or updated IEE and corrective action plan prepared during project implementation, if any; and
- (iii) environmental monitoring reports

210. RUDSICO (EAP) PMU will send written endorsement to ADB for disclosing these documents on ADB's website. RUDSICO (EAP) PMU will also provide relevant safeguards information in a timely manner, in an accessible place and in a form and languages understandable to affected people and other stakeholders. For illiterate people, other suitable communication methods will be used.

VIII. GRIEVANCE REDRESS MECHANISM

A. Project Specific Grievance Redress Mechanism

211. A project-specific, three-tier grievance redress mechanism (GRM) covers both environment and social issues. The GRM will be established to receive, evaluate, and facilitate the resolution of affected persons' concerns, complaints, and grievances about the social and environmental performance at project level. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns related to the project. Assessment of the GRM designed and implemented for Rajasthan Urban Sector Development Program (RUSDP)²⁷ the system was effective in timely resolution of grievances in

²⁷ The procedures followed for grievance redress during implementation of RUSDP Phase III included the project GRM and the pilot GRM software application (smart check) in Pali, the Sampark portal of Government of Rajasthan, and the Chief Minister's helpline. Complaints received through various channels were mostly minor and pertained to damage to existing water supply pipelines and disruption of water supply during construction, delays in road restoration, and pending new connections. Complaints related to damage to private property (compound walls/steps, etc.) were less in number. The grievances were mostly possible to resolve in coordination with the contractors.

a transparent manner.²⁸ The multichannel, project-specific, three-tier GRM is functional at RUSDP, hence the design of GRM for RSTDSP takes into account the proposed institutional structure for RSTDSP and the positive features and learnings from the previous GRM.²⁹

212. Common Grievance Redress Mechanism. A common GRM will be in place for social, environmental, or any other grievances related to the project. Implementation of the resettlement plans/RIPPs/DDRs/IEEs will follow the GRM described below. The GRM will provide an accessible and trusted platform for receiving and facilitating resolution of affected persons' grievances related to the project.

213. Public awareness campaigns within entire ULB/Municipal area will ensure that awareness on grievance redress procedures is generated. The nodal officer- social/environment at field level through community awareness and public participation consultant (CAPPC) will conduct ULB/Municipal area-based awareness campaigns to ensure that poor and vulnerable households are made aware of grievance redress procedures and entitlements. Contractors will provide pamphlets to communities prior to start of works and billboards during construction. The pamphlets and billboards will include relevant environmental and social safeguards, GRM information, and contact details of key personnel from PIU and contractors.

214. Affected persons will have the flexibility of conveying grievances/suggestions by dropping grievance redress/suggestion forms in complaint/suggestion boxes that will be installed by project PIUs or by e-mail, by post, or by writing in a complaints register in ULB offices/complaints register at contractor's work site³⁰ or by sending a WhatsApp message to the PIU³¹ or by dialling the phone number of town level PIU/CAPPC or by dialling a toll-free number.³² Any aggrieved person can also avail the facilities of online grievance monitoring system 'Rajasthan Sampark' portal to register their grievances which is a parallel mechanism of grievance registration, in addition to the project GRM.³³ Careful documentation of the name of the complainant, date of receipt of the complaint, address/contact details of the person, location of the problem area, and how the problem was resolved will be undertaken and feedback provided to the complainant on action/decision taken. The Safeguard and safety officer of town/city level PIU will have the overall

Complaints received were immediately referred by the CAPC/PMDSC supervision staff to the PIU Nodal officer (safeguards) and concerned engineer at PIU, who advised them on further action. Follow up with the contractor on complaint resolution was undertaken by PIU Nodal officer CAPC and PMDSC and final feedback sought from complainant upon resolution. Complaints requiring inter-departmental coordination were referred to the PMU for resolution, and feedback provided to complainant. The PMU kept regular track of grievances through WhatsApp and email alerts, ensuring registration and follow-up until resolution.

²⁸ Town-level grievance registration data indicates that a large number of grievances were registered, pointing to the effectiveness of the multi-channel GRM. No major grievance was received for RUSDP Phase III. The GRM helped smoothen the process of project implementation, hence the proposed architecture for the RSTDSP GRM remains similar, with some refinement, taking into account the changes in institutional setup proposed for project implementation.

²⁹ Continued logistics support at field level will be key to successful management of grievance redress under RSTDSP. The target date for establishment of the first level (PIU level) and second level (Zonal level) of GRM is before loan negotiation.

³⁰ RUSDP piloted an online application based live GRM counter for resolution of public grievances over and above the usual process of grievance registration and redressal. This app based GRM - "RUIDP Smart Check" is available at Google play store (free of cost) and is operational. The RUIDP Smart Check "app" was launched in Pali town in July 2017 and is proposed to be scaled up in RSTDSP project towns. For persons without access to the application, the traditional channels will continue to be available.

³¹ It is suggested for each PIU to have a dedicated WhatsApp group for registration of grievances and receipt of quick feedback, to be followed by more formal communication.

³² Project contractors in all project towns will have a toll-free number with specific working hours for registration of grievances related to RSTDSP.

³³ <http://www.sampark.rajasthan.gov.in/RajSamWelcome.aspx>

responsibility for timely grievance redressal on environmental and social safeguards issues and for registration of grievances, related disclosure, with the assistance of project consultants. In case of grievances that are immediate and urgent in the perception of the complainant, the contractor, and officials of PIU with assistance from CMSC and CAPPC on-site will provide the most easily accessible or first level of contact for quick resolution of grievances. Contact numbers and names of the concerned PIU safeguard and safety officer, contractors, CAPPC and CMSC personal will be posted at all construction sites at visible locations.

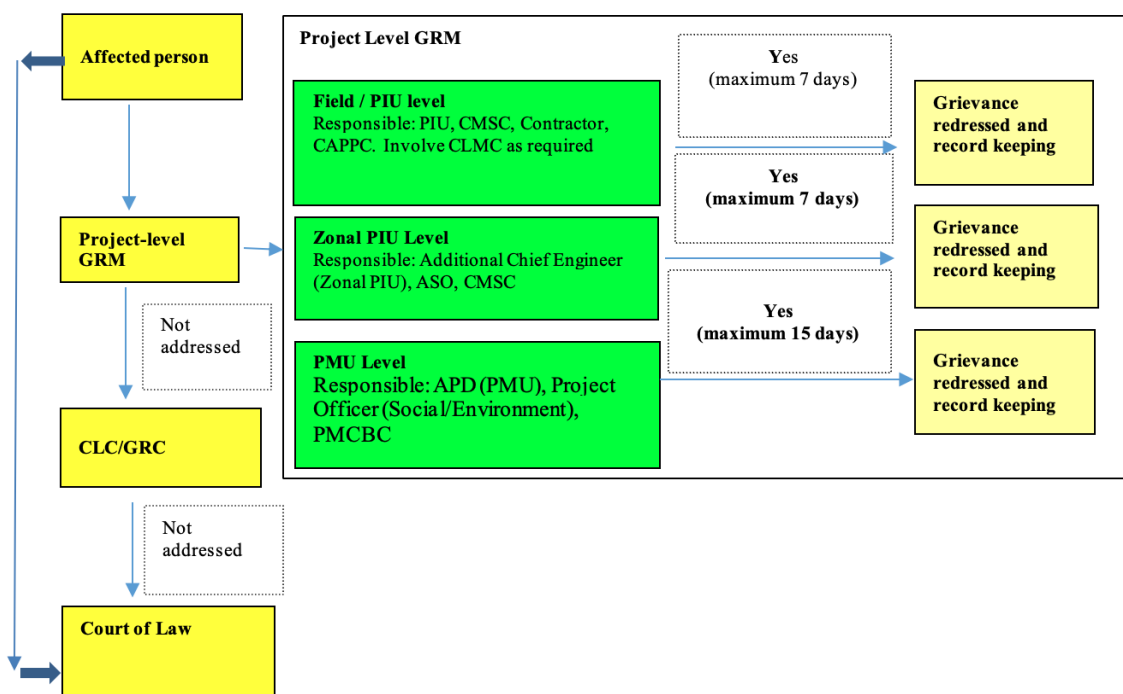
- (i) **1st level grievance.** The contractors, PIU executive engineer/assistant engineer designated as safeguard and safety officer (social and environment), CMSC (safeguard staff) and CAPPC can immediately resolve issues on-site, in consultation with each other and will be required to do so within 7 days of receipt of a complaint/grievance. If required, city level monitoring committee (CLMC)³⁴ will be involved in resolution of grievances at the 1st level;
- (ii) **2nd level grievance.** All grievances that cannot be redressed within 7 days at field/PIU level will be brought to the notice of Zonal PIU headed by Additional Chief Engineer (ACE). The ACE at zonal PIU will resolve the grievance within 7 days of receipt of complaint/grievance in discussion with the ASO, field level PIU, CMSC, CAPPC and the contractor; and
- (iii) **3rd level grievance.** All the grievances that are not addressed by Zonal PIU within 7 days of receipt will be brought to the notice of the PMU. Depending on the nature of grievance, the project officer (social/environment) at PMU will resolve the grievance within 15 days of receipt of grievance with necessary coordination of Zonal PIU and CMSC and guidance/instruction of additional project director (APD-PMU).
- (iv) Grievances not redressed through this process within/at the project level within stipulated time period will be referred to the CLC/GRC, which has been set up.³⁵ In its role as a GRC, the CLC will meet whenever there is an urgent, pending grievance. Other grievances can be discussed during its regular meetings. Zonal PIU will inform the CLC regarding any grievances required to be resolved urgently. The GRC will resolve the grievance within 15 days of receiving the complaint. In case of any indigenous peoples impacts in subprojects, the CLC/GRC must have representation of the affected indigenous people community, the chief of the tribe or a member of the tribal council as traditional arbitrator (to ensure that traditional grievance redress systems are integrated) and an NGO working with indigenous people groups.
- (v) The multi-tier GRM for the project is outlined below (Figure 11), each tier having time-bound schedules and with responsible persons identified to address

³⁴The CLMC has been formed at the town/city level for planning and monitoring of work, resolve issues related to departmental coordination etc. It is headed by Commissioner/Executive Officer ULB (Chairman) and city engineer of public health engineering department (PHED), public works department (PWD) and head of PIU acting as Member Secretary.

³⁵ City Level Committee (CLC)/grievance redress committees (GRCs) has been constituted for each town/city under the Chairmanship of District Collector to provide overall subproject guidance and "to sort out issues and remove hindrances, if any". CLC formed at city-level/district level with members composed of: District Collector as Chairperson, and following as members: ULB Commissioner/Mayor/Chairman; Deputy Mayor/Vice Chairman ULB; Chairman/Secretary Urban Improvement Trust (UIT); Head of Zonal/field level PIU as Member Secretary; one representative each from relevant government departments as appropriate (PWD/PHED/Town Planning Department etc.). All CLCs in their role as GRCs will have at least one-woman member/chairperson. In addition, for project-related grievances, representatives of affected persons, community-based organizations (CBOs), and eminent citizens will be invited as observers in GRC meetings. The concerned Member of Parliament (MP) and Member of Legislative Assembly are also part of the CLC.

grievances and seek appropriate persons' advice at each stage, as required. The GRC will continue to function throughout the project duration.

Figure 11: Grievance Redress Mechanism-RSTDSP



APD = Additional Project Director, ASO = Assistant Safeguards Officer, CAPPC = community awareness and public participation consultant, CMSC = construction management and supervision consultants, CLC = city level committee, CLMC = city level monitoring committee, GRC = grievance redress committee, PIU = project implementation unit, PMU = program management unit, PMCBC = project management and capacity building consultant.

215. The project GRM notwithstanding, an aggrieved person shall have access to the country's legal system at any stage and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM. In case of grievance related to land acquisition, resettlement and rehabilitation, the affected persons will have to approach a legal body/court specially proposed under the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (RFCTLARRA), 2013.³⁶

216. People who are, or may in the future be, adversely affected by the project may submit complaints to ADB's Accountability Mechanism. The Accountability Mechanism provides an independent forum and process whereby people adversely affected by ADB-assisted projects can voice, and seek a resolution of their problems, as well as report alleged violations of ADB's operational policies and procedures. Before submitting a complaint to the Accountability Mechanism, affected people should make an effort in good faith to solve their problems by working with the concerned ADB operations department. Only after doing that, and if they are still dissatisfied, should they approach the Accountability Mechanism.³⁷

³⁶ The Authority admits grievance only with reference to the Land Acquisition and R&R issues under the RFCTLARRA, 2013.

³⁷ Accountability Mechanism. <http://www.adb.org/Accountability-Mechanism/default.asp>.

217. **Record-keeping.** The PIU of each town/city will keep records of grievances received, including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions and the date these were affected and final outcome. The number of grievances recorded and resolved, and the outcomes will be displayed/disclosed in the PMU office, PIU offices, and on the web, as well as reported in monitoring reports submitted to ADB on a semi-annual basis. The sample grievance registration format is attached as Appendix 20.

218. **Periodic review and documentation of lessons learned.** The PMU Project Officers (Social and Environment) will periodically review the functioning of the GRM in each town and record information on the effectiveness of the mechanism, especially on the project's ability to prevent and address grievances.

219. **Costs.** Contractors are required to allocated budget for pamphlets and billboards as part of the EMP. Costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by the concerned PIU at town level while costs related to escalated grievances will be met by the PMU. Cost estimates for grievance redress are included in resettlement cost estimates.

220. The PMU of RSTDSP has issued an Office Order dated May 4, 2018 establishing the GRM as described above (Appendix 21).

IX. ENVIRONMENTAL MANAGEMENT PLAN

A. Environmental Management Plan

221. An Environmental Management Plan (EMP) has been developed to provide mitigation measures to reduce all negative impacts to acceptable level and monitoring the same. This is presented in the following tables, which show the potential environmental impacts, designed mitigation measures and responsible agencies for implementation and monitoring.

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

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

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

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

226. The contractor will be required to submit to PIU, for review and approval, a site environmental plan (SEP) including (i) designed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring program as per SEP; and (iv) budget for SEP implementation. No works can commence prior to approval of SEP.

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

Table 9: Design Stage Environmental Management Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Cost and Source of Funds
Sewage Treatment Plant (STP)	Odour nuisance and aesthetics	(i) Provide a green buffer zone of 10-20 m wide all around the STP with trees in multi-rows. This will act as a visual screen around the facility and will improve the aesthetic appearance. Treated wastewater shall be used for plantation. (ii) Develop layout plan of STP such that odour generating units (such as sludge / solids handling facilities) are located away from the surrounding area with future development potential.	DBO Contractor / PIU	Project costs
All work sites	Tree cutting	(i) Minimize removal of trees by adopting to site condition and with appropriate layout design of STP or any other site with trees (ii) Obtain prior permission for tree cutting at STP site or at any other site that may require tree cutting finalized during detailed design (iii) Plant and maintain 3 trees for each tree that is removed	DBO Contractor / PIU	Project costs
Seismic sensitivity	Damage to infrastructure and potential risks: project area in moderate earthquake risk zone (Zone III)	(i) Designs of project component structures shall comply with relevant codes of design such as Bureau of Indian Standard (BIS) specifications for earthquake resistant design (IS: 1893: Criteria for earthquake resistant design of structures).	DBO Contractor/PIU	Project costs

Field	Anticipate d Impact	Mitigation Measures	Responsible for Implementati on/ Monitoring	Cost and Sourc e of Funds														
STP	Hazardous / harmful chemicals	(i) Reduce the use of chemicals in the treatment process to the extent possible (water treatment); provide non-chemical alternatives or easily recoverable and/or reusable chemicals or biocompatible alternatives. (ii) Establish proper handling / storage / application system according to the relevant standards, safety precautions and prevent accidental release / spill (iii) Provide leak/spill detection, collection / capture and safe disposal facilities such as chlorine absorption and neutralization facility (iv) Provide ventilation, lighting, entry and exit facilities; visible and audible alarm facilities to alert chemical/chlorine leak (v) Facility for isolation in the event of major leakages (vi) Eye wash and shower facility (vii) Personal protection and safety equipment for the operators (masks, oxygen cylinders, gloves, etc. .) (viii) Provide training to the staff in safe handling and application of chemicals, material safety, and standard operating procedures and emergency responses (ix) Develop emergency response procedures	DBO Contractor/PI U	Project costs														
Sewage Treatmen t Plant (STP)	Inefficient sewage treatment, treated effluent characterist ics not satisfying the CPCB/RSP CB standards	(i) Ensure that the selected process in appropriate for the town and meets discharge standards and facilitate reuse (ii) Treated effluent should meet the criteria set by RSPCB/CPCB or the following bid specified parameters, whichever are stringent: <table><tr><th>Paramater</th><th>Standards</th></tr><tr><td>BOD, mg/l</td><td>10</td></tr><tr><td>TSS, mg/l</td><td>20</td></tr><tr><td>COD, mg/l</td><td>50</td></tr><tr><td>Nitrogen-Total, mg/l</td><td>10</td></tr><tr><td>Phosphorus- Total, mg/l</td><td>1</td></tr><tr><td>Fecal Coliform (MPN/ 100 ml)</td><td>100 (Desirable)230 (Permissible)</td></tr></table>	Paramater	Standards	BOD, mg/l	10	TSS, mg/l	20	COD, mg/l	50	Nitrogen-Total, mg/l	10	Phosphorus- Total, mg/l	1	Fecal Coliform (MPN/ 100 ml)	100 (Desirable)230 (Permissible)	DBO Contractor / PIU	Project costs
Paramater	Standards																	
BOD, mg/l	10																	
TSS, mg/l	20																	
COD, mg/l	50																	
Nitrogen-Total, mg/l	10																	
Phosphorus- Total, mg/l	1																	
Fecal Coliform (MPN/ 100 ml)	100 (Desirable)230 (Permissible)																	
Change in raw sewage quality	Mixing of industrial effluent with sewage	(i) No industrial wastewater shall be allowed to dispose into municipal sewers (ii) As there is a risk of potential mixing of industrial waste, no domestic wastewater from industrial units shall be allowed into municipal sewers (iii) Ensure that there is no illegal discharge	DBO Contractor and PIU / PMU	Project Costs														

Field	Anticipate d Impact	Mitigation Measures	Responsible for Implementati on/ Monitoring	Cost and Sourc e of Funds
		through manholes or inspection chambers (iv) Conduct public awareness programs; in coordination with RSPCB and CLC. , (v) Conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated wastewater quality complies with the effluent standards		
STP	Use of treated wastewater for reuse applications	Develop wastewater reuse plan for Pratapgarh town in consultation with CLC as per the Sewerage and Wastewater Policy, 2016. The Reuse Plan shall inter alia include the following: (i) Identify potential reuse application in Pratapgarh, and establish quality criteria for each of the use (ii) For applications that use treated wastewater directly (e.g., agriculture), the quality required for such application in safe manner considering health, environment and crop yield concerns shall be ensured; (iii) Prepare a reuse plan for agriculture, if that is the priority use or one of the applications as per the CLC in Pratapgarh, clearly indicating the limits (geographical / crops / type of application / type of soils etc.); adopt international good practice suggested by agencies like World Health Organization (WHO), Food and Agricultural Organization (FAO) of the United Nations. (iv) Plan should include awareness and training provisions and responsibilities; these can be conducted by concerned department (e.g., Agricultural Department, District Collectorate) (v) Carryout regular / online monitoring of critical quality parameters of treated wastewater to ensure that they meet the preset standards established for reuse	DBO Contractor / PIU	Project costs
STP	Treated effluent discharge into water channel/dra ins and associated impacts on river water and downstrea m users	(i) Obtain of consent of RSPCB for discharge of treated wastewater into drains (ii) Conduct a baseline water quality assessment of receiving water body (iii) Regularly monitor the treated wastewater quality at STP and ensure that it meets the discharge standards (iv) Monitor water quality periodically during operation phase as per the Environmental Monitoring Plan	DBO Contractor/PI U	Project Costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Cost and Source of Funds
STP	Sludge management and reuse	(i) Prepare a sludge management plan (ii) Prepare a dried Sludge utilization plan for Pratapgarh within the help of Agriculture Department / CLC; plan should also include if any additional processing is required for sludge to use as soil conditioner (iii) Plan should clearly various potential uses and demand in Pratapgarh and surroundings (iv) Establish usage limits, where required, (geographical / crops / type of application / type of soils etc.); adopt international good practice suggested by agencies like World Health Organization (WHO), Food and Agricultural Organization (FAO) of the United Nations. (v) Identify a landfill / suitable site for disposal of surplus dried sludge (vi) Monitor sludge quality during operation phase as per the Environmental Monitoring Plan, ensure that it meets the quality parameters established by FCO (vii) In case of sludge not meeting the quality parameters, it shall not be used as soil condition, and shall be disposed at appropriate disposal site (if it falls under hazardous category, it shall be disposed as per the Hazardous Waste Management Rules, 2016)	DBO Contractor/PIU	Project costs
Sewer network – collection and conveyance	Poor design leading to overflows, blockages, and creating nuisance, pollution	(i) Limit the sewer depth where possible (ii) Sewers shall be laid away from water supply lines and drains (at least 1 m, wherever possible); (iii) In all cases, the sewer line should be laid deeper than the water pipeline (the difference between top of the sewer and bottom of water pipeline should be at least 300 mm) (iv) In unavoidable, where sewers are to be laid close to storm water drains, appropriate pipe material shall be selected (stoneware pipes shall be avoided) (v) For shallower sewers and especially in narrow roads, use small inspection chambers in lieu of manholes; (vi) Design manhole covers to withstand anticipated loads and ensure that the covers can be readily replaced if broken to minimize silt/garbage entry (vii) Ensure sufficient hydraulic capacity to accommodate peak flows and adequate slope and gas vents in gravity mains to prevent buildup of solids and hydrogen sulfide generation (viii) Take necessary precautionary measures to protect sewer network, and to avoid disposal of	DBO Contractor/PIU	Project costs

Field	Anticipate d Impact	Mitigation Measures	Responsible for Implementati on/ Monitoring	Cost and Sourc e of Funds
		solid wastes, debris, wastewater into newly laid sewers from the time it is constructed to the start of operation phase		
FSSM	Occupation al health and safety issues, and impact on STP process	(i) Conduct detailed survey of the households to be covered with FSSM to design the system to suit the local conditions, such as type of septic tanks and their location in the houses (ii) Create awareness program on the FSSM from collection to treatment system that will be adopted (iii) Design the sewage treatment process duly considering mixing of septage (iv) Ensure that the FSSM system is completely mechanized no human touch, even accidentally, from collection at household to discharge into STP, and in periodic cleaning of tankers (v) Demarcate a proper area for cleaning of mobile tankers in STP premises, and ensure that the wastewater shall be discharged into STP (vi) Provide proper training to the workers, and staff in safe handling of FSSM tasks, provide all necessary personal protection equipment (vii) Ensure proper facilities for workers including showers, wash areas, toilets, drinking water, eating and resting places (viii) Conduct regular health checks (ix) Prepare Health and Safety Plan for FSSM	DBO Contractor/PI U	Project costs
Preparati on of plans and protocols	Various impacts	(i) Prepare traffic management plan (ii) Prepare occupational health and safety plan (iii) Prepare spoils management plan	DBO Contractor and PMCBC	Approv al of plans by PIU

Table 10: Environmental Management Plan of Anticipated Impacts during Pre-Construction

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Compliance with environmental subproject selection criteria	Environmental impacts due to subproject	Compliance with environmental subproject selection criteria	DBO Contractor, PIU and Nagar Parishad	PMU	No costs required
Environment al monitoring of baseline	To establish base line environmental	Environmental monitoring through NABL	Construction contractor	Consultants/PI U	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
conditions of air, noise, water and soil	conditions	accredited laboratory			
Legal compliance	Environmental legal noncompliance may attract legal actions Failure to obtain necessary consents Permits, NOCs etc. can result to design revisions and /or stoppage of works	(i)Obtain all consents, clearances (CTE/CTO from RSPCB), permits NOCs etc. before start of construction works Ensure that all necessary approvals for construction to be obtained by contractor are in place before start of construction (ii)Following consents are required- Tree cutting-local authority Storage, handling and transport of hazardous materials- RSPCB Sand mining, quarries, borrow areas- Department of mines and Geology, Traffic diversion/road cutting- local authority, traffic police (iii)Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs etc. (iv)Include in detailed design drawings and	PIU/Consultants in coordination of Nagar Parishad	PMU	Cost of obtaining all consents, permits, clearance, NOCs etc. prior to start of civil works responsibility of PIU.

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		documents all conditions and provisions; if necessary			
Utilities	Telephone lines, electric poles and wires, water lines within designed project area	(i) Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and (ii) Require construction contractors to prepare a contingency plan to include actions to be taken in case of unintentional interruption of services. (iii) Require contractors to prepare spoils management plan (Appendix 14) and traffic management plan (Appendix 15)	DBO Contractor in collaboration with PIU and with approval of PMU	(i) List of affected utilities and operators; (ii) Bid document to include requirement for a contingency plan for service interruptions (example provision of water if disruption is more than 24 hours), spoil management plan (Appendix 14), and traffic management plan (Appendix 15)	No cost required. Mitigation measures are part of TOR of PMU, PIU and Consultant
Utilities-Hight Tension overhead Electricity line through STP	Electrical hazards	•Consult with electricity department for shifting of HT line from STP site before start of any construction activity at site •Provide a board of high tension electricity hazards at site until HT line is not shifted •Do not start any	PIU	Electricity line shifted from STP site	Project Cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		construction activity near the HT line and provide barricades below the electricity line to prevent entry of any worker or construction machineries in the impact area of hazards			
Social and Cultural Resources	Ground disturbance can uncover and damage archaeological and historical remains	Develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognized, and measures are taken to ensure they are protected and conserved.	DBO Contractor and PIU	Chance Finds Protocol	No cost required. Mitigation measures are part of TOR of PIU and Consultant
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Disruption to traffic flow and sensitive receptors	(i) Prioritize areas within or nearest possible vacant space in the project location. (ii) If it is deemed necessary to locate elsewhere, consider sites that will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems. (iii) Do not consider residential areas. (iv) Take extreme care in selecting sites to avoid direct disposal to	Contractor to finalize locations in consultation and approval of PIU	(i) List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas. (ii) Written consent of landowner/s (not lessee/s) for reuse of excess spoils to agricultural land	No cost required. Mitigation measures are part of TOR of PIU and Consultant and part of contractual terms

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		water body which will inconvenience the community. (v) For excess spoil disposal, ensure (a) site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, written consent from landowners (not lessees) will be obtained; (b) debris disposal site shall be at least 200 m away from surface water bodies; (c) no residential areas shall be located within 50 m downwind side of the site; and (d) site is minimum 250 m away from sensitive locations like settlements, ponds/lakes or other water bodies.			
Sources of Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water	(i) Prioritize sites already permitted by the Department of Mines and Geology (ii) If other sites are necessary, inform construction contractor that it is their responsibility to verify the suitability of all material sources	DBO Contractor to prepare list of approved quarry sites and sources of materials with the approval of PIU	(i) List of approved quarry sites and sources of materials; (ii) Bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.	No cost required. Mitigation measures are part of TOR of PIU and Consultant and also part of contractual terms

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
	pollution.	and to obtain the approval of PMU and (iii) If additional quarries will be required after construction is started, inform construction contractor to obtain a written approval from PIU.			
Consents, permits, clearances, NOCs, etc.	Failure to obtain necessary consents, permits, NOCs, etc. can result to design revisions and/or stoppage of works	(i) Obtain all necessary consents (including CTE for STP from RSPCB), permits, clearance, NOCs, etc. prior to award of civil works. Following consents are required- Tree cutting- local authority Storage, handling and transport of hazardous materials- RSPCB Sand mining, quarries, borrow areas- Department of mines and Geology Traffic diversion/road cutting- local authority, traffic police (ii) Ensure that all necessary approvals for construction to be obtained by contractor are in place before start of construction (iii) Acknowledge in writing and	DBO Contractor and PIU and Consultant	Incorporated in final design and communicated to contractors.	No cost required. Cost of obtaining all consents, permits, clearance, NOCs, etc. prior to start of civil works responsibility of PIU. Mitigation measures are part of TOR of PIU and Consultant

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		provide report on compliance all obtained consents, permits, clearance, NOCs, etc. (iv) Include in detailed design drawings and documents all conditions and provisions if necessary			
Asbestos materials in existing PHED campus	Health impacts due to air borne asbestos if handled unsafely, cut, drilled or broken into pieces	i. Coordinate and provide support to the asbestos management service provider on the requirement of sampling, testing and disposing existing asbestos materials (ii) Coordinate and implement the construction of the temporary storage per specification of the asbestos management service provider (iii) Provide support to the asbestos management service provider supervising the removal, transport, disposal and documentation of the asbestos materials (iv) Conduct awareness workshops and trainings to stakeholders on the risks of the	DBO Contractor / PIU	PMU	Project costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		asbestos materials (v) Maintain records of asbestos materials inventory (vi) Ensure that handling and disposal of asbestos materials are carried out by specially trained service provider/s following Government of India requirements, or in their absence, internationally recognized procedures (vii) Refer to the requirements of the Asbestos Management Plan (Appendix 13) and instructions of the Asbestos Expert			

Table 11: Environmental Management Plan of Anticipated Impacts during Construction

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
EMP Implementation	Irreversible impact to the environment, workers, and community	(i) Contractor is required to depute a qualified and experienced EHS officer/supervisor for monitoring of EMP implementation measures (ii) Project manager and all key workers will be required to undergo EMP implementation including spoils management, Standard operating procedures (SOP) for construction works; occupational health and	Construction Contractor	(i) Certificate of Completion (Safeguards Compliance Orientation) (ii) Posting of Certification of Completion at worksites (iii) Posting of EMP at worksites	Cost of EMP Implementation Orientation Training to contractor is responsibility of PMU. Other costs responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		safety (OHS), core labor laws, applicable environmental laws, etc.			
Air Quality	Emissions from construction vehicles, equipment, and machinery used for installation of pipelines resulting to dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons.	(i) Plan the work sites properly, and demarcate the sites for stockpiling of, soils, gravel, and other construction materials away from the traffic, vehicle, general worker movement to avoid disturbance of loose materials (ii) Damp down exposed soil and any stockpiled material on site by water sprinkling. (iii) Use tarpaulins to cover sand and other loose material when transported by trucks; (iv) Clean wheels and undercarriage of haul trucks prior to leaving construction site (v) Don't allow access in the work area except workers to limit soil disturbance and prevent access by barricading and security personnel (vi) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly contractor's vehicles and equipment should compulsorily have PUC and submit to PIU before deployment at site (vii) Obtain, CTE and CTO for batching plant, hot mix plant, crushers etc. if specifically established for this project. (viii) If contractor procures any material (such as ready mix concrete, asphalt/macadam, aggregates etc. .) from third party agencies, contractor shall ensure that such agencies have all necessary	Construction Contractor	(i) Location of stockpiles; (ii) Complaints from sensitive receptors; (iii) Heavy equipment and machinery with air pollution control devices; (iv) Certification that vehicles are compliant with Air Act (v) Reports of air quality monitoring	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		clearances / permissions as required under the law; these include CTE/CTO from RSPCB, environmental clearance, etc. ; contractor shall collect the copy of these certificates and submit to PIU; PIU will approve the source only after all the certificates are submitted (ix) Conduct air quality monitoring according to the Environmental Management Plan (EMP).			
Surface water quality	Works in rains/ Mobilization of settled silt materials, and chemical contamination from fuels and lubricants during installation of pipelines can contaminate nearby surface water quality.	(i) Prepare and implement a spoils management plan (ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets; (iii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with PIU on designated disposal areas; (iv) Inspect all the drainage at construction site/construction camp/labor camp etc. and clear all the drainage lines so that no water stagnation/flooding may occur during heavy rainfall (v) As for a possible avoid trench works and excavation works (pipe laying) during monsoon season to avoid any water logging and accident due to it (vi) If open trenches are not avoidable during monsoon, keep ready all the mitigations measures to avoid water logging such as dewatering pumps and sufficient pipes, traffic assistance, barricades etc. (vii) Inspect and verify all the emergency measures	Construction Contractor	(i) Areas for stockpiles, storage of fuels and lubricants and waste materials; (ii) Number of silt traps installed along trenches leading to water bodies; (iii) Records of surface water quality inspection; (iv) Effectiveness of water management measures; (v) No visible degradation to nearby drainages, nallahs or water bodies due to civil works	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		and emergency control system before start of monsoon, keep the emergency response committee on high alert during monsoon/heavy rain fall (ix) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; (x) Place storage areas for fuels and lubricants away from any drainage leading to water bodies; (xi) Dispose any wastes generated by construction activities in designated sites; and (xii) 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 PIU/Consultant so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance; (ii) Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; (iii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and (iv) Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. (v) Periodical monitoring of noise quality as per EMP	Construction Contractor	(i) Complaints from sensitive receptors; (ii) Use of silencers in noise-producing equipment and sound barriers; (iii) Equivalent day and nighttime noise levels (see Appendix 5 of this IEE)	Cost for implementation of mitigation measures responsibility of contractor.
Landscape and	Impacts due	(i) Prepare and implement	Construction	(i) Complaints	Cost for

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
aesthetics	to excess excavated earth, excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, and other similar items.	spoils management plan (Appendix 14); (ii) Avoid stockpiling of excess excavated soils; (iii) Coordinate with ULB/PIU for beneficial uses of excess excavated soils or immediately dispose to designated areas; (iv) Recover used oil and lubricants and reuse or remove from the sites; (v) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; (vi) Remove all wreckage, rubbish, or temporary structures which are no longer required; and (vii) Request PIU to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.	Contractor	from sensitive receptors; (ii) Worksite clear of hazardous wastes such as oil/fuel (iii) Worksite clear of any excess excavated earth, excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers	implementation of mitigation measures responsibility of contractor.
Existing Infrastructure and Facilities	Disruption of service and damage to existing infrastructure at specified project location	(i) Obtain from PIU the list of affected utilities and operators if any; (ii) Prepare a contingency plan to include actions to be done in case of unintentional interruption of service	Construction Contractor	Existing Utilities Contingency Plan	Cost for implementation of mitigation measures responsibility of contractor.
Ecological Resources – Terrestrial	Loss of vegetation and tree cover	(i) Minimize removal of vegetation and disallow cutting of trees; (ii) If tree-removal will be required, obtain tree-cutting permit from the concerned department; and (iii) Plant three native trees for every one that is removed as per RUDSICO-EAP Circular.	Construction Contractor	PIU to report in writing the no of trees cut and planted.	Cost for implementation of mitigation measures responsibility of contractor.
Land use	Environmental Issues due to land use change	The impact due to change in land use will be negligible due to this project.	Not applicable	Not applicable	Not applicable
Accessibility	Traffic problems and conflicts near project	i) Plan water and sewer line works to minimize traffic disturbance / blockades; as the both water	Construction Contractor	(i) Traffic route during construction works including	Cost for implementation of mitigation measures

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
	locations and haul road	and sewer lines are to be laid in all the roads and streets in the town, work planning is crucial to minimize the inconvenience to public due to repeated excavations (ii) Prepare and implement a Traffic Management Plan (Appendix 15) (ii) Duly consider and select sections for trenchless method of pipelaying based on traffic conditions (iii) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites; (iv) Schedule transport and hauling activities during non-peak hours; (v) Locate entry and exit points in areas where there is low potential for traffic congestion; (vi) Keep the site free from all unnecessary obstructions; (vii) Drive vehicles in a considerate manner; (viii) Coordinate with Traffic Police for temporary road diversions and with for provision of traffic aids if transportation activities cannot be avoided during peak hours; (ix) Notify affected sensitive receptors 1-week in advance by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints. (x) Plan and execute the work in such a way that the period of disturbance/ loss of access is minimum. (xi) Provide pedestrian access in all the locations until normalcy is restored.		number of permanent signage, barricades and flagmen on worksite; (ii) Complaints from sensitive receptors; (iii) Number of signage placed at project location.	responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		Provide wooden/metal planks over the open trenches at each house to maintain the access.			
Socio-Economic – Income.	Impede the access of residents and customers to nearby shops	(i) Prepare and implement spoils management plan. Contractor to Implement RP and to follow mitigation measures prescribed (ii) Leave spaces for access between mounds of soil; (ii) Provide walkways and metal sheets where required for people; (iii) Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools; (iv) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and (v) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints. (vi) Notify community/ water users in advance about likely interruptions in water supply. (vii) Provide alternate sources of clean water until water supply is restored.	Construction Contractor	(i) Complaints from sensitive receptors; (ii) Spoils management plan (iii) Number of walkways, signage, and metal sheets placed at project location.	Cost for implementation of mitigation measures responsibility of contractor.
Socio-Economic - Employment	Generation of temporary employment and increase in local revenue	(i) Employ local labour force, or to the maximum extent possible (ii) Comply with labor laws	Construction Contractor	(i) Employment records; (ii) Records of sources of materials (iii) Compliance to labor laws (see Appendix 7 of this IEE)	Cost for implementation of mitigation measures responsibility of contractor.
Occupational Health and Safety	Occupational hazards which can arise during work	(i) Comply with all national, state and local core labor laws (see Appendix 7 of this IEE); Following best practice health and safety guidelines: IFC's General EHS	Construction Contractor	(i) Site-specific OH and S Plan; (ii) Equipped first-aid stations; (iii) Medical insurance coverage for workers; (iv) Number of	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		Guidelines³⁸ and Sector Specific (Water and Sanitation) Guidelines³⁹ including COVID related guidelines (ii) Develop and implement site-specific occupational health and safety (OH and S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use personal protective equipment like helmet, gumboot, safety belt, gloves, nose musk and ear plugs; (c) OH and S Training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents; (iii) Conduct work in confine spaces, trenches, and at height with suitable precautions and using standards and safe construction methods; do not adopt ad hoc methods; all trenches deeper than 1. 5 m shall be provided with safety shoring/braces; and avoid open cutting method for trenches deeper than 3. 5 m by adopting trenchless technology (iv) Ensure that qualified first aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site; (v) Provide medical insurance coverage for workers;		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 equipment; (ix) % of moving equipment outfitted with audible back-up alarms; (xi) permanent sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. (xii) Compliance to core labor laws (see Appendix 7 of this IEE)	

³⁸<https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES>

³⁹<https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B-%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES>

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		(vi) Secure all installations from unauthorized intrusion and accident risks; (vii) The project area experiences extreme temperature during summer months of April and May, which may affect the health of workers engaged in construction work. Contractor should take necessary measures during summers including the following: (a) work schedule should be adjusted to avoid peak temperature hours (12 – 3 PM); (b) provide appropriate shade near the workplace; allow periodic resting and provide adequate water, and (c) provide necessary medicine and facilities to take care of dehydration related health issues (viii) Provide supplies of potable drinking water; (vi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances; (ix) Provide HS orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; (x) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; (xi) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;			

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		(xii) Ensure moving equipment is outfitted with audible back-up alarms; (xiii) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for 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; (xiv) Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively. (xv) Conduct regular health check-ups for workers (xvi) Provide periodical awareness camps and special trainings for workers for health issues and risks in construction sites (xviii) Provide proper solid and liquid waste management system in workers' campsite, separate from spoils and debris disposal, as their presence can add to existing waste volume at the project sites.			
Occupational and community health and safety	Hazardous working conditions due to presence of asbestos containing material / AC Pipes in work sites: clearing, transfer and disposal; work in narrow streets, and	(i) implement the ACM Management Plan (AMP) that includes identification of hazards, the use of proper safety gear and disposal methods. Sample AMP is provided in Appendix 13. Adhere to the suggested workflow process (ii) Conduct awareness program on safety during the construction work (iii) Undertake the	Construction Contractor	(i) Asbestos management plan preparation and implementation (iii) quantity and characteristics of asbestos containing material removed/handled and disposed safely	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
	interventions in existing AC pipelines Health impacts due to air borne asbestos if handled unsafely, cut, drilled or broken into pieces	construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day (iv) Provide barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches (v) Identify risk of intervention with existing AC pipes. If there is significant risk, implement the AMP strictly that includes identification of hazards, the use of proper safety gear and disposal methods. (vi) Appropriate actions as defined in the Asbestos Management Plan will have to be adhered to (vii) Maintain records of AC pipes as per the AMP			
Community Health and Safety.	Traffic accidents and vehicle collision with pedestrians during material and waste transportation	(i) Trench excavation and pipeline works shall be conducted in a safe manner; if the allowing public movement along the work sites (pedestrians or vehicles as the case may be) is likely to cause safety risks, movement should be blocked temporarily and work shall be conducted; in such areas, conducting night work or working in small stretches to avoid blockage of traffic/movement no more than few hours in due consultation with the local community and ULB shall be planned (ii) All trenches deeper than 1.5 m shall be provided with safety shoring/braces; and avoid open cutting method for trenches deeper than 3.5 m by adopting trenchless technology (iii) Survey the surrounding vulnerable	Construction Contractor	(i) Traffic Management Plan; (ii) Complaints from sensitive receptors	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		buildings for likely issues in structural stability / differential settlement during the excavation works (iv) Provide prior information to the local people about the (v) Plan routes to avoid times of peak-pedestrian activities. (vi) Liaise with PIU/ULB in identifying high-risk areas on route cards/maps. (vii) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure. (viii) Provide road signs and flag persons to warn of on-going trenching activities.			
Safety of sensitive groups (children, elders etc.) and other pedestrians in narrow streets	Trench excavation in narrow streets will pose high risk to children and elders in the locality	(i) Provide prior information to the local people about the nature and duration of work (ii) Conduct awareness program on safety during the construction work (iii) Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day (iv) Provide barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches	Construction Contractor	Complaints from neighborhood and monitoring of accidents	Cost for implementation of mitigation measures responsibility of contractor.
Night Works	Public inconvenience due to traffic diversion, disturbance due to excessive noise and access loss, occupational	Prepare a night work protocol and obtain prior approval from PIU, and strictly implement and report on implementation of protocol during the workers; Contractors should have handheld noise level meter for measurement of noise during night hours	Contractor	Night work plan / protocol submitted by contractor and approved by PIU/Consultant	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
	health and safety issues etc.	Contractors should have handheld lux meter for the measurement of illumination during night hours Preferably electrical connection is available for running equipment otherwise soundproof/super silent Diesel Generator set should be available Sound level should not increase as prescribe by CPCB Illumination should be as prescribed in protocol As far as possible ready-mix concrete from batching plant to be used, otherwise the concrete should be prepared away from residential areas and brought to the site All the noisy activities like hammering, cutting, crushing, running of heavy equipment should be done in daytime and avoided in nighttime Workers engaged in night works should have adequate rest/sleep in daytime before start of night works Worker engaged for night works should have previous experience of night works and should be physically fit for such works including clear vision in night All the necessary provisions of traffic aids such as traffic signals, road signage, barricades, cautions boards, traffic diversion boards etc. should be available with fluorescent/retro-reflective arrangements Workers should be trained before start of night works about risks and hazards of night works and their mitigation measures and should be provided all the protective aids (PPEs) including fluorescent/retro-			

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		reflective vests Horns should not be permitted by equipment and vehicles Workers should not shout and create noise First aid and emergency vehicles should be available at site Emergency preparedness plan should be operative during night works Old persons and pregnant women and women having small kids should not work in night-time All the vehicles and equipment being used at night works should have adequate type of silencers/enclosures/mufflers to reduce noise All the vehicles should be checked for working head lamps, tail lamps, inner lights etc. before start of night works PIU site engineers and contractor's safety personnel should closely monitor the safety of works continuously and noise and illumination levels on hourly basis and maintain photographic and video graphic records as well as register the observations. Night works should be stopped early in the morning at least one hour before start of pedestrian/traffic movement After completion of night works all the site should be cleaned and maintained obstruction free for daytime movement of vehicles and pedestrians Drivers and workers should be alert and responsive during night works All the wages to workers working in night hours			

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		should be as per the applicable labour acts Avoid any nuisance which may create problems to nearby habitants and work peacefully during night hours Night works should not be conducted near hospitals and during peak seasons such as peak tourist season, students' exam times etc.			
Work in narrow streets	will pose high risk to children and elders in the locality	(i) Conduct awareness program on safety during the construction work (ii) Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day (iii) Provide barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches (iv) Trench excavation and pipeline works shall be conducted in a safe manner; if the allowing public movement along the work sites (pedestrians or vehicles as the case may be) is likely to cause safety risks, movement should be blocked temporarily and work shall be conducted; in such areas, conducting night work or working in small stretches to avoid blockage of traffic/movement no more than few hours in due consultation with the local community and ULB shall be planned			responsibility of contractor.
Construction camps and worker facilities	Temporary air and noise pollution from machine operation, water pollution from storage and use of	(i) Consult with PIU before locating project offices, sheds, and construction plants; (ii) Minimize removal of vegetation and disallow cutting of trees; (iii) Provide drinking water,	Construction Contractor	(i) Complaints from sensitive receptors; (ii) Drinking water and sanitation facilities for employees	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
	fuels, oils, solvents, and lubricants Unsanitary and poor living conditions for workers	water for other uses, and sanitation facilities for employees; (iv) Provided temporary rest and eating area at all work sites (v) Ensure conditions of livability at work camps are always maintained at the highest standards possible; living quarters and construction camps shall be provided with standard materials (as far as possible to use portable ready to fit-in reusable cabins with proper ventilation); thatched huts, and facilities constructed with materials like GI sheets, tarpaulins, etc. , shall not be used as accommodation for workers; accommodation shall meet the IFC standards for workers accommodation which include: provision of safe housing, availability of electricity, plumbing, water and sanitation, adequate fire protection and dormitory/room facilities; accommodation shall be in the range from 10 to 12. 5 cubic meters (volume) or 4 to 5. 5 square meters (surface) per worker, a minimum ceiling height of 2. 10 meters; a reasonable number of workers are allowed to share the same room – (standards range from 2 to 8 workers); workers with accompanying families shall be provided with a proper and safe accommodation (IFC benchmark standards for workers accommodation is provided in Appendix 16) (vi) Train employees in the storage and handling of materials which can potentially cause soil contamination;			

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		(vii) Recover used oil and lubricants and reuse or remove from the site; (viii) Manage solid waste according to the preference hierarchy: reuse, recycling and disposal to designated areas; (ix) Ensure unauthorized persons specially children are not allowed in any worksite at any given time.			
Social and Cultural Resources	Risk of archaeological chance finds	(i) Strictly follow the protocol for chance finds in any excavation work; (ii) Create awareness among the workers, supervisors and engineers about the chance finds during excavation work (iii) Stop work immediately to allow further investigation if any finds are suspected; (iv) Inform local Archeological Department / Museum office if a find is suspected and take any action, they require to ensure its removal or protection in situ	Construction Contractor	Records of chance finds	Cost for implementation of mitigation measures responsibility of contractor.
Monsoon preparedness	Disruption of utilities and water logging in trenches	(i) As for a possible avoid trench works and excavation works (pipe laying) during monsoon season to avoid any water logging and accident due to it (ii) if open trenches are not avoidable during monsoon, keep ready all the mitigations measures to avoid water logging such as dewatering pumps and sufficient pipes, traffic assistance, barricades etc. (iii) keep emergency response system ready before monsoon/heavy rain fall	Construction Contractor	Monsoon preparedness plan	Cost for implementation of mitigation measures responsibility of contractor.
Submission of EMP implementation report	Unsatisfactory compliance to EMP	(i) Appointment of supervisor to ensure EMP implementation (ii) Timely submission of monitoring reports including pictures	Construction contractor	Availability and competency of appointed supervisor Monthly report	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Post-construction clean-up	Damage due to debris, spoils, excess construction materials	(i) Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and (ii) All excavated roads shall be reinstated to original condition. (iii) All disrupted utilities restored (iv) All affected structures rehabilitated/compensated (v) The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up. (vi) All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be top soiled and re-grassed using the guidelines set out in the re-vegetation specification that forms part of this document. (vii) The contractor must arrange the cancellation of all temporary services. (viii) Request PIU to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.	Construction Contractor	PIU/Consultant report in writing that (i) worksite is restored to original conditions; (ii) camp has been vacated and restored to pre-project conditions; (iii) all construction related structures not relevant to O andM are removed; and (iv) worksite clean-up is satisfactory.	Cost for implementation of mitigation measures responsibility of contractor.

Table 12: Environmental Management Plan of Anticipated Impacts during Operation

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Sewerage system operation: treatment discharge of treated wastewater, sludge	Environmental and health issues due to operation	(i) Ensure that treated wastewater meets the established discharge standards all times; Conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated effluent quality complies with design standards; (ii) Conduct baseline water quality assessment of receiving water body prior to start of operation (iii) Ensure implementation of Reuse Plan, and ensure intended quality for each direct reuse (iv) Assess composition and characteristics of sludge from the first batch operation at the initial phases, and confirm the handling, management and disposal/reuse actions suggested in the management plan (v) Conduct periodic testing of dried sludge/compost to check presence of heavy metals and confirming the concentrations to use as compost as specified in the Standards for Composting, Schedule II A, Solid Waste Management Rules, 2016, FCO = Fertilizer Control Order, 1985, amendments in 2009 and 2013. It shall not be used for food crops. (vi) Ensure valid consent to operate (CTO) from RSPCB for operation of STP (vii) Ensure that all conditions/standards prescribed by RSPCB are complied duly (viii) Ensure that chlorinator facility is operated only by trained staff and as per	O and M contractor for 10 years and then Nagar Parishad	Partapgarh Nagar Parishad	O and M cost of contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		the standard operating procedures; in case of any accident and/or maintenance activity, ensure that the staff follows documented procedures only (ix) Implement Emergency Response System (ERS) for the chlorine leakage; Guidelines and Emergency plan for handling and storing chlorine is attached as Appendix 17 (x) Ensure proper knowledge transfer, hands-on training to municipal staff engaged in STP operation has been provided by contractor prior to handover of facility; (xi) Operate and maintain the facility following standard operating procedures of operational manual; (xii) Undertake preventive and periodic maintenance activities as required; (xiii) Conduct periodic training to workers; ensure that all safety apparatus at STP including personal protection equipment are in good condition all times; and are at easily accessible and identifiable place; periodically check the equipment, and conduct mock drills to deal with emergency situations; (xiv) No wastewater from industrial premises (including domestic wastewater) shall be allowed to dispose into municipal sewers; monitor regularly and ensure that there is no illegal discharge through manholes or inspection chambers; conduct public awareness programs; in coordination with RSPCB:			
Sewerage system	Environmental and	(i) Establish regular maintenance	O and M	Partapgarh	O and M

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
operation: collection and conveyance	health issues due to operation of sewer network	program, including: • Regular cleaning of grit chambers and sewer lines to remove grease, grit, and other debris that may lead to sewer backups. Cleaning should be conducted more frequently for problem areas. • Inspection of the condition of sanitary sewer structures and identifying areas that need repair or maintenance. Items to note may include cracked/deteriorating pipes; leaking joints or seals at manhole; frequent line blockages; lines that generally flow at or near capacity; and suspected infiltration or exfiltration; and • Monitoring of sewer flow to identify potential inflows and outflows • Conduct repairs on priority based on the nature and severity of the problem. Immediate clearing of blockage or repair is warranted where an overflow is currently occurring or for urgent problems that may cause an imminent overflow (e. g. pump station failures, sewer line ruptures, or sewer line blockages); (ii) Review previous sewer maintenance records to help identify “hot spots” or areas with frequent maintenance problems and locations of potential system failure, and conduct preventative maintenance, rehabilitation, or replacement of lines as needed; (iii) When a spill, leak, and/or overflow occurs, keep sewage from entering the storm drain system by covering or blocking storm drain inlets or by containing and diverting the sewage	contractor for 10 years and then ULB	Nagar Parishad	cost of contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		away from open channels and other storm drain facilities (using sandbags, inflatable dams, etc.). Remove the sewage using vacuum equipment or use other measures to divert it back to the sanitary sewer system. (iv) Prohibit/prevent disposal of wastewater/effluent from industrial units in the sewers; ensure regular checking to ensure no illegal entry of industrial wastewater into sewers (v) Develop an Emergency Response System for the sewerage system leaks, burst and overflows, etc. (vi) Provide necessary health and safety training to the staff (vii) Provide all necessary personnel protection equipment (viii) During cleaning/clearing of manholes and sewer lines great precautions should be taken for the safety of workers conducting such works. • As far as possible use remote / CCTV mechanism to identify/detect the problems in sewers and do not engage persons for this purpose • As far as possible use mechanized cleaning of manholes and sewers by using modern techniques and machines and do not engage persons for this purpose • Ensure that maintenance staff and supervisors understand the risks; provide proper instructions, training and supervision. • Use gas detector to detect any hazardous or inflammable gas in confined			

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		areas like sewers /manholes prior to maintenance process • Provide suitable personal protective equipment that may include waterproof / abrasion-resistant gloves, footwear, eye and respiratory protection. Face visors are particularly effective against splashes. Equipment selection and a proper system for inspection and maintenance are important. • Provide adequate welfare facilities, including clean water, soap, nail brushes, disposable paper towels, and where heavy contamination is foreseeable, showers. • For remote locations portable welfare facilities should be provided. • Areas for storage of clean and contaminated equipment should be segregated and separate from eating facilities. • Provide adequate first-aid equipment, including clean water or sterile wipes for cleansing wounds, and a supply of sterile, waterproof, adhesive dressings. • Make effective arrangements for monitoring the health of staff. • Keep emergency preparedness plan ready before starting the work of sewage system cleaning			
Repair and maintenance activities sewerage Construction disturbances, nuisances, public and worker safety	All work sites	Implementation of dust control, noise control, traffic management, and safety measures. Site inspection checklist to review implementation is appended at Appendix 22.	O and M contractor for 10 years and then NAGAR PARISHAD	Partapgarh Nagar Parishad	O and M cost of contractor

Table 13: Environmental Monitoring Plan of ambient air, noise, water and soil quality during Construction

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Construction disturbances, nuisances, public & worker safety	All work sites	Implementation of dust control, noise control, traffic management, & safety measures. Site inspection checklist to review implementation is appended at Appendix 22		Supervising staff and safeguards specialists	No costs required
Tree cutting and plantation	STP, SPS, and pipe laying sites	Obtain permission from concerned authority for any tree cutting and plant trees in the ratio of 1:3 as per RUDSICO (EAP) Circular		Supervising staff and safeguards specialist	Contractors cost
Ambient air quality	6 locations (STP site, SPS sites (2), pipe laying sites and workers camp during construction)	PM ₁₀ , PM _{2.5} , NO ₂ , SO ₂ , CO	Quarterly except Monsoon period	Contractor	Cost for implementation of monitoring measures responsibility of contractor
Ambient noise	6 locations (STP site, SPS site, pipe laying sites and workers camp during construction)	Day time and night time noise levels	Quarterly	Contractor	Cost for implementation of monitoring measures responsibility of contractor
Ground Water quality	4 locations (STP, SPS/MWP (2 sites) and construction camp)	pH, TDS, Total Hardness, Zn, Chloride, Iron, Copper, DO, Manganese, Sulphate, Nitrate, Fluoride, Hg, Cadmium, Cr ⁺⁶ , Arsenic, Lead, Total Alkalinity, Phosphate, Phenolic compound	Quarterly except Monsoon period	Contractor	Cost for implementation of monitoring measures responsibility of contractor
Surface Water quality	1- River Aeva near STP 2- Deepeshwar Talab near SPS	pH, Turbidity, Total Hardness, DO, BOD, COD, Chloride, Hg, Iron, TDS, TSS, Calcium, Zn, Cr ⁺⁶ , Magnesium, Copper, Manganese, Sulphate, Cyanide, Nitrate, Sodium, Potassium,	Quarterly except Monsoon period	Contractor	Cost for implementation of monitoring measures responsibility of contractor

		Fluoride, Cadmium, Arsenic, Lead, Boron, Selenium, Aluminium, Total residual Chlorine			
Soil quality	4 locations (STP SPS (2sites) and construction camp site)	pH, Elect. Conductivity (at 25°C), Moisture (at 105°C), Texture (silt, clay, sand), Calcium (as CaO), Magnesium (as Mg), Permeability, Nitrogen (as N), Sodium (as Na), Phosphate (as PO ₄), Potassium (as K), Organic Matter, oil and grease	Quarterly except Monsoon period	Contractor	Cost for implementation of monitoring measures responsibility of contractor
Construction, Labour Camp, storage yard Management	Construction, Labour Camp, storage yard Management	As per EMP	Weekly	EHS officer, Environment Specialist of consultant	contractor
Solid waste management	Construction, Labour Camp, storage yard Management	As per EMP	Weekly	EHS officer, Environment Specialist of consultant	contractor
Construction and demolition waste management	All construction site	As per EMP and applicable rules and regulations	Weekly	EHS officer, Environment Specialist of consultant	contractor
Consent to establish of STP, batching plants, crusher, hot mix plant. DG sets etc.	STP, batching plants, crusher, hot mix plants etc	Consents are taken as per table 5 & 6	Periodically	EHS officer, Environment Specialist of consultant	No cost required for monitoring cost for obtaining CTE/CTO from PMU and for others from Contractor

Table 14: Environmental Monitoring Plan of Anticipated Impacts during Operation

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Monitoring of raw wastewater quality	Inlet of the STP	Suspended solids, pH, Temperature Oil and grease, Total residual chlorine, Ammonical nitrogen (as N), BOD, COD, Nitrate Nitrogen The values should be within the limit specified by NGT/CPCB to discharge into municipal sewers (see Appendix 4)	As per O&M Plan	O&M Contractor/Nagar Parishad	O&M Contractor/Nagar Parishad

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Monitoring of treated effluent quality	Outlet of STP	pH, BOD, COD, TSS, NH ₄ -N, N-total, Fecal Coliform (as per Appendix 4)	As per O&M Plan	O&M Contractor/Nagar Parishad	O&M Contractor/Nagar Parishad
Monitoring of plantations	Plantations locations	Nos. of tree survived	monthly	O&M Contractor/Nagar Parishad	O&M Contractor/Nagar Parishad
Sewer network to sustain operational efficiency and avoid clogging and early occurrence of leakages	Sewer network	to be included in the O&M plan prepared under the project	as per O&M plan	O&M Contractor/Nagar Parishad	O&M Contractor/Nagar Parishad
De-sludging of sludge beds to avoid sedimentation and ensure efficient collection and storage of wastewater	Sludge beds	To be included in O&M plan prepared under the project	as per O&M plan	O&M contractor for 10 years and then Nagar Parishad	Nagar Parishad, Shapura
Consent to operate (CTO) from RPCB	STP	CTO should be renewed before expired	5 yearly	Pratapgarh Nagar Parishad	Pratapgarh Nagar Parishad

B. Institutional Requirements

219. The Local Self Government Department (LGSD) is the executing agency which will be responsible for the overall strategic guidance and ensure the compliance with ADB loan covenants. RUDSICO is the implementing agency responsible for the technical supervision and project implementation. The RUDSICO Board (under the chairmanship of the Honorable Minister), the LGSD and the City Level Monitoring Committees (CLMCs, under the chairmanship of their respective commissioner/executive officer) is proposed to monitor the project implementation. The PMU is at state-level and headed by a dedicated Project Director. The PIUs have two zonal offices (1 in Jaipur and 1 in Jodhpur). Each zonal office will be headed by an additional chief engineer. Urban Local Bodies (ULBs) will be the final custodian and user of the created infrastructure. As primary stakeholders, the ULBs will be involved and engaged in the day-to-day monitoring and implementation.

220. At the PMU level, the Project Director shall be supported by Additional Project Director (Chief Engineer-level) and a Chief Engineer, who shall then be supported by Dy Project Director and a financial advisor. There shall be one project officer for Social and another project officer for Environmental aspects of the project.

221. The PMU shall be supported by the Project Management and Capacity Building Consultants (PMCBC). The PMCBC shall manage preparation/vetting design documents, tendering of contracts, implementation of resettlement, environmental management and gender action plans; setting and managing project performance monitoring systems, planning and

managing implementation of training and capacity building as well as institutional strengthening activities besides preparing reports as per ADB requirements. PMCBC shall engage a social safeguard specialist and environmental safeguard specialist at the PMU level for managing all social and environmental safeguard related support services as envisaged in its scope of work. They will be assisted by concerned field level safeguard support staffs of CMSCs and PIU.

222. PMCBC shall be joined by the following specialists to address site-specific environmental requirements as below:

- (i) **Environment Specialist Consultant.** Responsibilities include the review and refinement of the IEEs and the EMPs and ensure inclusion in the bid documents and during construction, monitor the implementation of the EMPs and support in the reporting and documentation requirements;
- (ii) **Asbestos Management Specialist.** Provides training and awareness on the risks and safe handling and management of asbestos-containing materials (ACMs) and to coordinate with the Asbestos Management Service Provider in the implementation of the Asbestos Management;
- (iii) **Heritage Management Specialist.** Provides guidance on the ADB SPS, 2009 requirement on Physical Cultural Resources in the RSTDSP towns including the conduct of Heritage Impact Assessment, provides support on the statutory clearances to be obtained and the documentation and reporting on the implementation of mitigation measures;
- (iv) **Biodiversity Expert.** Provides guidance on the ADB SPS, 2009 requirement on Biodiversity Conservation and Critical Habitat Assessment including the conduct preliminary screening (e. g. IBAT assessment reports), on-site verifications and consultations, recommend specific measures and provide supervisor support during the planning and construction periods; and
- (v) **Architect.** Assists the team leader and structural expert for review and approval of all drawings from architectural and heritage perspective; review and approve the detailed architectural drawings prepared by the contractor and promptly address ant site-specific issues regarding architectural and heritage aspects.

223. There will be two zonal PIUs and a PIU at every town. PIUs at the town-level shall be headed by a Superintending Engineer / Executive Engineer, who shall work as Project Manager and shall sign the contract documents, manage the contract and disburse payments as Drawing and Disbursing Officer.

224. **Construction management and supervision consultants - 2 nos.** catering to Jaipur and Jodhpur units. They shall directly support PIUs in day to day contract management, construction supervision including quality management of ongoing works etc. This shall include work measurement, quantities, verification of bills of contractors etc. In compliance with the EMP, the CMSC shall develop a strategy to overcome the difficulties of construction/traffic management in narrow streets and also prepare detailed plans for detour of traffic during excavation for pipe laying. The CMSC will propose and implement mechanism for coordination among all stakeholders such as traffic police, roads department, user committees, etc., for smooth construction execution. Adequate measures shall be taken for working near physical cultural resources involving close coordination with the Department of Archaeology. The CMSC will lead design of surveys and investigations required for the protection of archaeological sites/heritage areas and prepare Archaeological Impact Assessments, or other agreed upon document to be approved by the Department of Archaeology for the archaeologically sensitive locations;

225. **Community awareness and public participation consultants (CAPPC)** will closely work in the field (with PIUs) to facilitate creation of project awareness and ensuring public participation for all project works at the community level. This shall mainly involve house connections for sewerage and metering. CAPPC shall also undertake various IEC activities to promote and pursue health and hygiene among the communities.

226. **Safeguards Implementation Arrangements.** At PMU, there will be two dedicated Project Officers (i) Project Officer (Environment) and (ii) Project Officer (Social), who will be responsible for compliance with the environmental and social safeguards in program implementation. PO (Environment) will have overall responsibility in implementation of the RSTDSP program as per the Environmental Assessment and Review Framework (EARF) agreed between ADB and the government. At individual subproject level, PO will ensure that environmental assessment is conducted, and a project-specific one is prepared and implemented, and the compliance, and corrective actions, if any are reported as required. PO (Environment) will be supported by Environmental Safeguards Specialist of PMCBC.

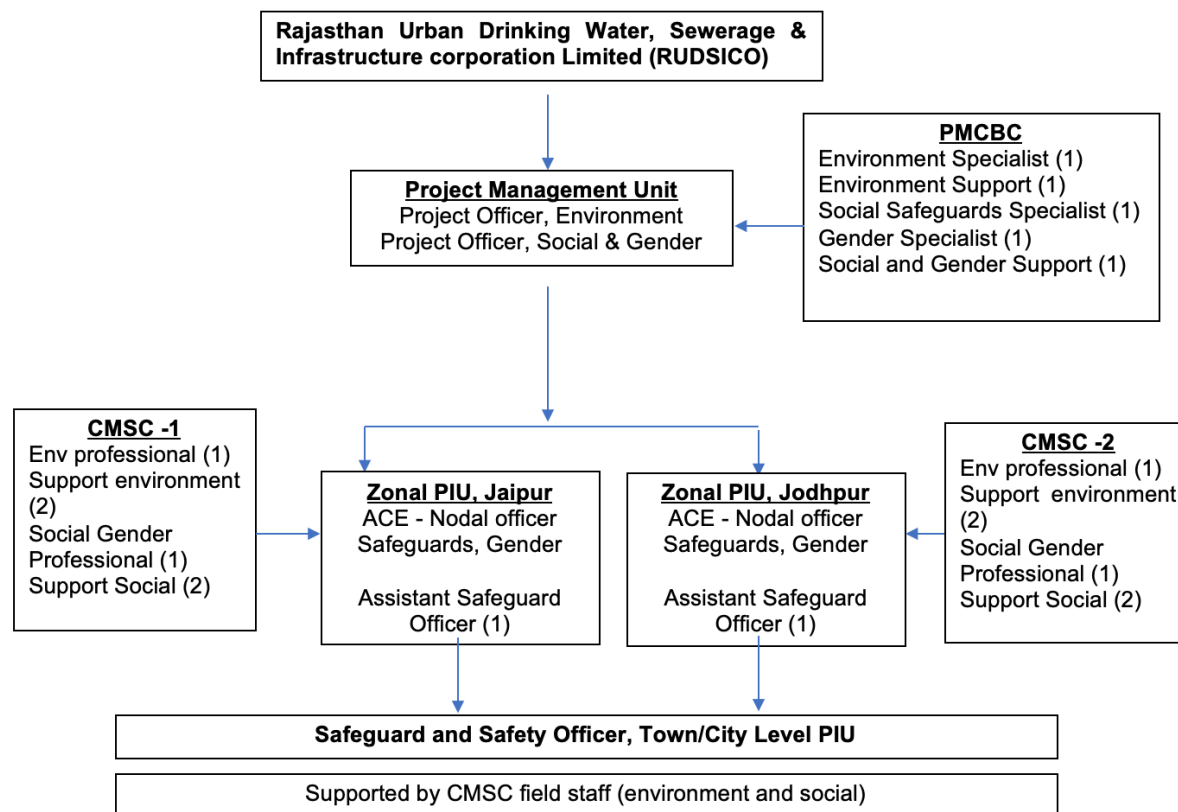
227. Each Zonal PIU will be staffed with two dedicated Safeguards Officers (Environmental Safeguards Officer, and Social Safeguards Officer) who will assist PMU Project Officer (Environment) in implementation of the environmental safeguards at the zonal PIU level. CMSC will assist Zonal, cluster and town-level PIUs and PMU in preparation, implementation and monitoring of environmental safeguards. There will be two sets of CMSCs each housed in a Zonal PIU (Jaipur and Jodhpur) and will assist the PIUs under respective Zonal PIUs. Each CMSC will be staffed with one Environmental Safeguard Specialist, and one Support Environmental Engineer in each PIU. Community Awareness and Public Participation Consultants (CAPPC) will closely work in field (with PIUs) to facilitate creation of project awareness and ensuring public participation for all project works at the community level. This shall mainly involve house connections for water supply, sewerage and metering. Besides, they shall also undertake various IEC activities to promote and pursue health and hygiene amongst communities.

228. **Contractor.** Project being DBO contract, contractor will be required to review the IEE and provide information to consultant's ESS for update the IEE as per changed design and latest scope of works. The contractor shall appoint an Environment, Health and Safety (EHS) engineer who will be responsible on a day-to-day basis for (i) ensuring implementation of EMP, (ii) coordinating with the ACM and environment safeguards specialists (all levels PO, SO and ESS); (iii) community liaison, consultations with interested/affected parties, and grievance redress; and (iv) reporting. Requirement of EHS Supervisor will be included in the bid documents.

229. The Contractor will be required to submit to RUDSICO-EAP, for review and approval, a site-specific environmental management plan (SEMP) including (i) designed sites or locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring program per SEMP; (iv) budget for SEMP implementation. No works can commence prior to approval of SEMP by the PMU.

230. Table 15 and 16 summarize the institutional responsibility of environmental safeguards implementation at all stages of the project.

Figure 12: Safeguards Implementation - RSTDSP



231. **Project Management Unit.** RUDSICO will establish a state-level PMU, headed by dedicated project director, and housed in EAP division of RUDSICO. For the purpose of project implementation, two Zonal Project Implementation Units (Zonal PIUs), at Jaipur and Jodhpur, headed by Additional Chief Engineers (ACE) will be established. At PMU, there will be two dedicated project officers (i) Project Officer (Environment) and (ii) Project Officer (Social and Gender), who will be responsible for compliance with the environmental, social safeguards and gender in program implementation. Key responsibilities of the Project Officer (Environment) are as follows:

- (i) Review REA checklists and assign categorization based on ADB SPS 2009 and EARF
- (ii) Submit IEE to ADB for approval and disclosure in ADB website
- (iii) Ensure approved IEEs are disclosed in RSTDSP/PMU websites and summary posted in public areas accessible and understandable by local people.
- (iv) Ensure EMPs are included in the bid documents and contracts
- (v) Organize an orientation workshop for PMU, PIU, ULB and all staff involved in the project implementation on (a) ADB SPS, (b) Government of India national, state, and local environmental laws and regulations, (c) core labor standards, (d) OH&S, (e) EMP implementation especially spoil management, working in congested areas, public relations and ongoing consultations, grievance redress, etc.
- (vi) Assist in addressing any grievances brought about through the GRM

- (vii) Organize an induction course for the training of contractors preparing them on EMP implementation, environmental monitoring requirements related to mitigation measures; and taking immediate actions to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation.
- (viii) Ensure compliance with all government rules and regulations regarding site and environmental clearances as well as any other environmental requirements
- (ix) Assist PMU, PIUs, and project consultants to document and develop good practice construction guidelines to assist the contractors in implementing the provisions of IEE and EMP.
- (x) Assist in the review of the contractors' implementation plans to ensure compliance with the IEE.
- (xi) Review monthly monitoring reports submitted by PIUs, and prepare and submit to ADB semi-annual monitoring reports
- (xii) If necessary, prepare Corrective Action Plan and ensure implementation of corrective actions to ensure no environmental impacts;
- (xiii) Review and submit Corrective Action Plans to ADB
- (xiv) Coordinate with national and state level government agencies
- (xv) Coordinate PIUs, consultants and contractors on mitigation measures involving the community and affected persons and ensure that environmental concerns and suggestions are incorporated and implemented

232. The PMU will be supported by three institutional consultants under the supervision and control of PD, PMU: (i) the Project Management and Capacity Building Consultants (PMCBC) will support the PMU; (ii) 2 Construction Management and Supervision Consultants (CMSC) will support the 2 zonal PIUs and town-level PIUs; and (iii) Community Awareness and Public Participation Consultants (CAPPC), will support the zonal PIUs and town-level PIUs.

233. **Zonal Project implementation units (Zonal PIUs).** There will be two zonal level PIUs at Jaipur and Jodhpur. Under each zonal PIU, there will be city/town level PIUs, for ease of day-to-day monitoring and management at local level. The Additional Chief Engineer at each Zonal PIU will serve as the Nodal Officer, Safeguards and Gender. Each Zonal PIU will be staffed with an assistant safeguards officer (ASO Environmental and Social Safeguards) who will assist PMU project officer (environment/social) in implementation of the environmental/social safeguards and GESI Action Plan in PIUs under its jurisdiction. Zonal PIUs will undertake internal monitoring and supervision and record observations throughout the project period to ensure that the safeguards and mitigation measures are provided as intended.

234. The zonal level Assistant Safeguards Officer will oversee safeguards implementation by the city/town level PIUs, coordinate public consultations, information disclosure, regulatory clearances and approvals, implementation of resettlement plans, EMP implementation, and grievance redressal. Key safeguard tasks and responsibilities of the zonal PIU Assistant Safeguards Officer (Environment) are as follows:

- (i) Coordinate updating/revision of IEEs updated based on detailed design and technical studies (asbestos management, heritage impact assessment, and/or biodiversity assessment);
- (ii) Review and submit approved updated/revised IEE to PMU;
- (iii) Ensure relevant information in the IEE is disclosed to stakeholders;
- (iv) Obtain all necessary clearances, permits, consents, NOCs, etc. Ensure compliance to the provisions and conditions;

- (v) Ensure EMP requirements for pre-construction regarding sites for disposal of wastes, camps, storage areas, quarry sites, etc. are complied and communicated by town-level PIUs to contractors in a timely manner;
- (vi) Support town-level PIUs in supervising contractor EMP implementation. If necessary, organize an induction course upon mobilization of contractors, preparing them on EMP implementation, environmental monitoring requirements related to mitigation measures, and on taking immediate action to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation;
- (vii) Coordinate actions required for obtaining rights of way in timely manner;
- (viii) Take corrective actions when necessary to ensure no environmental impacts;
- (ix) Consolidate monthly environmental monitoring reports by town-level PIUs and submit to PMU;
- (x) Formulate timebound corrective actions for non-compliances
- (xi) Conduct continuous public consultation and awareness;
- (xii) Address any grievances in a timely manner as per the GRM; and
- (xiii) Issue clearance for contractor's post-construction activities as specified in the EMP.

235. Town/City Level Project Implementation Unit (PIU). The town-level PIUs shall be responsible for the quality of works executed under the project and will be guided by the zonal PIUs. The city/town PIUs will be responsible for implementation of the IEE. The town-level PIUs will be headed by a Project Manager [Executive Engineer (EE) or Assistant Engineer (AE)] and supported by CMSC field staff. Environment Specialist of CMSC will assist PIU in implementation of environmental safeguard. At each PIU, the Assistant Project Manager will be given additional responsibilities of safeguard tasks and will be designated as Safeguard and Safety Officer (SSO). The SSO will be assisted by the Social and Gender Specialist and Environment Specialist of CMSC in reviewing updated/revised IEEs, etc. They will also be responsible for coordination of field level activities related to safeguards conducted by the DBO contractor and CMSC. Key responsibilities of the town-level Environment Specialist are as follows:

- (i) Prepare REA Checklists, No Mitigation Checklists, baseline environmental surveys to support screening and categorization per EARF;
- (ii) Submit designed subproject categorization to Zonal PIU and coordinate with PMCBC the preparation of IEE and technical studies;
- (iii) Coordinate the conduct of technical studies such as but not limited to inventory of asbestos materials in subproject sites, heritage impact assessment and/or biodiversity assessment;
- (iv) Ensure IEEs are updated/revised based on detailed design and recommendations of technical studies;
- (v) Oversee day-to-day implementation of EMPs by contractors, including compliance with all government rules and regulations;
- (vi) Take necessary action for obtaining rights of way;
- (vii) Take corrective actions when necessary to ensure no environmental impacts;
- (viii) Submit monthly environmental monitoring reports to Zonal PIUs;
- (ix) Conduct continuous public consultation and awareness;
- (x) Address any grievances in a timely manner as per the GRM; and
- (xi) Issue clearance for contractor's post-construction activities as specified in the EMP.

236. Contractors. The contractor will be required to update the IEE and will be responsible for providing final design (including pipe alignments) to the supervision consultant for

finalization/updating of resettlement plan. The contractor shall appoint an Environment, Health and Safety (EHS) Engineer who will be responsible on a day-to-day basis for (i) ensuring implementation of EMP, (ii) coordinating with the Town-level PIUs and environment specialists of project consultant teams; (iii) community liaison,⁴⁰ consultations with interested/affected people, (iv) field-level grievance redress; and (iv) reporting.

237. The Contractor will be required to submit to RUDSICO, for review and approval, a site-specific environmental management plan (SEMP) including (i) designed sites or locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring program per SEMP; (iv) budget for SEMP implementation. No works can commence prior to approval of SEMP.

238. A copy of the EMP or approved SEMP will be kept on-site during the construction period at all times. Non-compliance with, or any deviation from, the conditions set out in the EMP or SEMP constitutes a failure in compliance and will require corrective actions. The EARF and the IEEs specify responsibilities in EMP implementation during design, construction and O&M phases.

239. **RUDSICO** will ensure that bidding and contract documents include specific provision requiring Contractors to comply with: (i) all applicable labor laws and core labor standards on (a) prohibition of child labor as defined in national legislation for construction and maintenance activities; (b) equal pay for equal work of equal value regardless of gender, ethnicity, or caste and (c) elimination of forced labor; and (ii) the requirement to disseminate information on sexually transmitted diseases including HIV/AIDS, to employees and local communities surrounding the project sites.

Table15: Safeguard Roles and Responsibilities

Implementation Arrangements	Roles and Responsibilities
Executing Agency: LSGD through RUDSICO	• Negotiate, sign, and execute the program. • Allocate and release government counterpart funds on time. • Facilitate obtaining timely Government-level approvals for smooth implementation of the program. • Monitor program implementation progress and ensure timely actions for completion of the project. • Plan, implement, and monitor public relations activities; gender mainstreaming initiatives and community participation activities, with the support of PIUs.
RUDSICO Board (like SLEC) Chairman: Minister of Urban Development Department, GOR Members: • Hon'ble Minister, LSGD	• Provide strategic guidance. • Provide policy decisions to support smooth program implementation. • Facilitate inter-departmental coordination and cooperation. • Support RUDSICO with government/ministerial level approvals. • Overall project review (physical, financial, safeguards)

⁴⁰ Reasonable size social outreach team (SOT) to be appointed by contractor to facilitate community liaison, consultations and R&R implementation (including resolution of grievances). Requirement of SOT will be included in bid document.

Implementation Arrangements	Roles and Responsibilities
• Secretary, LSGD – Vice Chairman • Principal Secretary, PHED -Director • Principal Secretary, PWD -Director • Secretary, Finance (Budget) Department -Director • Director, Department of Local Bodies • Executive Director, RUDSICO • Project Director, RUDSICO • Independent Director • Independent Director	• Approvals/Decisions as per approved SOP (Standard Operating Procedures – laying delegation of powers, Administrative and Financial Approval of works and services)
RUDSICO (with approval of RUDSICO board, as needed)	• Required support to review and monitor the physical and financial progress of the subprojects. • Provide additional technical support from RUDSICO Office (along with PMCBC) to PIUs for speedy resolution of implementation related issues such as variations, deviations, time and cost control, among others. • Provide backup technical support for review and finalization of DPRs, bid documents, bidding and award of contracts. • Review, appraise and put up matters to RUDSICO Board for approval, as described under “Delegation of Powers” • Overall Liaison, Monitoring and Reporting to DEA and ADB as per agreed requirements • Pursue GOR, through LSGD for approval of Policy, Rules, Guidelines, Government Orders for use in the state
Program Management Unit • Program Director: Project Director, RUDSICO • Additional Project Director, RUDSICO <u>PMU Staff</u> • 2 Zonal Additional Chief Engineers (Jaipur and Jodhpur). The Office of ACE to have Two EE, Two AE, Computer Operator, Support staff • Dy. PD(T) (Procurement, Tendering,	Program and Financial Management • Overall responsibility of the investment program and financial management and administering program procedures and guidelines. • Oversee design of all projects (in individual tranches as needed). • Finalize the DPRs for ULBs/implementing agencies and obtain approval from ADB and government. • Establish project management and monitoring systems (Command and Control Center) • Undertake project appraisals based on technical, financial, economic and safeguards compliance as agreed by GOR/RUDSICO and ADB. • Provide overall technical and implementation guidance to the PIUs as required. • Facilitate approval of various implementation related requests from the Project Implementation management and Field Units • Sign key documents including withdrawal applications and audit reports. • Timely submission of any withdrawal applications.

Implementation Arrangements	Roles and Responsibilities
Contracts, Consultancies) at RUDSICO HQ • Dy. PD(A) (Administration, Institutional) at RUDSICO HQ • SE's (Asset Management, NRW, Safeguards, Resettlement) at RUDSICO HQ • Financial Advisor at RUDSICO, Jaipur HQ • Senior Accounts Officer at RUDSICO, Jaipur HQ PMU at HO supported by: • Project Officers (7 Nos. EE level with POs for Procurement and contracts; NRW Reduction; Contract Management and O&M, Social Safeguards, Environmental Safeguards, Capacity Building etc.) • Accounts officers • Assistant Project Officers – on each with PO – AE level, Assistant Account Officer • IT Cell (project Management and Monitoring, GIS, MIS etc.) with MIS Expert • Statistical Unit • Legal Unit • Administration and Establishment	• Act as focal point for communication with the ADB. • Ensure compliance with loan covenants, ADB's guidelines, procedures and policies. • Facilitate ADB program review missions. • Represent the program at Tripartite Review Meetings. Safeguards compliance • Review and monitor safeguards compliance by PIUs and support corrective actions as necessary. • Submit semi-annual safeguard monitoring reports to ADB • Guide PIUs as and when necessary on safeguards compliance, and arrange capacity building for PIUs Capacity Building and Institutional • Allocate funds for capacity building and arrange required disbursements • Approve and Monitor Capacity Building Plan • Pursue reforms with GoR • Supervise and Monitor PMCB Consultants and approve their invoices
Project Implementation Units • 2 zonal PIUs (1 in Jaipur, 1 in Jodhpur) A. PIU Staff • Project Manager (SE level) • Executive Engineer / Assistant Engineer (2 or 3) at each	Project Management • Responsible for implementation management of sub-projects. • Responsible for day-to-day implementation, monitoring and reporting. Safeguards Compliance (with CAPPC) • Ensure compliance with safeguard frameworks and plans • Facilitate consultation with stakeholders and disclose program information in consultation with PMU.

Implementation Arrangements	Roles and Responsibilities
town for monitoring and supervision support • Assistant Accounts Officer • Computer Operator • Support Staff Supported by • Contract Management Officer (SE/EE of cluster shall invariably function as contract management officer) - No new position – • CMSC and CAPP Consultants (2 support engineers of CMSC at each town as per CMSc consultancy, 2 community mobilizers for each town – as per CAPP consultancy) besides required consultancy professionals reporting to EE)	• Address grievances (may be through Grievance Redressal Mechanism) Coordinate land acquisition actions, if required. • Submit quarterly safeguard monitoring reports to PMU. Advance Project Preparation • Prepare/supervise and monitor preparation of DPRs and bidding documents for future tranches.
ULBs	• Nodal Officers to be a part of PIU and discharge the assigned functions and part of project planning and implementation • Establish liaison with local communities, resolve local grievances for smooth implementation of the project • Support CAPP in awareness creation, connection modalities to household consumers etc.
Asian Development Bank	• Approve and monitor safeguards documents and implementation compliance. • Field review missions. • Facilitate knowledge sharing. • Provide training in program management and ADB procurement procedures to PMU/PIU staff. • Support LSGD, RUDSICO, PIUs etc. through various capacity building activities.

Table 16: Institutional Roles and Responsibilities

Responsible Agency	Responsibility		
	Pre-Construction Stage	Construction Stage	Post-Construction
PMU (Project Officer; Environment),	(i) Review REA checklists and assign categorization based on ADB SPS 2009 (ii) Review and approve EIA/IEE (iii) Submit EIA/IEE to ADB for approval and disclosure in	(i) Over-all environmental safeguards compliance of the project (iii) Monitor and ensure compliance of EMPs as well as any other environmental provisions and conditions.	Compliance monitoring to review the environmental performance of project component, if required and as specified in EMP

Responsible Agency	Responsibility		
	Pre-Construction Stage	Construction Stage	Post-Construction
	ADB website (iv) Ensure approved IEEs are disclosed in RSTDSP/PMU websites and summary posted in public areas accessible and understandable by local people. (v) Ensure environmental management plans (EMPs) are included in the bid documents and contracts (vi) Organize an orientation workshop for PMU, PIU, ULB and all staff involved in the project implementation on (a) ADB SPS, (b) Government of India national, state, and local environmental laws and regulations, (c) core labor standards, (d) OH&S, (e) EMP implementation especially spoil management, working in congested areas, public relations and ongoing consultations, grievance redress, etc. (vii) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs (viii) Organize an induction course for the training of contractors preparing them on EMP implementation, environmental monitoring requirements related to mitigation measures; and taking immediate actions to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation. (ix) Ensure compliance with all government rules and regulations regarding site and environmental clearances as well as any other environmental requirements (x) Assist PMU, PIUs, and project NGOs to document and develop good practice	(i) Review monthly monitoring report (ii) Prepare and submit to ADB semi-annual monitoring reports (iv) If necessary, prepare Corrective Action Plan and ensure implementation of corrective actions to ensure no environmental impacts; (iii) Review and submit Corrective Action Plans to ADB (iv) Organize capacity building programs on environmental safeguards v) Coordinate with national and state level government agencies vi) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs ix) Coordinate PIUs, consultants and contractors on mitigation measures involving the community and affected persons and ensure that environmental concerns and suggestions are incorporated and implemented	

Responsible Agency	Responsibility		
	Pre-Construction Stage	Construction Stage	Post-Construction
	construction guidelines to assist the contractors in implementing the provisions of IEE. (xi) Assist in the review of the contractors' implementation plans to ensure compliance with the IEE.		
PIU, Assistant Safeguard Officer	(i) Ensure IEE is included in bid documents and contract agreements. Ensure cost of EMP implementation is provided. (iv) Disclose of approved EIAs/IEEs. (v) Obtain all necessary clearances, permits, consents, NOCs, etc. Ensure compliance to the provisions and conditions. (vi) EMP implementation regarding sites for disposal of wastes, camps, storage areas, quarry sites, etc. (vii) Organize an induction course for the training of contractors, preparing them on EMP implementation, environmental monitoring requirements related to mitigation measures, and on taking immediate action to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation.	(i) oversee day-to-day implementation of EMPs by contractors, including compliance with all government rules and regulations. (i) take necessary action for obtaining rights of way; (ii) oversee implementation of EMPs, including environmental monitoring by contractors; (iv) take corrective actions when necessary to ensure no environmental impacts; (v) submit monthly environmental monitoring reports to PMU, (vi) conduct continuous public consultation and awareness; (vii) address any grievances brought about through the grievance redress mechanism in a timely manner as per the IEEs; and	(i) Conducting environmental monitoring, as specified in the EMP. (ii) Issuance of clearance for contractor's post-construction activities as specified in the EMP.
Consultant – 1. PMCBC-Environmental Safeguard Specialist – 1 no. Asbestos Expert – 1no. Heritage Expert – 1no. Biodiversity Expert – 1no.	(i) Review IEE/EMP submitted by CMSC and revise report to submit to PMU (ii) Assist PMU and PIU in obtaining all necessary clearances, permits, consents, NOCs, etc. Ensure provisions and conditions are incorporated in the IEE and detailed design documents. (iii) Assist in ensuring IEE is included in bid documents and contract agreements. (iv) Assist in determining adequacy of cost for EMP implementation.	(i) Monitor EMP implementation (ii) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs.	

Responsible Agency	Responsibility		
	Pre-Construction Stage	Construction Stage	Post-Construction
	(v) Assist in addressing any concern related to IEE and EMP. (vi). Conduct specific assessment requirements		
Consultant-2. CMSC-2 nos. Environmental safeguards professional	(i) Update initial environmental assessment for designed project using REA checklists and submit to PIU/PMCBC (ii) Assist in summarizing IEE and translating to language understood by local people.	(i) Monitoring of Implementation of EMP at site by contractor (ii) Recommend corrective action measures for non-compliance by contractors (iii) Assist in the review of monitoring reports submitted by contractors (iv) Assist in the preparation of monthly monitoring reports (v) conduct continuous public consultation and awareness;	(i) Assist in the inspection and verification of contractor's post-construction activities.
Contractors (EHS Engineer)	(i) Review the IEE and provide information about changes needed as per revised design and scope of works to ESS of PMCBC for final revision of IEE (ii) Prepare EHS plan and take approval from CMSC/PIU and Ensure EMP implementation cost is included in the methodology. (iii) Undergo EMP implementation orientation by ESS of supervision consultant prior to start of works (iv) Provide EMP implementation orientation to all workers prior to deployment to worksites (v) Seek approval for camp sites and sources of materials. (vi) Ensure copy of IEE is available at worksites. Summary of IEE is translated to language understood by workers and posted at visible places at all times.	(i) Implement EMP. (ii) Implement corrective actions if necessary. (iii) Prepare and submit monitoring reports including pictures to PIU (iv) Comply with all applicable legislation, is conversant with the requirements of the EMP; (v) Brief his staff, employees, and laborer about the requirements of the EMP and provide environmental awareness training to staff, employees, and laborers; (vi) Ensure any sub-contractors/ suppliers who are utilized within the context of the contract comply with all requirements of the EMP. The Contractor will be held responsible for non-compliance on their behalf; (vii) Bear the costs of any damages/compensation resulting from non-adherence to the EMP or written site instructions; (viii) Ensure that PIU and ACM/SO are timely informed of any foreseeable activities related to EMP	(i) Ensure EMP post-construction requirements are satisfactorily complied (ii) Request certification from PIU

Responsible Agency	Responsibility		
	Pre-Construction Stage	Construction Stage	Post-Construction
		implementation.	

C. Institutional Capacity and Development

240. Executing and implementing agencies need to have a sustained capacity to manage and monitor environmental safeguards. Although specialist consultants support will be available to PMU and PIUs, it is necessary to mainstream safeguards in day-to-day working. Therefore, PMU and PIUs require capacity building measures for (i) a better understanding of the project-related environmental issues; and (ii) to strengthen their role in preparation of IEE, implementation of mitigation measures, and subsequent monitoring. Trainings and awareness workshops are included in the project with the primary focus of enabling the PMU and PIU staff to understand impact assessments and carry out environmental monitoring and implement EMPs. After participating in such activities, the participants will be able to review environmental assessments, conduct monitoring of EMPs, understand government and ADB requirements for environmental assessment, management, and monitoring (short- and long-term), and incorporate environmental features into future project designs, specifications, and tender documents and carry out necessary checks and balances during project implementation.

241. PMCBC's ESSS shall assess the capabilities of the target participants, customize the training modules accordingly and provide the detailed cost.

242. Typical modules would be as follows: (i) sensitization; (ii) introduction to environment and environmental considerations in wastewater projects; (iii) review of IEEs and integration into the project detailed design; (iv) improved coordination within nodal departments; and (v) monitoring and reporting system. Specific modules customized for the available skill set will be devised after assessing the capabilities of the target participants and the requirements of the project. The contractors will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites. The proposed training project, along with the frequency of sessions, is presented in Table 17.

Table 171: Outline Capacity Building Program on EMP Implementation

Sl. No.	Description	Target Participants and Venue	Cost and Source of Funds
1	Introduction and Sensitization to Environmental Issues (1 day) - ADB Safeguards Policy Statement -EARF of RSTDSP -Government of India and Rajasthan applicable safeguard laws, regulations and policies including but not limited to core labor standards, OH&S, etc. -Incorporation of EMP into the project design and contracts -Monitoring, reporting and corrective action planning	All staff, ULBs and consultants involved in the project At PMU, Jaipur	PMU cost
2	Treated Effluent Reuse Concepts, Design and Management	All staff at PMU and ULBs	PMU cost
3	Sludge Reuse Concept, Design and Management	All staff at PMU and ULBs	PMU cost

Sl. No.	Description	Target Participants and Venue	Cost and Source of Funds
4	EMP implementation (2 days) -Roles and responsibilities -OH&S planning and implementation -Wastes management (water, hazardous, solid, excess construction materials, spoils, etc.) -Working in congested areas, - Public relations - Consultations - Grievance redress -Monitoring and corrective action planning -Reporting and disclosure -Post-construction planning	All staff and consultants involved in the subproject All contractors before start of construction works At PIU	PMU cost
5	Plans and Protocols (1 day) -Construction site standard operating procedures (SOP) -Asbestos Management Plan -Heritage Impact Assessment -Biodiversity and Critical Habitat Assessment - Site-specific EMP -Traffic management plan -Spoils management plan -Waste management plan - Chance find protocol - O&M plans - Post-construction plan	All staff and consultants involved in the project All contractors before start of construction works or during mobilization stage. At PIU	PMU cost Contractors cost as compliance to contract provisions on EMP implementation
6	Experiences and best practices sharing - Experiences on EMP implementation - Issues and challenges - Best practices followed	All staff and consultants involved in the project All contractors All NGOs At PMU Jaipur	PMU Cost
7	Contractors Orientation to Workers on EMP implementation (OHS, core labor laws, spoils management, etc.)	All workers (including manual laborers) of the contractor prior to dispatch to worksite	Contractors cost as compliance to contract provisions on EMP implementation

D. Monitoring and Reporting

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

244. During construction, results from internal monitoring by the DBO contractor will be reflected in their monthly EMP implementation reports to the PIU and ACM, CMSC. Project officer (Environment) and ACM will review and advise contractors for corrective actions if necessary. Monthly report summarizing compliance and corrective measures taken will be prepared by safeguard officer with the assistance of ACM and submitted to PMU.

245. Quarterly report shall be prepared by CMSC and PIU and submitted to PMU for review and further actions.

246. Based on monthly and quarterly reports and measurements, PMCBC will draft semi-annual environmental report and submit PMU for their review and further submission to ADB (Appendix 23). Once concurrence from the ADB is received the report will be disclosed in the Project website.

247. The PMU will include safeguards implementation status in the quarterly progress report (QPR) using the suggested checklists in Appendix 22 and separate semi-annual environmental and social safeguards monitoring reports to ADB, which will be reviewed and disclosed on ADB's website. The monitoring reports will be prepared by PMU with assistance from the PMU-consultant and inputs from the PIU's safeguard officers, contractors and NGOs, where relevant. The status of safeguard implementation, issues, and corrective actions including associated cost and schedule are to be clearly reported to ADB. The status of safeguards implementation will also be discussed at each ADB review mission and with necessary issues and agreed actions recorded in Aide Memoires. ADB will also carry out annual environmental and/or social (including gender) reviews of the Project. The outline of the semi-annual environmental monitoring report is in Appendix 23. ADB's monitoring and supervision activities are carried out on an ongoing basis until a project completion report (PCR) is issued. Thus, semi-annual report, which may cover O&M of completed packages, will be submitted to ADB until PCR is issued.

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

E. EMP Implementation Cost

249. Most of the mitigation measures require the contractors to adopt good site practice, which should be part of their normal procedures already, so there are unlikely to be major costs associated with compliance. Regardless of this, any costs of mitigation by the construction contractors or consultants are included in the budgets for the civil works and do not need to be estimated separately here. Mitigation that is the responsibility of PIU/ULB will be provided as part of their management of the project, so this also does not need to be duplicated here. Cost for the capacity building program is included as part of the project.

Table 18: Cost Estimates to Implement the EMP

	Particulars	Stages	Unit	Total Number#	Rate (INR)	Cost (INR)	Costs Covered By
A.	Monitoring Measures						
1	Air quality monitoring	Pre - Construction	per sample	4*	4920	19680	Civil works contract
		Construction	per sample	48**	4920	236160	Civil works contract
2	Noise levels monitoring	Pre - Construction	Per sample	5*	1980	9900	Civil works contract
		Construction	Per sample	48**	1980	95040	Civil works contract
3	Ground Water	Pre - Construction	Per sample	4	6720	26880	Civil works contract
		Construction	Per sample	32	6720	215040	Civil works contract

	Particulars	Stages	Unit	Total Number#	Rate (INR)	Cost (INR)	Costs Covered By
4	Surface Water	Pre - Construction	Per sample	2	6720	13440	Civil works contract
		Construction	Per sample	15	6720	100800	Civil works contract
5	Soil Testing	Pre - Construction	Per sample	4	5800	23200	Civil works contract
		Construction	Per sample	40	5880	235200	Civil works contract
	Subtotal (A)					975340	
B.	Capacity Building						
1.	Introduction and sensitization to environment issues	Pre-construction	lump sum			100000	PMU Cost
2.	EMP implementation	Construction	lump sum			50000	PMU Cost
3.	Plans and Protocols	Construction	lump sum			25000	PMU Cost
			lump sum			25000	Civil works contract
4.	Experiences and best practices sharing	Construction/ Post-Construction	lump sum			100000	PMU Cost
5.	Contractors Orientation to Workers on EMP implementation	Prior to dispatch to worksite	Lump sum			25000	Civil works contract
	Subtotal (B)					3,25,000	
C	Civil Works						
1	Water Sprinkling for dust suppression	Construction	kl	3000	111	333000	Civil works contract
2	Barricading using 40 mm dia M. S. pipe ("B" class) and fixing suitably two rows of 100mm wide PVC Tape	Construction	m	230550	38.5	8876175	Civil works contract
3	Barricading using 40 mm dia M. S. pipe ("B" class) and fixing suitably two rows of 40 mm dia M. S. pipe ("B" class) as horizontal	Construction	Mtr	32900	50	1645000	Civil works contract

	Particulars	Stages	Unit	Total Number#	Rate (INR)	Cost (INR)	Costs Covered By
	members with nuts & bolts						
4	Barricading with Minimum 0.63mm thick GI corrugated sheets (minimum width of each sheet shall be 60 cm) for covering the barricading in one/ two rows one above another and painting in red and white stripes	Construction	Sq Mtr	59150	101	5974150	Civil works contract
5	Plantations of trees***	Construction	Per hectare	0.10	137200	13720	Civil works contract
6	Rainwater Harvesting for STP	Construction	Nos.	1	LS	1000000	Civil works contract
	Sub Total (C)					17842045	
	Total (A+B+C)				INR	19142385	

* STP, SPS, Proposed Pipelines location, labor camp/construction camp/storage yard

** STP, SPS, Pipelines/working locations, Labour Camp, Construction Camps on quarterly basis

*** In preliminary design no trees are required to be cut, being DBO contract, contractor will be required to revise it. Compensatory plantation measures to be followed by contractor

Computation of total number of samples for monitoring as per Appendix 24.

X. CONCLUSION AND RECOMMENDATION

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

251. The STP of 7.0 MLD is designed based on SBR (sequential batch reactor) process, followed by disinfection. As the bid is DBO type, detailed design of the STP will be carried out by the contractor to the following specific discharge standards. Currently for STPs in India, the standards notified by Ministry of Environment, Forests and Climate Change (MOEFCC) in 2017 and subsequently latest NGT order dated 30.04.2019 are applicable. However, under RSTDSP,

PMU has decided to base the STP design on discharge standards for STPs suggested by CPCB in 2015 & NGT order dated 30. 04. 2019, which are more stringent. The stringent standards also facilitate maximum utilization of treated wastewater for reuse in various purposes following the Sewerage and Wastewater Policy, 2016, of Rajasthan. The treated wastewater will be reused, and a Reuse plan will be prepared during the detailed design. Various measures are suggested for safe reuse of wastewater and sludge.

252. There are no wildlife reported at this site. In sewerage network of Pratapgarh town two sewage pumping stations has been proposed looking to the topography of the town. For SPS 1 is of capacity 0. 25 MLD and land has been identified by the local body near Govt. Secondary School in ward no 19. There are residences and school near the site therefore all the precautions should be taken during construction to minimize the impacts on nearby residents. No vegetation exists (except bushes) at site therefore no tree cutting is anticipated. Capacity of SPS 2 is 7 MLD and land has been identified by the local body near Depaswar talab. This SPS will transfer all the sewage to STP. The land required for the same is available for the construction by the ULB. Being a DBO Contract, contractor is expected to explore design alternatives and avoid anticipated impact through careful planning.

253. Designed STP sites are away from habitations and surrounded by agricultural lands. Some trees and shrubs are present at these sites. No habitation exists within 200 m. Treated wastewater which is excess / surplus of reuse will be disposed into disposal ponds. No impacts envisaged as the water courses are mostly dry and carries untreated wastewater except during monsoon.

254. Except sewer works, all other construction activities will be confined to the selected sites, and the interference with the general public and community around is minimal. There will be temporary negative impacts, arising mainly from construction dust and noise, hauling of construction material, waste and equipment on local roads (traffic, dust, safety etc.), mining of construction material, occupation health and safety aspects. Sewer line works will be conducted along public roads in an urban area congested with people, activities and traffic, subproject is likely to significant impacts during construction. Impacts mainly arise from the construction dust and noise; from the disturbance of residents, businesses, traffic by the construction work, safety risk to workers, public and nearby buildings due to deep trench excavations, especially in narrow roads, dust, access impediment to houses and business, disposal of large quantities of construction waste, etc. These are all general impacts of construction in urban areas, and there are well developed methods of mitigation that are suggested in the EMP. Trenchless method will be adopted for sewers deeper than 3. 5 m and also at main road crossings in traffic areas.

255. Once the new system is operating, the facilities will operate with routine maintenance, which should not affect the environment. Improved system operation will comply with the operation and maintenance manual and standard operating procedures to be developed for all the activities.

256. 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 PMU. There will also be longer-term surveys to monitor raw and treated water quality, treatment efficiency of STP (raw and treated sewage quality), sludge at STP. Mitigation and monitoring measures, along with the project agency responsible for such actions, form part of the Environmental Management Plan.

257. Certain new initiatives have been taken in the project viz., promoting wastewater reuse, sludge reuse and contractor to work on private properties to provide sewerage connections. Hence, appropriate guidelines for these measures should be provided for these new initiatives. These could include viz., Guidelines for the ULBs for promoting wastewater reuse; Guidelines for the ULBs for sludge reuse; and Guidelines for the Contractors to work within the private properties. In the project, in a large portion of the project town areas, the septic tank system in individual households is replaced with direct connections to the new sewerage network. The impacts and mitigation measures from the existing septic tank that need to be closed should be identified in the Operation Phase

258. Stakeholders were involved in developing the IEE through face-to-face discussions, on site meetings, and a city level consultation workshop, which was conducted for larger public participation in the project. Views expressed by the stakeholders were incorporated into the IEE and the planning and development of the project. The IEE will be made available at public locations and will be disclosed to a wider audience via the PMU and ADB websites. The consultation process will be continued during project implementation to ensure that stakeholders are engaged in the project and have the opportunity to participate in its development and implementation. The project's grievance redress mechanism will provide the citizens with a platform for redress their grievances, and describes the informal and formal channels, time frame, and mechanisms for resolving complaints about environmental performance.

259. The EMP will be included in the bid and contract documents to ensure compliance with the conditions set out in this document. The contractor will be required to submit to PIU, for review and approval, an updated EMP / site environmental management plan (SEMP) including (i) designed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; and (iii) monitoring program as per EMP. The EMP shall be made binding on all contractors operating on the site and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document shall constitute a failure in compliance. No works can commence prior to approval of SEMP. A copy of the EMP/approved SEMP will always be kept on site during the construction period.

260. The citizens of the Pratapagarh will be the major beneficiaries of the new sewerage systems. The subproject is primarily designed to improve environmental quality and living conditions of Pratapagarh town through provision of sewerage. The benefits arising from this subproject include: (i) better public health particularly reduction in waterborne and infectious diseases; (ii) reduced risk of groundwater contamination; (v) reduced risk of contamination of treated water supplies; and, (vi) improvement in quality of water bodies due to disposal of treated effluent meeting disposal standards.

261. Therefore, as per ADB SPS, the project is classified as environmental category B and does not require further environmental impact assessment. However, to conform to government guidelines STP requires consent to establishment (CTE) and consent to operate (CTO) from Rajasthan State Pollution Control Board. CTE will be obtained prior to construction, as the detailed designs will be undertaken by contractor.

262. **Recommendations.** The following are recommendations applicable to the subproject to ensure no significant impacts:

- (i) Obtain all statutory clearances at the earliest time possible and ensure

- conditions/provisions are incorporated in the detailed design;
- (ii) Include this IEE in bid and contract documents;
- (iii) Update and implement the recommendations from the biodiversity assessment report;
- (iv) Update/revise this IEE based on detailed design and/or if there are unanticipated impacts, change in scope, alignment, or location;
- (v) Conduct safeguards induction to the contractor upon award of contract;
- (vi) Strictly supervise EMP implementation.
- (vii) Ensure contractor appointed qualified EHS officers prior to start of works;
- (viii) Documentation and reporting on a regular basis as indicated in the IEE;
- (ix) Continuous consultations with stakeholders;
- (x) Timely disclosure of information and establishment of grievance redressal mechanism (GRM);
- (xi) Involvement of contractors, including subcontractors, in first-level GRM;
- (xii) Commitment from PMU, PIUs, project consultants, and contractors to protect the environment and the people from any impact during project implementation.

263. This IEE shall be updated by PMU during the detailed design phase to reflect any changes, amendments and will be reviewed and approved by ADB.

Appendix 1: Rapid Environmental Assessment (REA) Checklist

Sewerage treatment

Instructions:

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

This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development. Answer the questions assuming the “without mitigation” case. The purpose is to identify potential impacts. Use the “remarks” section to discuss any anticipated mitigation measures.

Country/Project Title: India/Rajasthan Secondary Towns Development Sector Project (RSTDP)/Pratapgarh Wastewater Management Project, Rajasthan

Sector Division: Urban Development (Sewerage Treatment)

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting Is the project area...			
Densely populated?	√		Subproject activities extend to the entire town including the densely populated areas. There are no major negative impacts envisaged, because pipeline will be located within ROW alongside the existing roads and can be constructed without causing disturbance to, houses, and commercial establishments. STP site is sufficient away from habitations.
Heavy with development activities?	√		Pratapgarh is a developing town; urban expansion is considerable
Adjacent to or within any environmentally sensitive areas?		√	There are no any environmentally sensitive areas within or near to any proposed site
Cultural heritage site		√	
Protected Area		√	
Wetland		√	
Mangrove		√	
Estuarine		√	
Buffer zone of protected area		√	
Special area for protecting biodiversity		√	
Bay		√	
Potential Environmental Impacts Will the Project cause...			

SCREENING QUESTIONS	Yes	No	REMARKS
Impairment of historical/cultural monuments/areas and loss/damage to these sites?		√	No
Interference with other utilities and blocking of access to buildings; nuisance to neighboring areas due to noise, smell, and influx of insects, rodents, etc.?	√		Sewers will be laid underground and will be located away from water lines maintaining the minimum distance according to standards. Construction work may interfere with the power and communication lines, but resultant impact will be minimized with co-ordination of concerned agencies in finalization of best alignment and shifting of utilities, if required.
dislocation or involuntary resettlement of people	√		Project does not involve land acquisition / involuntary resettlement /displacement. During the sewer construction, particularly in narrow streets and streets with commercial activities, there may be temporary disruption or relocation of hawkers and vendors. These are addressed through preparation of resettlement plan.
disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	No such possibilities; sewerage system will cover entire population including urban poor; In fact, it will have positive health impact due to improved sanitation condition.
Impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage?		√	All the treated effluent from STP shall be utilized in agriculture and other uses, no discharge of treated effluent is proposed.
Overflows and flooding of neighboring properties with raw sewage?		√	Sewerage system has been designed considering the population growth. It has been designed to accommodate sewage until design year. Design considers standard peak factors and therefore no such impact envisaged.
Environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers?	√		Inadequate sludge disposal may cause environmental pollution and proper planning of sludge disposal from STP should be done during detail design. This sewerage system will cater only to domestic wastewater, no industrial wastewater discharge is allowed into the sewerage system.
Noise and vibration due to blasting and other civil works?		√	Blasting for underground works is prohibited in RUDSICO (EAP) works. Road cutting works for sewers is likely to generate noise. Scheduling of works appropriately and prior information to the affected people will minimize the impact.

SCREENING QUESTIONS	Yes	No	REMARKS
risks and vulnerabilities related to occupational health and safety due to physical, chemical, and biological hazards during project construction and operation?	√		Occupational health and safety risk are negligible due to chemical and biological hazards during construction in sewerage works, physical hazards may arise due to safety risks during construction works. During operation of sewerage system physical and biological hazards may cause health and safety risks to workers for which mitigation measures will be required
Discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers?		√	This sewerage system will cater only to domestic wastewater, no industrial wastewater discharge is allowed into the sewerage system. As a precaution, domestic wastewater from industrial units will also not be allowed into sewers.
Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances, and protect facilities?	√		STP is isolated through boundary wall and dense plantation will be done to avoid nuisance.
Road blocking and temporary flooding due to land excavation during the rainy season?	√		Road blocking for pipe laying works may be required and mitigation measures are required as per IEE/EMP. Underground construction works (sewer laying, foundations) should be carried out in non-monsoon period to avoid flooding.
Noise and dust from construction activities?	√		Road cutting (cement and bituminous roads) for sewer laying works is likely to generate noise. Scheduling of works appropriately and prior information to the affected people will minimize the impact. Dust generation will be controlled through water sprinkling, immediate transportation of excess soil, covered transport etc.
traffic disturbances due to construction material transport and wastes?	√		Linear activities like sewer laying along the roads is likely to disrupt traffic. Vehicle movement for construction purpose will increase the traffic. Identification of alternate routes, allowing limited - at least one-way traffic, prior information about the works and alternative arrangements, providing information/sign boards etc. will reduce the impact.
temporary silt runoff due to construction?	√		Mitigation measures will be required to check temporary silt run of due to construction works

SCREENING QUESTIONS	Yes	No	REMARKS
hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?	√		Sewerage system will be designed with applicable standards. Adequate trained staff and necessary equipment will be in place for regular operation and maintenance of the system. Proposed treatment system will be efficient and appropriate repair and maintenance procedure will be developed. Sufficient funds for operation will be ensured. Backup power supply system is part of project.
deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?	√		Inadequate sludge disposal or direct discharge of untreated sewage water may have impact on environment therefore adequate measure of sludge disposal and prohibit discharge of untreated sewage should be taken
contamination of surface and ground waters due to sludge disposal on land?	√		Inadequate sludge disposal on land can contaminate ground water and surface water and measures of adequate sludge disposal should be taken to avoid any environmental impact
Health and safety hazards to workers from toxic gases and hazardous materials which may be contained in sewage flow and exposure to pathogens in sewage and sludge?	√		Necessary apparatus and personal protection equipment should be provided to prevent workers from exposures to hazardous materials and toxic gases. Staff should be trained in safe handling of sewage and in mechanized cleaning of sewers
large population increase during project construction and operation that causes increased burden on social infrastructure (such as sanitation system)?		√	Most of the unskilled workers will be hired locally, some of skilled workers will be brought from outside but numbers will not so large to have impacts on social infrastructure and services
Social conflicts between construction workers from other areas and community workers?		√	The contractor will be utilizing the local labour force as far as possible; in case if it is unavoidable, labour camps and facilities will be provided appropriately. No conflicts envisaged
community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community during construction?		√	No explosives shall be used in project. Fuel and other chemicals will be used in very less quantities which will not have significant impact on community health and safety. Safe handling of fuels and chemicals will be ensured by contractor.
community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	√		Community safety risk may be there during construction during excavation for pipe laying, equipment and vehicle operation, construction of STP and SPS etc. for which mitigation measures will be required by contractor

Checklist for Preliminary Climate Risk Screening

Country/Project Title: India/Rajasthan Secondary Towns Development Sector Project (RSTDP), Pratapgarh Wastewater Project, Rajasthan

Sector: Urban Development

Subsector: Wastewater

Division/Department: SARD/SAUW

Screening Questions		Score	Remarks ⁴¹
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	0	No such issue may affect the project
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc.)?	0	No such issue may affect the project
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	No such issues may affect the project
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	0	No such issue may affect the project
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	No problem will envisaged in future which likely affect the performance of project output

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response will be categorized as high-risk project.

⁴¹ If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

Result of Initial Screening (Low, Medium, High): Low

Other Comments: The proposed subproject activity involves construction of one new STP and the anticipated environmental impacts are very marginal and the construction activity does not impose any threat to the existing climatic conditions.

Appendix 2: Compliance with Environmental Criteria for Subproject Selection

Components	Criteria	Design Considerations (if criterion is not met)	Compliance
All subprojects			
	Subproject will avoid potentially significant adverse impacts that are diverse, irreversible or unprecedented (ADB SPS Category A for environment).		Being complied, the proposed components of subproject are proposed in already developed area and all impacts are predictable and mitigation measures are part of project design
	Comply with all requirements of ADB SPS 2009 and follow procedures set in this environmental assessment and review framework (EARF)		Being complied
	Comply with relevant national, and local laws, rules and regulations regarding EIA, environmental protection, pollution prevention (water, air, noise, solid waste, etc.) wildlife protection, core labor standards, physical cultural resources, health and safety, and other laws in specific sectors as indicated below		Being complied
	Does not include and/or involve any activities listed in ADB's Prohibited Investment Activities List ⁴²		Being complied
	Reflect inputs from public consultations	Refer to ADB SPS requirements on meaning consultations ⁴³	Being complied
Location	Avoid involuntary resettlement by prioritizing rehabilitation over new construction using vacant government land where possible, and taking all possible measures in design and selection of site or alignment to avoid resettlement impacts	If cannot be avoided, prepare Resettlement Plan.	Being complied
	Avoid or minimize the cutting	If tree is to be cut, consider 1:3	Being complied

⁴² ADB SPS Appendix 5.

⁴³ Per ADB SPS, meaningful consultation is defined as “a process that (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle; (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues”

Components	Criteria	Design Considerations (if criterion is not met)	Compliance
	of trees	replacement	
Biodiversity	Avoid locating subprojects in critical habitats, such as, but not limited to, wildlife/bird sanctuaries, national parks, tiger reserves, elephant reserves, conservation reserves or core zone of biosphere reserves. Appendix 1 provides preliminary analysis using the International Biodiversity Assessment Tool (IBAT) key biodiversity areas, protected areas, IUCN red list species and likelihood of critical habitats per town. Should not directly affect environmentally protected areas, core zones of biosphere reserves and highly valued habitat	If criteria is not met, this is potential for Category A therefore alternate location should be considered. A Biodiversity Expert shall assess and confirm critical habitat qualification. Appendix 2 provides a Biodiversity Assessment Report prepared for a sample subproject (Abu Road water and sewerage subproject).	Being complied
	If work is proposed with the aim of improving the conservation or management of designated subproject sites (e.g. improved drainage), this must only be undertaken: (i) after a comprehensive study and development of management plans and criteria; and (ii) with the direct involvement and approval of national and local bodies responsible for the subproject site.		Being complied
Physical Cultural Resources	Should not result in the destruction/damage of or encroachment onto physical cultural resources (PCR)⁴⁴ such as archaeological monuments; heritage sites and movable or immovable objects, sites, structures, group of structures, and natural features and landscapes that have	If location is within 300 m of notified protected monuments/sites and there is no alternative, permissions from the ASI or State Department of Archaeology to be obtained prior to finalization of detailed engineering design. If potential physical cultural resources are found within or adjacent to project sites, a Heritage Impact	Being complied

⁴⁴ Physical cultural resources as defined as “movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings and may be above or below ground or underwater. Their cultural interest may be at the local, provincial, national, or international level.”

Components	Criteria	Design Considerations (if criterion is not met)	Compliance
	archaeological, paleontological, historical, architectural, religious, aesthetic or other cultural significance.	Assessment is required to be conducted by a competent expert.	
Existing Facilities to be rehabilitated or expanded	Conduct environmental audit of existing facilities ⁴⁵ per ADB SPS	For non-compliances, provide corrective action for each area of concern including cost and schedule to be included in the subproject EMP.	Being complied
Associated Facilities ⁴⁶	Analyze environmental impacts and risks to be included in the IEE		Being complied
Asbestos-containing materials (ACM) including, but not limited to, pipes, roofing, ceilings, insulation materials, excess pipes stored in PHED campuses, walls, etc.	Avoid handling or removing any ACM. Ensure asbestos concrete (AC) pipes facilities containing asbestos will not be disturbed and left in-situ. Appendix 4 provides asbestos management plan.	If ACM is suspected, asbestos verification by a competent expert is required and an asbestos management plan (AMP) prepared. Appendix 4 provides a sample AMP prepared for a sample subproject (Sardarshahar water and sewerage subproject). RUDSICO-EAP shall include AMP in all contracts. Contractor should be certified to handle ACM.	Being complied
	When designing subproject infrastructure that involves excavation in urban areas the relevant authorities must be consulted to ascertain the location of any ACM prior to any subproject activity. Locations of new infrastructure must then be designed to avoid excavating or disturbing any ACM.		Being complied
Right-of-way	Locate water supply pipelines within the right of way (ROW) of other linear structures (roads, irrigation canals) as far as possible, to reduce new land acquisition.		Being complied
	Ensure that pipelines ROW do not require land acquisition from individual farmers that is		Being complied

⁴⁵ ADB SPS Appendix 4 para 12 on Existing Facilities

⁴⁶ ADB SPS Appendix 1 para 6 defines associated facilities as “not funded as part of the project (funding may be provided separately by the borrower/client or by third parties), and whose viability and existence depend exclusively on the project and whose goods or services are essential for successful operation of the project”

Components	Criteria	Design Considerations (if criterion is not met)	Compliance
	a significant proportion of their total land holding (>10%).		
Sewage System			
Location	Locate new Sewage Treatment Plants (STP) as far as should be at least 500m away from any inhabited areas, in locations where no urban expansion is expected in the next 20 years, thus establishing a buffer to reduce effects of odor, visual appearance or other nuisance of the site (this may be reviewed depending on the technology adopted for the treatment of effluent).	In case of non-availability of suitable sites due to land and technical design constraints in already developed areas, where 500 m buffer is not available, following procedures shall be adopted and documented in order to finalize sites for implementation of project: (i) conduct alternate site analysis, justify the selected site; (ii) develop odor mitigation measures to prevent and control odor/air emissions – design measures, and operational practices that are feasible and practical in local conditions and include in DPR; (iii) develop layout plan with maximum buffer to nearby houses; (iv) provide a peripheral green buffer (at least three rows of trees within the pumping station compound); and (v) public information – consult local community, inform about the need, process adopted to select sites, its suitability, and measures adopted for odor prevention and control	Being complied
	Locate Sewage Pumping Stations (SPS) and wet wells as far as should be at least 100m away from any inhabited areas and from sites such as hospitals, schools, temples, etc. to minimize nuisance impacts from odor, rodents, etc.	In case of non-availability of suitable sites due to land and technical design constraints in already developed areas, where 100 m buffer is not available, following procedures shall be adopted and documented in order to finalize sites for implementation of project: (i) conduct alternate site analysis, justify the selected site; (ii) develop odor mitigation measures to prevent and control odor/air emissions – design measures, and operational practices that are feasible and practical in local conditions and include in IEE; (iii) develop layout plan with maximum buffer to nearby	Being complied

Components	Criteria	Design Considerations (if criterion is not met)	Compliance
		houses; (iv) provide a peripheral green buffer (at least three rows of trees within the STP compound); and (v) public information – consult local community, inform about the need, process adopted to select sites, its suitability, and measures adopted for odor prevention and control	
	Locate STP at sites where there is no risk of flooding or other hazards that might impair function of the STP or present a risk of damage to the STP or the surrounding area		Being complied
Quality	Ensure that sewage is treated at all times to national wastewater discharge standards and confirm this by regular monitoring of effluent from the STP.		Being complied
Design	Ensure that no wastewater is discharged into a water course in which it could be a hazard to downstream users (e.g. a waterway that is used as a source of water for domestic or municipal supply)		Being complied
	Include measures to ensure the safe disposal of sewage sludge and if possible, to promote its safe and beneficial use as an agricultural fertilizer ⁵		Being complied
Right-of-way	Locate sewage pipelines within the right of way (ROW) of other linear structures (e.g. roads) wherever feasible, to reduce new land acquisition.		Being complied
	Ensure that routes of sewage mains do not require land acquisition from individual farmers that is a significant proportion of their total land holding (10%)		Being complied

Appendix 3: Ambient Air Quality, Vehicle, Diesel Generator Emissions Standards

Ambient Air Quality Standards

Parameter	Location ^a	India Ambient Air Quality Standard ($\mu\text{g}/\text{m}^3$) ^b	WHO Air Quality Guidelines ($\mu\text{g}/\text{m}^3$)		Applicable Per ADB SPS ^e ($\mu\text{g}/\text{m}^3$)
			Global Update ^c 2005	Second Edition 2000	
PM ₁₀	Industrial Residential, Rural and Other Areas	60 (Annual) 100 (24-hr)	20 (Annual) 50 (24-hr)	-	20 (Annual) 50 (24-hr)
	Sensitive Area	60 (Annual) 100 (24-hr)	20 (Annual) 50 (24-hr)	-	20 (Annual) 50 (24-hr)
PM ₂₅	Industrial Residential, Rural and Other Areas	40 (Annual) 60 (24-hr)	10 (Annual) 25 (24-hr)	-	10 (Annual) 25 (24-hr)
	Sensitive Area	40 (Annual) 60 (24-hr)	10 (Annual) 25 (24-hr)		10 (Annual) 25 (24-hr)
SO ₂	Industrial Residential, Rural and Other Areas	50 (Annual) 80 (24-hr)	20 (24-hr) 500 (10-min)	-	50 (Annual) 20 (24-hr) 500 (10-min)
	Sensitive Area	20 (Annual) 80 (24-hr)	20 (24-hr) 500 (10-min)	-	20 (Annual) 20 (24-hr) 500 (10-min)
NO ₂	Industrial Residential, Rural and Other Areas	40 (Annual) 80 (24-hr)	40 (Annual) 200 (1-hr)	-	40 (Annual) 80 (24-hr) 200 (1-hr)
	Sensitive Area	30 (Annual) 80 (24-hr)	40 (Annual) 200 (1-hr)	-	30 (Annual) 80 (24-hr) 200 (1-hr)
CO	Industrial Residential, Rural and Other Areas	2,000 (8-hr) 4,000 (1-hr)	-	10,000 (8-hr) 100,000 (15-min)	2,000 (8-hr) 4,000 (1-hr) 100,000 (15-min)
	Sensitive Area	2,000 (8-hr) 4,000 (1-hr)	-	10,000 (8-hr) 100,000 (15-min)	2,000 (8-hr) 4,000 (1-hr) 100,000 (15-min)
Ozone (O ₃)	Industrial Residential, Rural and Other Areas	100 (8-hr) 180 (1-hr)	100 (8-hr)		100 (8-hr) 180 (1-hr)
	Sensitive Area	100 (8-hr) 180 (1-hr)	100 (8-hr)		100 (8-hr) 180 (1-hr)
Lead (Pb)	Industrial, Residential, Rural and Other Areas	0.5 (Annual) 1.0 (24-hr)		0.5 (Annual)	0.5 (Annual) 1.0 (24-hr)
	Sensitive Area	0.5 (Annual) 1.0 (24-hr)		0.5 (Annual)	0.5 (Annual) 1.0 (24-hr)
Ammonia (NH ₃)	Industrial Residential,	100 (Annual) 400 (24-hr)			100 (Annual) 400 (24-hr)

Parameter	Location ^a	India Ambient Air Quality Standard ($\mu\text{g}/\text{m}^3$) ^b	WHO Air Quality Guidelines ($\mu\text{g}/\text{m}^3$)		Applicable Per ADB SPS ^e ($\mu\text{g}/\text{m}^3$)
			Global Update ^c 2005	Second Edition 2000	
	Rural and Other Areas				
	Sensitive Area	100 (Annual) 400 (24-hr)			100 (Annual) 400 (24-hr)
Benzene (C_6H_6)	Industrial Residential, Rural and Other Areas	5 (Annual)			5 (Annual)
	Sensitive Area	5 (Annual)			5 (Annual)
Benzo(o)pyrene (BaP) particulate phase only	Industrial Residential, Rural and Other Areas	0.001 (Annual)			0.001 (Annual)
	Sensitive Area	0.001 (Annual)			0.001 (Annual)
Arsenic (As)	Industrial Residential, Rural and Other Areas	0.006 (Annual)			0.006 (Annual)
	Sensitive Area	0.006 (Annual)			0.006 (Annual)
Nickel (Ni)	Industrial Residential, Rural and Other Areas	0.02 (Annual)			0.02 (Annual)
	Sensitive Area	0.02 (Annual)			0.02 (Annual)

^a Sensitive area refers to such areas notified by the India Central Government.

^b Notification by Ministry of Environment and Forests, Government of India Environment (Protection) Seventh Amendment Rules, 2009

^c WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide. *Global update 2005*. WHO. 2006

^d Air Quality Guidelines for Europe Second Edition. WHO 2000.

^e Per ADB SPS, the government shall achieve whichever of the ambient air quality standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS

Table 2: Vehicle Exhaust Emission Norms

1. Passenger Cars

Norms	CO (g/km)	HC+ NOx (g/km)
1991 Norms	14.3-27.1	2.0(Only HC)
1996 Norms	8.68-12.40	3.00-4.36
1998 Norms	4.34-6.20	1.50-2.18
India stage 2000 norms	2.72	0.97
Bharat stage-II	2.2	0.5
Bharat Stage-III	2.3	0.35(combined)
Bharat Stage-IV	1.0	0.18(combined)
Bharat Stage-VI (Petrol)	1.0	0.16 (Combined)

2. Heavy Diesel Vehicles

Norms	CO (g/kmhr)	HC (g/kmhr)	NOx (g/kmhr)	PM (g/kmhr)
1991 Norms	14	3.5	18	-
1996 Norms	11.2	2.4	14.4	-
India stage 2000 norms	4.5	1.1	8.0	0.36
Bharat stage-II	4.0	1.1	7.0	0.15
Bharat Stage-III	2.1	1.6	5.0	0.10
Bharat Stage-IV	1.5	0.96	3.5	0.02
Bharat Stage-VI (Diesel)	0.5	0.17 (HC+NOx)		0.0045

Source: Central Pollution Control Board

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

Emission limits for New DG sets up to 800 KW (As per Environment (Protection) (Third Amendment) Rules, 2013)

TABLE

Power Category	Emission Limits (g/kW-hr)			Smoke Limit (light absorption coefficient, m ⁻¹)
	NOx+HC	CO	PM	
Upto 19 KW	≤ 7.5	≤ 3.5	≤ 0.3	≤ 0.7
More than 19 KW upto 75 KW	≤ 4.7	≤ 3.5	≤ 0.3	≤ 0.7
More than 75 KW upto 800 KW	≤ 4.0	≤ 3.5	≤ 0.2	≤ 0.7

Note:

1. The abbreviations used in the Table shall mean as under: NO_x – Oxides of Nitrogen; HC – Hydrocarbon; CO – Carbon Monoxide; and PM – Particulate Matter.
2. Smoke shall not exceed above value throughout the operating load points of the test cycle.
3. The testing shall be done as per D2 – 5 mode cycle of ISO: 8178- Part 4.
4. The above mentioned emission limits shall be applicable for Type Approval and Conformity of Production (COP) carried out by authorised agencies.
5. Every manufacturer, importer or, assembler (hereinafter referred to as manufacturer) of the diesel engine (hereinafter referred to as 'engine') for genset application manufactured or imported into India or, diesel genset (hereinafter referred to as 'product'), assembled or imported into India shall obtain Type Approval and comply with COP of their product(s) for the emission limits which shall be valid for the next COP year or, the date of implementation of the revised norms specified above, whichever earlier.
Explanation. - The term 'COP year' means the period from 1st April to 31st March.
6. Stack height (in metres), for genset shall be governed as per Central Pollution Control Board (CPCB) guidelines.

DIESEL GENERATOR SETS : STACK HEIGHT

The minimum height of stack to be provided with each generator set can be worked out using the following formula :

$$H = h + 0.2 \times \sqrt{\text{KVA}}$$

H = Total height of stack in metre

h = Height of the building in metres where the generator set is installed

KVA = Total generator capacity of the set in KVA

Based on the above formula the minimum stack height to be provided with different range of generator sets may be categorised as follows:

For Generator Sets	Total Height of stack in metre
50 KVA	Ht. of the building + 1.5 metre
50-100 KVA	Ht. of the building + 2.0 metre
100-150 KVA	Ht. of the building + 2.5 metre
150-200 KVA	Ht. of the building + 3.0 metre
200-250 KVA	Ht. of the building + 3.5 metre
250-300 KVA	Ht. of the building + 3.5 metre

Similarly for higher KVA ratings a stack height can be worked out using the above formula.

Source : Evolved By CPCB
[Emission Regulations Part IV:COINDS/26/1986-87]

Appendix 4: Effluent Discharge Standards for STPs order by NGT 30 April 2019

Sl. No.	Parameters	Parameters Limit
1	pH	5.5-9.0
2	BOD (mg/l)	Not more than 10 mg/l
3	COD (mg/l)	Not more than 50 mg/l
4	TSS (mg/l)	Not more than 20 mg/l
5	P-Total (mg/l)- for discharge into ponds/lakes	Not more than 1.0 mg/l
6	N-Total (mg/l)	Not more than 10 mg/l
7	Fecal Coliform (MPN/100ml)	Desirable- Less than 100 MPN/100ml Permissible- <230 MPN/100ml

Appendix 5: Ambient Air Quality Standards in Respect of Noise

Receptor/ Source	India National Noise Level Standards ^a (dBA)		WHO Guidelines Value For Noise Levels Measured Out of Doors ^b (One Hour LA _q in dBA)		Applicable Per ADB SPS ^c (dBA)	
	Day	Night	07:00 – 22:00	22:00 – 07:00	Day time	Night time
Industrial area	75	70	70	70	70	70
Commercial area	65	55	70	70	65	55
Residential Area	55	45	55	45	55	45
Silent Zone	50	40	55	45	50	40

^a Noise Pollution (Regulation and Control) Rules, 2002 as amended up to 2010.

^b Guidelines for Community Noise. WHO. 1999

^c Per ADB SPS, the government shall achieve whichever of the ambient air quality standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

Noise Limits for Diesel Generator Sets

Noise Limit for Generator Sets run with Diesel

- Noise limit for diesel generator sets (upto 1000 KVA) manufactured on or after the 1st January, 2005**

The maximum permissible sound pressure level for new diesel generator (DG) sets with rated capacity upto 1000 KVA, manufactured on or after the 1st January, 2005 shall be 75 dB(A) at 1 metre from the enclosure surface.

The diesel generator sets should be provided with integral acoustic enclosure at the manufacturing stage itself.

The implementation of noise limit for these diesel generator sets shall be regulated as given in paragraph 3 below.

- Noise limit for DG sets not covered by paragraph 1.**

Noise limits for diesel generator sets not covered by paragraph 1, shall be as follows:-

- Noise from DG set shall be controlled by providing an acoustic enclosure or by treating the room acoustically, at the users end.
- The acoustic enclosure or acoustic treatment of the room shall be designed for minimum 25 dB (A) insertion loss or for meeting the ambient noise standards, whichever is on the higher side (if the actual ambient noise is on the higher side, it may not be possible to check the performance of the acoustic enclosure/acoustic treatment. Under such circumstances the performance may be checked for noise reduction upto actual ambient noise level, preferably, in the night time). The measurement for Insertion Loss may be done at different points at 0.5 m from the acoustic enclosure/ room, then averaged.
- The DG set shall be provided with proper exhaust muffler with insertion loss of minimum 25 dB (A).

2.4 These limits shall be regulated by the State Pollution Control Boards and the State Pollution Control Committees.

2.5 Guidelines for the manufacturers/ users of Diesel Generator sets shall be as under:-

01. The manufacturer shall offer to the user a standard acoustic enclosure of 25 dB (A) insertion loss and also a suitable exhaust muffler with insertion loss of 25 dB(A).
02. The user shall make efforts to bring down the noise levels due to the DG set, outside his premises, within the ambient noise requirements by proper citing and control measures.
03. Installation of DG set must be strictly in compliance with the recommendations of the DG set manufacturer.
04. A proper routine and preventive maintenance procedure for the DG set should be set and followed in consultation with the DG set manufacturer which would help prevent noise levels of the DG set from deteriorating with use.

3.0 Limits of Noise for DG Sets (upto 1000 KVA) Manufactured on or after the 1st January, 2005

3.1 Applicability

01. These rules apply to DG sets upto 1000 KVA rated output, manufactured or imported in India, on or after 1st January, 2005.
02. These rules shall not apply to –
 - a) DG sets manufactured or imported for the purpose of exports outside India; and
 - b) DG sets intended for the purpose of sample and not for sale in India.

3.2 Requirement of Certification

Every manufacturer or assembler or importer (hereinafter referred to as the "manufacturer") of DG set (hereinafter referred to as "product") to which these regulations apply must have valid certificates of Type Approval and also valid certificates of Conformity of Production for each year, for all the product models being manufactured or assembled or imported from 1st January, 2005 with the noise limit specified in paragraph 1.

3.3 Sale, import or use of DG sets not complying with the rules prohibited

No person shall sell, import or use of a product model, which is not having a valid Type Approval Certificate and Conformity of Production certificate.

Appendix 6: Extract from Construction and Demolition Management Rules, 2016

[Published In the Gazette of India, Part-II, Section-3, Sub-section (ii)]
Ministry of Environment, Forest and Climate Change

NOTIFICATION

New Delhi, the 29th March, 2016

G.S.R. 317(E).—Whereas the Municipal Solid Wastes (Management and Handling) Rules, 2000 published vide notification number S.O. 908(E), dated the 25th September, 2000 by the Government of India in the erstwhile Ministry of Environment and Forests, provided a regulatory frame work for management of Municipal Solid Waste generated in the urban area of the country;

And whereas, to make these rules more effective and to improve the collection, segregation, recycling, treatment and disposal of solid waste in an environmentally sound manner, the Central Government reviewed the existing rules and it was considered necessary to revise the existing rules with a emphasis on the roles and accountability of waste generators and various stakeholders, give thrust to segregation, recovery, reuse, recycle at source, address in detail the management of construction and demolition waste.

And whereas, the draft rules, namely, the Solid Waste Management Rules, 2015 with a separate chapter on construction and demolition waste were published by the Central Government in the Ministry of Environment, Forest and Climate Change vide G.S.R. 451 (E), dated the 3rd June, 2015 inviting objections or suggestions from the public within sixty days from the date of publication of the said notification;

And Whereas, the objections or suggestions received within the stipulated period were duly considered by the Central Government;

Now, therefore, in exercise of the powers conferred by sections 6, 25 of the Environment (Protection) Act, 1986 (29 of 1986), and in supersession of the Municipal Solid Wastes (Management and Handling) Rules, 2000, except as respect things done or omitted to be done before such supersession, the Central Government hereby notifies the following rules for Management of Construction and Demolition Waste –

1. Short title and commencement.—(1) These rules shall be called the Construction and Demolition Waste Management Rules, 2016.

(2) They shall come into force on the date of their publication in the Official Gazette.

2. Application.—The rules shall apply to every waste resulting from construction, re-modeling, repair and demolition of any civil structure of individual or organisation or authority who generates construction and demolition waste such as building materials, debris, rubble.

3. Definitions —(1) In these rules, unless the context otherwise requires,–

(a) “ACT” means the Environment (Protection) Act, 1986 (29 of 1986);

(b) "**construction**" means the process of erecting of building or built facility or other structure, or

building of infrastructure including alteration in these entities,;

- (c) **"construction and demolition waste"** means the waste comprising of building materials, debris and rubble resulting from construction, re-modeling, repair and demolition of any civil structure;
- (d) **"de-construction"** means a planned selective demolition in which salvage, re-use and recycling of the demolished structure is maximized;
- (e) **"demolition"** means breaking down or tearing down buildings and other structures either manually or using mechanical force (by various equipment) or by implosion using explosives.
- (f) **"form"** means a **Form annexed to these rules**;
- (g) **"local authority"** means an urban local authority with different nomenclature such as municipal corporation, municipality, nagarpalika, nagarnigam, nagarpanchayat, municipal council including notified area committee and not limited to or any other local authority constituted under the relevant statutes such as gram panchayat, where the management of construction and demolition waste is entrusted to such agency;
- (h) **"schedule"** means a schedule annexed to these rules;
- (i) **"service provider"** means authorities who provide services like water, sewerage, electricity, telephone, roads, drainage etc. often generate construction and demolition waste during their activities, which includes excavation, demolition and civil work;
- (j) **"waste generator"** means **any person or association of persons** or institution, residential and commercial establishments including Indian Railways, Airport, Port and Harbour and Defence establishments who undertakes construction of or demolition of any civil structure which generate construction and demolition waste.

(2) Words and expressions used but not defined herein shall have the same meaning defined in the ACT.

(4) Duties of the waste generator -

- (1) Every waste generator shall prima-facie be responsible for collection, segregation of concrete, soil and others and storage of construction and demolition waste generated, as directed or notified by the concerned local authority in consonance with these rules.
- (2) The generator shall ensure that other waste (such as solid waste) does not get mixed with this waste and is stored and disposed separately.
- (3) Waste generators who generate more than 20 tons or more in one day or 300 tons per project in a month shall segregate the waste into four streams such as concrete, soil, steel, wood and plastics, bricks and mortar and shall submit waste management plan and get appropriate approvals from the local authority before starting construction or demolition or remodeling work and keep the concerned

authorities informed regarding the relevant activities from the planning stage to the implementation stage and this should be on project to project basis.

(4) Every waste generator shall keep the construction and demolition waste within the premise or get the waste deposited at collection centre so made by the local body or handover it to the authorised processing facilities of construction and demolition waste; and ensure that there is no littering or deposition of construction and demolition waste so as to prevent obstruction to the traffic or the public or drains.

(5) Every waste generator shall pay relevant charges for collection, transportation, processing and disposal as notified by the concerned authorities; Waste generators who generate more than 20 tons or more in one day or 300 tons per project in a month shall have to pay for the processing and disposal of construction and demolition waste generated by them, apart from the payment for storage, collection and transportation. The rate shall be fixed by the concerned local authority or any other authority designated by the State Government.

(5) Duties of service provider and their contractors -

(1) The service providers shall prepare within six months from the date of notification of these rules, a comprehensive waste management plan covering segregation, storage, collection, reuse, recycling, transportation and disposal of construction and demolition waste generated within their jurisdiction.

(2) The service providers shall remove all construction and demolition waste and clean the area every day, if possible, or depending upon the duration of the work, the quantity and type of waste generated, appropriate storage and collection, a reasonable timeframe shall be worked out in consultation with the concerned local authority.

(3) In case of the service providers have no logistics support to carry out the work specified in sub-rules (1) and (2) , they shall tie up with the authorised agencies for removal of construction and demolition waste and pay the relevant charges as notified by the local authority.

(6) Duties of local authority-The local authority shall,-

(1) issue detailed directions with regard to proper management of construction and demolition waste within its jurisdiction in accordance with the provisions of these rules and the local authority shall seek detailed plan or undertaking as applicable, from generator of construction and demolition waste;

(2) chalk out stages, methodology and equipment, material involved in the overall activity and final clean up after completion of the construction and demolition ;

(3c) seek assistance from concerned authorities for safe disposal of construction and demolition waste contaminated with industrial hazardous or toxic material or nuclear waste if any;

(4) shall make arrangements and place appropriate containers for collection of waste and shall remove at regular intervals or when they are filled, either through own resources or by appointing private operators;

(5) shall get the collected waste transported to appropriate sites for processing and disposal either through own resources or by appointing private operators;

(6) shall give appropriate incentives to generator for salvaging, processing and or recycling preferably in-situ;

(7) shall examine and sanction the waste management plan of the generators within a period of one month or from the date of approval of building plan, whichever is earlier from the date of its submission;

(8) shall keep track of the generation of construction and demolition waste within its jurisdiction and establish a data base and update once in a year;

(9) shall device appropriate measures in consultation with expert institutions for management of construction and demolition waste generated including processing facility and for using the recycled products in the best possible manner;

(10) shall create a sustained system of information, education and communication for construction and demolition waste through collaboration with expert institutions and civil societies and also disseminate through their own website;

(11) shall make provision for giving incentives for use of material made out of construction and demolition waste in the construction activity including in non-structural concrete, paving blocks, lower layers of road pavements, colony and rural roads.

(7) Criteria for storage, processing or recycling facilities for construction and demolition waste and application of construction and demolition waste and its products-

(1) The site for storage and processing or recycling facilities for construction and demolition waste shall be selected as per the criteria given in **Schedule I**;

(2) The operator of the facility as specified in sub- rules (1) shall apply in **Form I** for authorization from State Pollution Control Board or Pollution Control Committee.

(3) The operator of the facility shall submit the annual report to the State Pollution Control Board in **Form II**.

(3) Application of materials made from construction and demolition waste in operation of sanitary landfill shall be as per the criteria given in **Schedule II**.

(8) Duties of State Pollution Control Board or Pollution Control Committee-

(1) State Pollution Control Board or Pollution Control Committee shall monitor the implementation of these rules by the concerned local bodies and the competent authorities and the annual report shall be sent to the Central Pollution Control Board and the State Government or Union Territory or any other State level nodal agency identified by the State Government or Union Territory administration for generating State level comprehensive data. Such reports shall also contain the comments and suggestions of the State Pollution Control Board or Pollution Control Committee with respect to any comments or changes required;

(2) State Pollution Control Board or Pollution Control Committee shall grant authorization to construction and demolition waste processing facility in **Form-III** as specified under these rules after examining the application received in **Form I**;

(3) State Pollution Control Board or Pollution Control Committee shall prepare annual report in **Form IV** with special emphasis on the implementation status of compliance of these rules and forward report to Central Pollution Control Board before the 31st July for each financial year.

(9) Duties of State Government or Union Territory Administration-

(1) The Secretary in-charge of development in the State Government or Union territory administration shall prepare their policy document with respect to management of construction and demolition of waste in accordance with the provisions of these rules within one year from date of final notification of these rules.

(2) The concerned department in the State Government dealing with land shall be responsible for providing suitable sites for setting up of the storage, processing and recycling facilities for construction and demolition waste.

(3) The Town and Country planning Department shall incorporate the site in the approved land use plan so that there is no disturbance to the processing facility on a long term basis.

(4) Procurement of materials made from construction and demolition waste shall be made mandatory to a certain percentage (say 10-20%) in municipal and Government contracts subject to strict quality control.

(10) Duties of the Central Pollution Control Board - (1) The Central Pollution Control Board shall,-

(a) prepare operational guidelines related to environmental management of construction and demolition waste management;

(b) analyze and collate the data received from the State Pollution Control Boards or Pollution Control Committee to review these rules from time to time;

(c) coordinate with all the State Pollution Control Board and Pollution Control Committees for any matter related to development of environmental standards;

(d) forward annual compliance report to Central Government before the 30th August for each financial year based on reports given by State Pollution Control Boards of Pollution Control Committees.

(11) Duties of Bureau of Indian Standards and Indian Roads Congress -The Bureau of Indian Standards and Indian Roads Congress shall be responsible for preparation of code of practices and standards for use of recycled materials and products of construction and demolition waste in respect of construction activities and the role of Indian Road Congress shall be specific to the standards and practices pertaining to construction of roads.

Schedule III
Timeframe for Planning and Implementation
[See Rule 13]

Sl. No.	Compliance Criteria	Cities with population of 01 million and above	Cities with population of 0.5-01 million	Cities with population of less than 0.5 million
1	Formulation of policy by State Government	12 months	12 months	12 months
2	Identification of sites for collection and processing facility	18 months	18 months	18 months
3	Commissioning and implementation of the facility	18 months	24 months	36 months
4	Monitoring by SPCBs	3 times a year – once in 4 months	2 times a year – once in 6 months	2 times a year – once in 6 months

**The time Schedule is effective from the date of notification of these rules.*

FORM – I
See [Rule 7 (2)]
Application for obtaining authorisation

To,
The Member Secretary

_____ Name of the local authority or Name of the agency :
appointed by the municipal authority

Correspondence address Telephone No. Fax No.	
Nodal Officer and designation (Officer authorized by the competent authority or agency responsible for operation of processing or recycling or disposal facility)	
Authorisation applied for (Please tick mark)	Setting up of processing or recycling facility of construction and demolition waste
Detailed proposal of construction and demolition waste processing or recycling facility to include the following Location of site approved and allotted by the Competent Authority. Average quantity (in tons per day) and composition of construction and demolition waste to be handled	

Appendix 7: Salient Features of Major Laws Applicable to Establishments Engaged in Construction of Civil Works

- (i) Workmen Compensation Act, 1923 - The Act provides for compensation in case of injury by accident arising out of and during the course of employment.

- (ii) Payment of Gratuity Act, 1972 - Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years' service or more or on death at the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.

- (iii) Employees' PF and Miscellaneous Provisions Act, 1952 - The Act provides for monthly contributions by the employer plus workers @10 % or 8.33 %. The benefits payable under the Act are: (a) Pension or family pension on retirement or death as the case may be; (b) deposit linked insurance on the death in harness of the worker; (c) payment of PF accumulation on retirement/death etc.

- (iv) Maternity Benefit Act, 1951 and its amendments - The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.

- (v) Contract Labour (Regulation and Abolition) Act, 1970 - The Act provides for certain welfare measures to be provided by the Contractor to contract labor and in case the Contractor fails to provide, the same are required to be provided by the Principal Employer by Law. The principal employer is required to take Certificate of Registration and the Contractor is required to take a License from the designated Officer. The Act is applicable to the establishments or Contractor of principal employer if they employ 20 or more contract labor.

- (vi) Minimum Wages Act, 1948 - The employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads and Runways are scheduled employment.

- (vii) Payment of Wages Act, 1936 - It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.

- (viii) Equal Remuneration Act, 1979 - The Act provides for payment of equal wages for work of equal nature to Male and Female workers and not for making discrimination against Female employees in the matters of transfers, training and promotions etc.

- (ix) Payment of Bonus Act, 1965 - The Act is applicable to all establishments employing 20 or more workmen. The Act provides for payments of annual bonus subject to a minimum of 8.33 % of wages and maximum of 20 % of wages to employees drawing Rs. 3,500/- per month or less. The bonus to be paid to employees getting Rs. 2,500/- per month or above up to Rs.3,500/- per month shall be worked out by taking wages as Rs.2,500/- per month only. The Act does not apply to certain establishments. The newly set up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of the Act.

- (x) Industrial Disputes Act, 1947 - The Act lays down the machinery and procedure for resolution of industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the

establishment.

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

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

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

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

(xv) Construction and Demolition Waste Management Rules 2016- This Rule stipulate that-

- Every waste generator shall segregate construction and demolition waste and deposit at collection centre or handover it to the authorized processing facilities
- Shall ensure that there is no littering or deposition so as to prevent obstruction to the traffic or the public or drains.
- Large generators (who generate more than 20 tons or more in one day or 300 tons per project in a month) shall submit waste management plan and get appropriate approvals from the local authority before starting construction or demolition or remodeling work,
- Large generators shall have environment management plan to address the likely environmental issues from construction, demolition, storage, transportation process and disposal / reuse of C & D Waste.
- Large generators shall segregate the waste into four streams such as concrete, soil, steel, wood and plastics, bricks and mortar,
- Large generators shall pay relevant charges for collection, transportation, processing and disposal as notified by the concerned authorities;

(xvi) Solid Waste Management Rules 2016- As per this Rule responsibility of Solid Waste Generator is as below.

- segregate and store the waste generated in three separate streams namely bio-degradable, non-biodegradable and domestic hazardous wastes in suitable bins and handover segregated wastes to authorized waste pickers or waste collectors as per the direction or notification by the local authorities from time to time;
- store separately construction and demolition waste, as and when generated, in his own premises and shall dispose off as per the Construction and Demolition Waste Management Rules, 2016; and

- No waste generator shall throw, burn or bury the solid waste generated by him, on streets, open public spaces outside his premises or in the drain or water bodies.

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

Employer shall-

- (i) Provide and maintain, at suitable point, sufficient quantity of wholesome drinking water, such point shall be at least 6 meters away from any washing areas, urinals or toilets
- (ii) Provide sufficient urinals and latrines at convenient place, easily accessible by workers
- (iii) Provide free of charge, temporary living accommodations near to work sites with separate cooking place, bathing and lavatory facilities and restore the site as pre-conditions after completing the construction works
- (iv) Provide crèche with proper accommodation, ventilation, lighting, cleanliness and sanitation if more than fifty female workers are engaged
- (v) Provide first aid facilities in all construction sites

For safety of workers employer shall provide-

- (i) Safe access to site and workplace
- (ii) Safety in demolition works
- (iii) Safety in use of explosives
- (iv) Safety in operation of transporting equipments and appoint competent person to drive or operate such vehicles and equipments
- (v) Safety in lifting appliance, hoist and lifting gears
- (vi) Adequate and suitable lighting to every workplace and approach
- (vii) Prevention of inhalation of dust, smoke, fumes, gases during construction works and provide adequate ventilation in workplace and confined space
- (viii) Safety in material handling and stacking/unstacking
- (ix) Safeguarding the machinery with fly-wheel of moving parts
- (x) Safe handling and use of plants operated by compressed air
- (xi) Fire safety
- (xii) Limit of weight to be lifted by workers individually
- (xiii) Safety in electric wires, apparatus, tools and equipments
- (xiv) Provide safety net, safety sheet, safety belts while working at height (more than 1.6 m as per OSHA)
- (xv) Providing scaffolding, ladders and stairs, lifting appliances, chains and accessories where required
- (xvi) Safety in pile works, concrete works, hot asphalt, tar, insulation, demolition works, excavation, underground construction and handling materials
- (xvii) Provide and maintain medical facilities for workers
- (xviii) Any other matters for the safety and health of workers.

Appendix 8: Biodiversity Assessment Report- Pratapgarh

Biodiversity Assessment – Pratapgarh Sewerage Subproject

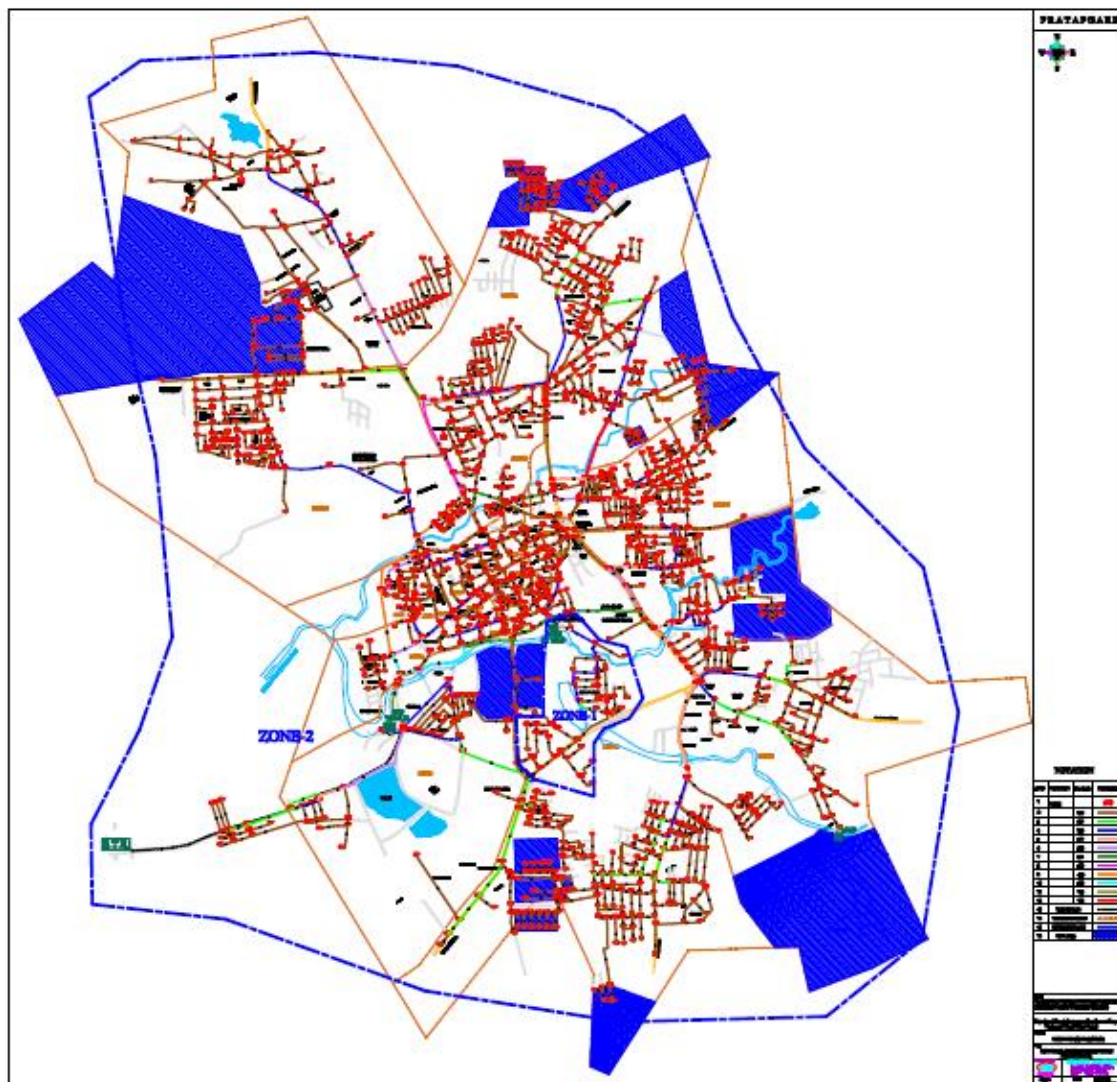
A. INTRODUCTION

This detailed biodiversity assessment is carried out for the proposed Pratapgarh Sewerage Subproject located in Pratapgarh City of Rajasthan State in India. This subproject is included in the Rajasthan Secondary Towns Development Sector Project (RSTDSP) to be financed by ADB. The assessment has been carried out to identify critical habitats and anticipated impacts from the subproject implementation. The assessment is based on the desk review and analysis of the secondary information collected through various sources and supported by the results of the proximity report generated by the Integrated Biodiversity Assessment Tool (IBAT). The findings and assessment will be further strengthened following detailed field assessments and consultations with key stakeholders involving forest and wildlife officials from the state before project implementation.

B. PROJECT DESCRIPTION

The project is located in Pratapgarh city of Pratapgarh District of Rajasthan State. The project components are planned and will be located inside the municipality limits on land owned by the government. The sewerage system is proposed to construction of new sewerage treatment plant of 7.0MLD capacity at in the available vacant land near village Talabkheda adjacent to seasonal river Aerava. One Sewage pumping station (SPS) is proposed site near Deepeshwar Talab on vacant government land. One manhole with pumping (MWP) of 0.10 MLD has been proposed in Zone 1. The sewer system will be designed as a separate sewer system that carries only the domestic wastewater. The open trench will be having maximum width of 1 m only on one side of the road within available ROW of the roads in municipality limits. The location of project component on town map is given in Figure-1.

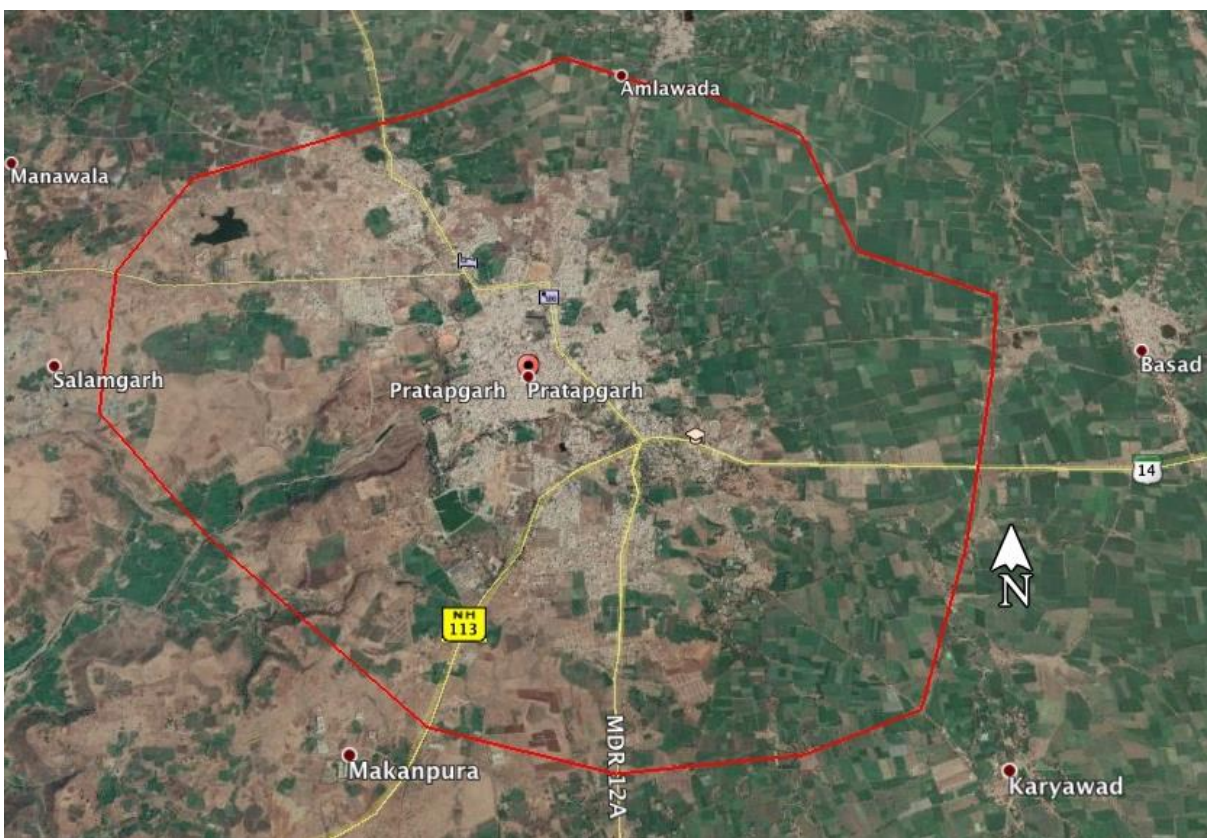
Figure 1: Project area on Town Map



C. ESTABLISHING PROJECT AREA OF INFLUENCE (PAI)

The project area of influence (PAI) for study is established on basis of locations on project components of proposed project. The scope of work covering all components and associated facilities under the sewage treatment project in Pratapgrah Town are considered as a project area of influence (PAI). The critical habitat assessment has been conducted within the boundaries of PAI which has been established using ecological units and/or physical features within the landscape such as roads, village habitation or seasonal river/streams. The established PAI for subproject in Pratapgrah Town is given in Figure -2.

Figure 2: Map showing boundary of PAI Pratapgrah subproject



The boundaries of PAI for subproject has been established on the basis of physical/topographical features surrounding the Town area. The seasonal river Aerava and its streams are flowing in South and Southwest direction of the town. The tracks of these seasonal streams are the limit for study area, which are starting from agriculture field and about 3-4 km away from developed area. On east direction of the town a seasonal stream of river in fields of Basad and Karyawad is taken as a limit for PAI boundary. The village track from habitation area of Amlawad to National Highway (NH)-113 and road connecting Karmadi Khera are north boundary of the study area.

D. BIODIVERSITY ASSESSMENT

Biodiversity assessment in the project influence area has been conducted as per the International Finance Corporation's (IFC) Performance Standard No 6 of 2012, within updated version in June 2019 on the Guidance Note for the Performance Standard. The process of biodiversity assessment based on presence of protected or designated areas and the potential presence of Critical Habitat in the study area. The Critical Habitat assessment is based on presence of Threatened species (Critically Endangered (CR), Endangered (EN) species, and to a lesser extent Vulnerable (VU) species as defined by the IUCN.

D.1 KEY BIODIVERSITY AREA

The project areas have been screened to determine presence of Key Biodiversity Areas (KBAs) using the Integrated Biodiversity Assessment Tool (IBAT).⁴⁷ As per the Proximity report generated

⁴⁷ IBAT is a multi-institutional programme of work involving Bird Life International, Conservation International, IUCN

by IBAT, there are three protected area and five key biodiversity areas within the buffer of 10 km and 50km radius of the subproject components. There is no national protected area and no Key Biodiversity Area located within 10 km radius of the subproject. The nearest notified area to Pratapgarh Town is Sita Mata Forest Reserve; which is also an IBA site is located at an aerial distance of 45km on northwest direction.

D.2 PROTECTED AREAS (SITA MATA WILDLIFE SANCTUARY)

Sitamata Wildlife Sanctuary is situated in the South-East region of the Rajasthan in Chittorgarh, Pratapgarh & Udaipur Districts; where three very ancient mountain ranges of India namely The Aravallis, The Vindhyas and Malva Plateau meet together forming the Northwestern limits of Teak Forest.

The floral constituents of the Sitamata wildlife Sanctuary are mostly edaphoclimax. As per the Champion & Seth's classification the forest of this sanctuary falls under II category of Tropical Dry Deciduous Forest. The main species dominating are *Tectona grandis*(teak/sagwan), *Wrightia tinctoria*, *Boswellia serrata*, *Lannea grandis*, *Madhuca indica*(mahua), *Pongamia pinnata*, *Dendrocalamus strictus*, *Sterculia urens*, *Butea monosperma*, *Anogeisus latifolia*, *Syzygium heynnainum*, *Adina cardifolia*, *Diospyrus malanoxylon*, orchids, tuberos plants etc.

Nearly 50 species of mammals, more than 325 species of birds 40 species of reptiles, 9species of amphibians, 30 species of fishes and more than 800 species of plants have been listed in the Sanctuary. Flying Squirrels, Four horned antelope, Tree snakes, Tree Frog, Ratal, Indian pangolin ,etc. can be seen here .This Sanctuary is famous for Four horned Antelopes and considered as best Chousinga Sanctuary of state. Birds like Grey jungle fowl, Aravalli red spur fowl, yellow footed Green Pigeon, Alexandrine parakeet, Stork-billed kingfisher, Indian pitta, Black -headed oriole, Indian paradise Flycatcher, Black lored tit, Purple-rumped sun bird, Monarach, ultra-marine verditor flycatchers etc. can be seen in sylvan environs of the Sitamata. Lesser Floricans are worth seeing over here during monsoon at eastern outskirts of Sanctuary.

The Sanctuary area is also listed as an International Bird Area due to hot spot for threatened species of birds. The IBA listed areas are important for conservation and protection of birds at the global, regional or sub-regional level. There are four criterion set out to qualify for IBA sites based on threshold of species, the criteria are:

A1) Globally threatened species: The site qualifies if it is known, estimated or thought to hold a population of a species categorized by the IUCN Red List as Critically Endangered, Endangered or Vulnerable

A2) Restricted-range species: The site forms one of a set selected to ensure that all restricted-range species of an Endemic Bird Area (EBA) or a Secondary Area (SA) are present in significant numbers in at least one site and preferably more.

A3) Biome-restricted species: The site forms one of a set selected to ensure adequate representation of all species restricted to a given biome, both across the biome as a whole and

and UNEP-WCMC. IBAT provides a basic risk screening on biodiversity. It draws together information on globally recognized biodiversity information drawn from a number of IUCN's Knowledge Products: IUCN Red List of Threatened Species, Key Biodiversity Areas (priority sites for conservation) and Protected Planet/The World Database on Protected Areas (covering nationally and internationally recognized sites, including IUCN management categories I–VI, Ramsar Wetlands of International Importance and World Heritage sites).

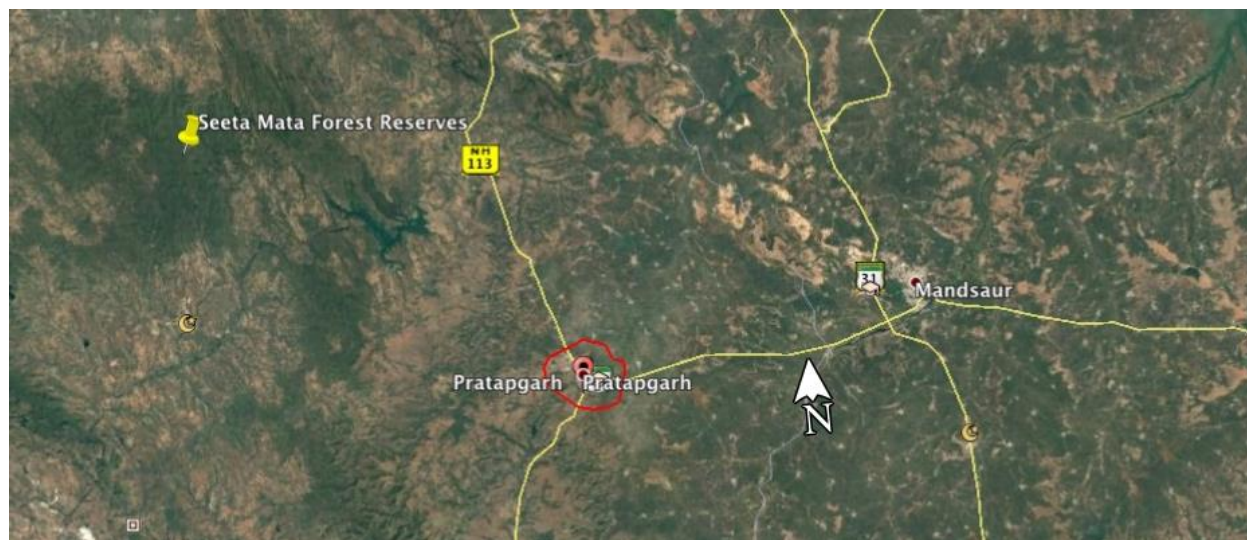
for all of its species in each range state.

A4) Congregations

- (i) This applies to 'waterbird' species as defined by Delaney and Scott⁴⁸ and is modelled on criterion 6 of the Ramsar Convention for identifying wetlands of international importance. Depending upon how species are distributed, the 1% thresholds for the biogeographic populations may be taken directly from Delaney & Scott, they may be generated by combining flyway populations within a biogeographic region or, for those for which no quantitative thresholds are given, they are determined regionally or inter-regionally, as appropriate, using the best available information.
- (ii) This includes those seabird species not covered by Delaney and Scott (2002). Quantitative data are taken from a variety of published and unpublished sources.
- (iii) This is modelled on criterion 5 of the Ramsar Convention for identifying wetlands of international importance. The use of this criterion is discouraged where quantitative data are good enough to permit the application of A4i and A4ii.
- (iv) The site is known or thought to exceed thresholds set for migratory species at bottleneck sites.

⁴⁸ Delaney and Scott (2002) Waterbird Population Estimates Third Edition, Wetlands International, Wageningen, The Netherlands.

Figure 3: Map showing Protected area in subproject surrounding



D.3 CRITICALLY ENDANGERED / ENDANGERED SPECIES

A total of 29 IUCN red list (CR, EN & VU) species reported within 50km radius. Out of these 29 IUCN red list species, 12 species are classified as Critically Endangered (CR) and Endangered (EN). Birds are common species which includes 19 species (CR-4, EN-7 & VU-8), 6 mammals (EN-1, VU-5), 2 reptiles (VU-2) and 2 plants (VU-2). Table-1 lists the species designated by the International Union for the Conservation of Nature (IUCN) as Critically Endangered (CR), Endangered (EN) and Vulnerable (VU) having recorded ranges that include the study area.

Table 2: List of species designated by IUCN threatened species as CR, EN & VU

S. No.	Scientific Name	Common Name	IUCN Red List category
	Birds		
1	<i>Vanellus gregarius</i>	Sociable Lapwing	CR
2	<i>Gyps bengalensis</i>	White-rumped Vulture	CR
3	<i>Sarcogyps calvus</i>	Red-headed Vulture	CR
4	<i>Gyps indicus</i>	Indian Vulture	CR
5	<i>Neophron percnopterus</i>	Egyptian Vulture	EN
6	<i>Aquila nipalensis</i>	Steppe Eagle	EN
7	<i>Falco cherrug</i>	Saker Falcon	EN
8	<i>Haliaeetus leucoryphus</i>	Pallas's fish-eagle	EN
9	<i>Leptoptilos dubius</i>	Greater Adjutant	EN
10	<i>Sterna acuticauda</i>	Black-bellied tern	EN
11	<i>Sypheotides indicus</i>	Lesser Florican	EN
12	<i>Amandava formosa</i>	Green avadavat	VU
13	<i>Antigone antigone</i>	Sarus crane	VU
14	<i>Aquila rapax</i>	Tawny eagle	VU
15	<i>Aythya ferina</i>	Common pochard	VU
16	<i>Ciconia episcopus</i>	Asian woollyneck	VU
17	<i>Clanga clanga</i>	Greater spotted eagle	VU
18	<i>Rynchops albicollis</i>	Indian skimmer	VU
19	<i>Columba eversmanni</i>	Yellow-eyed pigeon	VU
	Mammals		
20	<i>Manis crassicaudata</i>	Indian Pangolin	EN
21	<i>Lutrogale perspicillata</i>	Smooth-coated otter	VU
22	<i>Melursus ursinus</i>	Sloth bear	VU
23	<i>Panthera pardus</i>	Leopard	VU
24	<i>Tetracerus quadricornis</i>	Four-horned antelope	VU
25	<i>Rusa unicolor</i>	Sambar	VU
	Reptile		
26	<i>Crocodylus palustris</i>	Mugger	VU
27	<i>Geochelone elegans</i>	Indian star tortoise	VU
	Plant		
28	<i>Anacyclus pyrethrum</i>	Atlas daisy	VU
29	<i>Oryza malampuzhaensis</i>	Asian Rice	VU

E. CRITICAL HABITAT ASSESSMENT PROCESS

Habitats that are critical to the survival of International Union for the Conservation of Nature (IUCN) designated Critically Endangered or Endangered species, migratory species, congregatory species and endemic or restricted range species are classified as critical habitats.

The screening of Critical Habitat in the area has been conducted based on species which enlisted in redlist of IUCN. The presence of habitat of these species in the area will designate Critical Habitat. There are five criterion set out in updated Performance Standard No 6 Guidance note (IFC 2019) to consider the area as Critical Habitat. The five criterion for Critical Habitat determination is:

Criterion 1: Critically Endangered and Endangered Species

Criterion 2: Endemic and Restricted range Species

Criterion 3: Migratory and Congregatory Species

Criterion 4: Highly Threatened or Unique Ecosystems

Criterion 5: Key Evolutionary Processes

Out of these five criteria, first three criteria are related to species and threshold of species enlisted in the IUCN Redlist representing the risk of extinction of species at global level. While the criterion 4 & 5 are related to ecosystems and evolutionary processes. The brief description of criteria is mentioned in below sections.

E.1 CRITERION 1: CRITICALLY ENDANGERED AND ENDANGERED SPECIES

Species threatened with global extinction and listed as CR and EN on the IUCN Red List of Threatened Species shall be considered as part of Criterion 1. Critically Endangered species face an extremely high risk of extinction in the wild. Endangered species face a very high risk of extinction in the wild.

As described in footnote 11 of Performance Standard 6, the inclusion in Criterion 1 of species that are listed nationally/regionally as CR or EN in countries that adhere to IUCN guidance shall be determined on a project-by-project basis in consultation with competent professionals.

Thresholds for Criterion 1 are the following:

- a) Areas that support globally important concentrations of an IUCN Red-listed EN or CR species ($\geq 0.5\%$ of the global population AND ≥ 5 reproductive units of a CR or EN species).
- b) Areas that support globally important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds.
- c) As appropriate, areas containing important concentrations of a nationally or regionally listed EN or CR species.

E.2 CRITERION 2: ENDEMIC AND RESTRICTED RANGE SPECIES

For purposes of this Guidance Note, the term endemic is defined as restricted range. Restricted range refers to a limited extent of occurrence (EOO).

- For terrestrial vertebrates and plants, restricted range species are defined as those species that have an EOO less than 50,000 km².
- For marine systems, restricted range species are provisionally being considered those with an EOO of less than 100,000 km².

- For coastal, riverine, and other aquatic species in habitats that do not exceed 200 km width at any point (for example, rivers), restricted range is defined as having a global range of less than or equal to 500 km linear geographic span (i.e., the distance between occupied locations furthest apart).

The threshold for Criterion 2 is the following:

- a) Areas that regularly hold $\geq 10\%$ of the global population size and ≥ 10 reproductive units of a species.

E.3 CRITERION 3: MIGRATORY AND CONGREGATORY SPECIES

Migratory species are defined as any species of which a significant proportion of its members cyclically and predictably move from one geographical area to another (including within the same ecosystem).

Congregatory species are defined as species whose individuals gather in large groups on a cyclical or otherwise regular and/or predictable basis. Examples include the following:

- Species that form colonies.
- Species that form colonies for breeding purposes and/or where large numbers of individuals of a species gather at the same time for non-breeding purposes (for example, foraging and roosting).
- Species that utilise a bottleneck site where significant numbers of individuals of a species occur in a concentrated period of time (for example, for migration).
- Species with large but clumped distributions where a large number of individuals may be concentrated in a single or a few sites while the rest of the species is largely dispersed (for example, wildebeest distributions).
- Source populations where certain sites hold populations of species that make an inordinate contribution to recruitment of the species elsewhere (especially important for marine species).

Thresholds for Criterion 3 are the following:

- a) Areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle.
- b) Areas that predictably support ≥ 10 percent of the global population of a species during periods of environmental stress.

E.4 CRITERION 4: HIGHLY THREATENED OR UNIQUE ECOSYSTEMS

The IUCN is developing a Red List of Ecosystems, following an approach similar to the Red List for Threatened Species. The client should use the Red List of Ecosystems where formal IUCN assessments have been performed. Where formal IUCN assessments have not been performed, the client may use assessments using systematic methods at the national/regional level, carried out by governmental bodies, recognized academic institutions and/or other relevant qualified organizations (including internationally recognized Non-Government Organizations (NGOs)).

The thresholds for Criterion 4 are the following:

- a) Areas representing $\geq 5\%$ of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN.
- b) Other areas not yet assessed by IUCN but determined to be of high priority for conservation by regional or national systematic conservation planning.

E.5 CRITERION 5: KEY EVOLUTIONARY PROCESSES

The structural attributes of a region, such as its topography, geology, soil, temperature, and vegetation, and combinations of these variables, can influence the evolutionary processes that give rise to regional configurations of species and ecological properties. In some cases, spatial features that are unique or idiosyncratic of the landscape have been associated with genetically unique populations or subpopulations of plant and animal species. Physical or spatial features have been described as surrogates or spatial catalysts for evolutionary and ecological processes, and such features are often associated with species diversification. Maintaining these key evolutionary processes inherent in a landscape as well as the resulting species (or subpopulations of species) has become a major focus of biodiversity conservation in recent decades, particularly the conservation of genetic diversity. By conserving species diversity within a landscape, the processes that drive speciation, as well as the genetic diversity within species, ensures the evolutionary flexibility in a system, which is especially important in a rapidly changing climate.

For illustrative purposes, some potential examples of spatial features associated with evolutionary processes are as follows:

- Landscapes with high spatial heterogeneity are a driving force in speciation, as species are naturally selected based on their ability to adapt and diversify.
- Environmental gradients, also known as ecotones, produce transitional habitat, which has been associated with the process of speciation and high species and genetic diversity.
- Edaphic interfaces are specific juxtapositions of soil types (for example, serpentine outcrops, limestone, and gypsum deposits), which have led to the formation of unique plant communities characterized by both rarity and endemism.
- Connectivity between habitats (for example, biological corridors) ensures species migration and gene flow, which is especially important in fragmented habitats and for the conservation of metapopulations. This also includes biological corridors across altitudinal and climatic gradients and from “crest to coast.”
- Sites of demonstrated importance to climate change adaptation for either species or ecosystems are also included within this criterion.

F. CRITICAL HABITAT ASSESSMENT IN PAI

A critical habitat assessment has been carried out using the above mentioned five criterion of Performance Standard No 6 Guidance note (IFC 2019).

F.1 IBAT STUDY OUTPUT FOR HABITAT ANALYSIS (CRITERIA 1-3)

A habitat analysis carried out for the Critically Endangered (CR) and Endangered species reported in the project area of influence (50km) shows that it is likely that the 29 species identified in IBAT are mostly located inside the ecological areas and not within the project area of influence (PAI). Details of the habitat analysis in the PAI is presented in Table-2.

Table 3: Habitat Analysis in PAI – Pratapgarh Subproject

S. No.	Common Name (Species Name)	IUCN Category	Habitat Preferences	Likelihood of Occurrence in PAI
Birds				
1	Sociable Lapwing (<i>Vanellus gregarious</i>)	CR	Desert, Wetlands (inland), Grassland, Artificial/Terrestrial	None; The species occurs in the north-west part of India, as non-breeding habitat, mainly in Great Rann of Kutch. https://www.iucnredlist.org/species/22694053/130586388#habitat-ecology
2	White-rumped vulture (<i>Gyps bengalensis</i>)	CR	Forest, Grassland, Shrubland, Savanna, Artificial/Terrestrial	Yes, the species habitat in South Asia and South-east Asia. Habitat reported in North India including Rajasthan state. https://www.iucnredlist.org/species/22695194/118307773
3	Red-headed Vulture (<i>Sarcogyps calvus</i>)	CR	Forest, Grassland, Shrubland, Savanna, Artificial/Terrestrial	Yes; distributed in parts of Rajasthan State, habitat extend mainly in North India. https://www.iucnredlist.org/species/22695254/118371885
4	Indian Vulture (<i>Gyps indicus</i>)	CR	Forest, Grassland, Shrubland, Savanna, Artificial/Terrestrial	Yes; possibility of habitat in Rajasthan, species breeds in south-east Pakistan and peninsular India south of the Gangetic plain, north to Delhi, east through Madhya Pradesh, south to the Nilgiris, and occasionally further south. https://www.iucnredlist.org/species/22729731/117875047
5	Egyptian Vulture (<i>Neophron percnopterus</i>)	EN	Rocky areas (eg. inland cliffs, mountain peaks), Wetlands (inland), Grassland, Shrubland, Savanna, Artificial/Terrestrial	Yes; extend of migratory bird species breeding habitat during winter in India including Rajasthan state. https://www.iucnredlist.org/species/22695180/154895845
6	Steppe Eagle (<i>Aquila nipalensis</i>)	EN	Rocky areas (eg. inland cliffs, mountain peaks), Grassland, Savanna	Yes; extend of migratory bird species non-breeding habitat during winter in India including Rajasthan state. https://www.iucnredlist.org/species/22696038/155419092
7	Saker Falcon (<i>Falco cherrug</i>)	EN	Marine Intertidal, Wetlands (inland), Grassland, Shrubland, Artificial/Terrestrial	None; extend of migratory bird species only non-breeding habitat during winter in India including some parts of Rajasthan state. https://www.iucnredlist.org/species/22696495/110525916
8	Pallas's Fish-eagle	EN	Wetlands (inland)	None: species breed only in northern India with strongholds in Assam and Uttarakhand only.

S. No.	Common Name (Species Name)	IUCN Category	Habitat Preferences	Likelihood of Occurrence in PAI
	(<i>Haliaeetus leucoryphus</i>)			https://www.iucnredlist.org/species/22695130/131934599
9	Greater Adjutant (<i>Leptoptilos dubius</i>)	EN	Forest, Wetlands (inland), Artificial/Terrestrial, Grassland	None; in India species breeding habitat extend is limited in Assam and Bihar state only. https://www.iucnredlist.org/species/22697721/93633471
10	Black-bellied tern (<i>Sterna acuticauda</i>)	EN	Wetlands (inland)	None; the extend of species habitat is throughout India except the dry part of Rajasthan State where inland wetlands are absent. https://www.iucnredlist.org/species/22694711/110488626
11	Lesser Florican (<i>Sypheotides indicus</i>)	EN	Grassland, Artificial/Terrestrial	Yes; possibility of habitat in Rajasthan state as species breeds in Gujarat, Rajasthan, Maharashtra, Madhya Pradesh & Andhra Pradesh by Bhardwaj et al. 2011. https://www.iucnredlist.org/species/22692024/110438391
12	Green avadavat (<i>Amandava Formosa</i>)	VU	Forest, Shrubland, Grassland, Artificial/Terrestrial	None; The species habitat endemic to central India, in Rajasthan state found in southern parts with sugarcane fields as reported by Sharma et al. 2012. https://www.iucnredlist.org/species/22719618/131995719
13	Sarus crane (<i>Antigone antigone</i>)	VU	Grassland, Artificial/Terrestrial, Wetlands (inland), Artificial/Aquatic & Marine	Yes; habitat extend of the bird species resident is mainly in Uttar Pradesh State and nearby areas of surrounding states, breeding habitat during winter extended in adjoining areas of Rajasthan state. https://www.iucnredlist.org/species/22692064/93335364
14	Tawny eagle (<i>Aquila rapax</i>)	VU	Forest, Grassland, Shrubland, Savanna, Artificial/Terrestrial	Yes; habitat extend of the bird species resident is mainly in central India including Rajasthan state https://www.iucnredlist.org/species/22696033/131671001
15	Common pochard (<i>Aythya ferina</i>)	VU	Marine Neritic, Wetlands (inland), Marine Coastal/Supratidal, Artificial/Aquatic & Marine	None; the migratory bird specie's non-breeding habitat extend during winter season is limited in eastern and northern parts of India https://www.iucnredlist.org/species/22680358/155473754

S. No.	Common Name (Species Name)	IUCN Category	Habitat Preferences	Likelihood of Occurrence in PAI
16	Asian woollyneck (<i>Ciconia episcopus</i>)	VU	Marine Intertidal, Forest, Artificial/Terrestrial, Artificial/Aquatic & Marine, Grassland, Wetlands (inland), Marine Neritic	None; the species is found patchily across South Asia and South East Asia, range extends throughout India https://www.iucnredlist.org/species/22727255/110064997
17	Greater spotted eagle (<i>Clanga clanga</i>)	VU	Forest, Wetlands (inland), Shrubland, Artificial/Aquatic & Marine, Grassland	Yes; the species non-breeding habitat is found across South Asia and South East Asia, range extends throughout northeast and Northern India https://www.iucnredlist.org/species/22696027/110443604
18	Indian Skimmer (<i>Rynchops albicollis</i>)	VU	Wetlands (inland)	Yes; species is confined to Pakistan and India, north of Bangladesh, where a large proportion of the population winters, principally in the Padma-Meghna delta and Myanmar. The species has been reported in March 2018 from Jawai Dam Pali District, Rajasthan by Omveer Dhawal, Deptt. Of Zoology, MDS University, Ajmer. https://www.iucnredlist.org/species/22694268/34892705
19	Yellow-eyed pigeon (<i>Columba eversmanni</i>)	VU	Desert, Caves and Subterranean Habitats (non-aquatic), Wetlands (inland), Shrubland, Artificial/Terrestrial	None; in India species non-breeding habitat extend is limited in north-west parts including parts of Rajasthan State. https://www.iucnredlist.org/species/22690097/110099638
Mammals				
20	Indian Pangolin (<i>Manis crassicaudata</i>)	EN	Forest, Savanna, Shrubland, Artificial/Terrestrial, Grassland	Yes; species is distributed in South Asia through much of India including Rajasthan https://www.iucnredlist.org/species/12761/123583998
21	Smooth-coated otter (<i>Lutrogale perspicillata</i>)	VU	Artificial/Aquatic & Marine, Wetlands (inland), Forest, Grassland, Marine Coastal/Supratidal, Marine Neritic, Marine Intertidal, Shrubland	Yes; species is distributed in South Asia through much of India including Rajasthan https://www.iucnredlist.org/species/12427/21934884

S. No.	Common Name (Species Name)	IUCN Category	Habitat Preferences	Likelihood of Occurrence in PAI
22	Sloth bear (<i>Melursus ursinus</i>)	VU	Forest, Savanna, Shrubland, Grassland, Artificial/Terrestrial	None; the species habitat is limited between Alwar and Jaipur stretch as per IUCN species distribution map. https://www.iucnredlist.org/species/13143/166519315
23	Leopard (<i>Panthera pardus</i>)	VU	Forest, Desert, Rocky areas (eg. inland cliffs, mountain peaks), Grassland, Savanna, Shrubland	None; Leopard range widespread in inside and outside Protected Areas of India. https://www.iucnredlist.org/species/15954/160698029
24	Four-horned antelope (<i>Tetracerus quadricornis</i>)	VU	Forest, Shrubland	None; species habitat is extended most parts of India including Rajasthan https://www.iucnredlist.org/species/21661/50195368
25	Sambar (<i>Rusa unicolor</i>)	VU	Forest, Artificial/Terrestrial, Savanna, Shrubland, Grassland, Wetlands (inland)	None; the habitat extend is throughout India except North India and western parts of Rajasthan and Gujarat state. https://www.iucnredlist.org/species/41790/85628124
Reptile				
26	Mugger (<i>Crocodylus palustris</i>)	VU	Wetlands (inland), Marine Neritic, Artificial/Aquatic & Marine	None; the species habitat extends in India to waterbodies including rivers, in Rajasthan State mainly in River Chambal. https://www.iucnredlist.org/species/5667/3046723
27	Indian star tortoise (<i>Geochelone elegans</i>)	VU	Forest, Shrubland, Grassland, Artificial/Terrestrial	None; as per study by Gaur during 2006 the species habitat is found in three broadly disjunct areas of geographic occurrence: northwestern India (Gujarat, Rajasthan) and adjoining southeastern Pakistan; eastern and southern areas from Tamil Nadu, Andhra Pradesh and eastern Karnataka to Odisha (Orissa). https://www.iucnredlist.org/species/39430/115173155
Plant				
28	Atlas daisy (<i>Anacyclus pyrethrum</i>)	VU	Rocky areas (eg. inland cliffs, mountain peaks), Forest, Grassland, Shrubland	None; the plant species is native to India and extend of occurrence in Rajasthan State. https://www.iucnredlist.org/species/202924/121743450
29	Asian Rice	VU	Particularly found in forest	None; the species is endemic to the Kerala region in India.

S. No.	Common Name (<i>Species Name</i>)	IUCN Category	Habitat Preferences	Likelihood of Occurrence in PAI
	(<i>Oryza malampuzhaensis</i>)		reserves either in marshy fields or along the margins of streams or rivulets in the forest interiors	https://www.iucnredlist.org/species/112680709/113899465

F.2 ASSESSMENT OUTPUT BASED ON CRITERIA 4&5

The ecosystem within the project area of influence has not been assessed to date under IUCN assessment for the extinction threat to species. The ecosystem within the PAI is not considered to be highly threatened, as main land use is of residential & commercial in urban or agricultural in the surrounding locality. Further, there is no key evolutionary processes⁴⁹ within the PAI, as key indicator for evolutionary process areas is presence of a high number of endemic or range restricted species. Therefore, the project area of influence does not meet the thresholds set out in Criterion 4 & 5.

F.3 PROTECTED AREAS

As per ADB's SPS 2009; the designated⁵⁰ or proposed protected areas at national and international level should be considered as Critical Habitat. In the PAI for subproject in Pratapgrah Town there is no national protected area and no international designated site or proposed and notified protected area. The nearest national protected area and Key Biodiversity Area is Seeta Mata Forest Reserve, which is approx. 45 km away from the PAI boundary established for critical habitat assessment study.

G. IMPACTS & MITIGATION MEASURES

The project components are proposed to be implemented within the developed areas of Pratapgrah Town and on land under municipal limits. The project area is approx. 45 km away from the boundary of nearest protected area of Seeta Mata Wildlife Sanctuary. The sanctuary area is located at where ancient mountain ranges of The Aravallis, The Vindhyas and Malva Plateau meet together forming the Northwestern limits of Teak Forest. The nearest Key Biodiversity Areas and national protected areas are located more than 45km aerial distance from the project town. There is water body on east direction of town area that may attract migratory birds and other wildlife in the area.

The species of vulture and eagle reported in the project area of influence or passing by may visit the project area due to extend range of habitat or in search of food during migration period. The availability of these species in the PAI need to be confirmed with local community and district forest and wildlife department.

Implementation of subproject for sewage treatment plant and collection network for the town will result in reduce in waste water in reservoir. It is generally known that birds generally migrate in winter season. The treated water from proposed sewerage treatment plant will be used for irrigation purposes in agriculture fields and horticulture plantation in area. This will increase in food sources and with horticulture plantation will be improve settler and nesting ground for birds.

Construction workers may hunt, birds or carry out other activities that will negatively impact wildlife. No construction or labour camps, batching plants, and quarrying activities will be allowed within or near the forest area or near water course. The contractor will clearly brief the construction workers on strict forestry rules on illegal harvesting of forest products and poaching of wildlife. Contractor will ensure supply of all necessary food items; cooking fuel and proper housing is

⁴⁹ The evolutionary processes often occur in an isolated habitat and ecosystem due to physical or biological barriers, for example habitat on islands or valley.

⁵⁰ As per ADB's SPS the sites which are of international designation, such as Ramsar and UNESCO sites should be considered as Critical Habitat.

provided to prevent illegal hunting and tree felling.

The operation of various construction equipment is likely to generate significant noise. Noise disturbance may cause migration of the birds to other areas which may increase the probability of habitat loss. Setting of construction camp near forests or protected area may generally disturb surrounding fauna.

The such impacts on avifauna can be mitigated by following measures:

- Project improvement proposals are restricted to available land with minimal tree cutting.
- Adequate measure is included in the design for development of green belt development and horticulture plantation scheme at proposed STP area.
- Noise generating equipment like DG set, compressors will have acoustic enclosures. Noise generating activities should not be permitted during night.
- Workers should be warned about wild life protected areas and possible movement.
- project staff and work crews should not be allowed to have fire-arms and animal traps etc.;
- construction facilities such as workers camp, construction camp, batching plant should be located at least 1 km away from any the forest stretches.
- employment agreements should specify heavy penalties for illegal hunting, trapping and wildlife trading – all other ancillary works should also agree not to participate in such activities.
- Strict anti-poaching surveillance measures need to be implemented, especially during project construction phase.

The anticipated impacts on ecological system due to project and proposed mitigation measures for EMP are provided in Table -3.

Table 4: Impact-mitigation measures for EMP

Field	Anticipated Impact	Mitigation Measure	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Design					
Site selection for project component implementation	Disruption of biodiversity & damage to habitat due to project infrastructure at specified location	(i) Avoid or no land acquisition in forest area or in notified wildlife area	PIU/PMU	PMU	No cost required Mitigation measures are part of project design
Water in wastewater drain and tree cutting	Sources of food and water for birds in the area	(i) Green belt and landscaping development plan at location of proposed STP	PIU/PMU	PMU	No cost required mitigation measures are part of project design
Permission	Failure to obtain necessary permits for tree cutting can result to design revisions and/or stoppage of works	(i) Ensure all permission before start of construction in place (ii) Removal of trees after verification and approval from concerned agency (iii) Plantation of three trees against every single tree removed	PIU/PMU	PMU	No cost required mitigation measures are part of project design
Construction					
Construction camp location	Impacts on forest resources for establishing construction camp and plants.	(i) Prior approvals for establishing construction facilities from PMU with submission of location details (ii) Construction facilities such as workers camp, construction camp, batching plant should be	Construction Contractor	PMU	Cost for implementation of mitigation measures responsibility of contractor

Field	Anticipated Impact	Mitigation Measure	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		located at least 1 km away from the forest stretches			
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	(i) Impact due to noise generated from project activities (ii) Contamination of water and soil due to construction waste disposal in forest area	(i) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers to reduce impact to surrounding sensitive receptor; and (ii) Prepare and implement construction waste management plan (iii) Disposal of waste at designated sites and approval from local authorities (iv) Conduct surface quality monitoring according to the EMP.	Construction Contractor	PMU	Cost for implementation of mitigation measures responsibility of contractor
Construction Workers	Involvement in illegal hunting, trapping and wildlife trading	(i) Awareness training to workers on wildlife presence in the project area and protection of wildlife. (ii) Reporting to PMU on sighting of wild animals	Construction Contractor	PMU	Cost for implementation of mitigation measures responsibility of contractor

Field	Anticipated Impact	Mitigation Measure	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		in the project area. (iii) Employment agreements should specify heavy penalties for illegal hunting, trapping and wildlife trading – all other ancillary works should also agree not to participate in such activities. (iv) Strict anti-poaching surveillance measures need to be implemented, especially during project construction phase			
Operational Stage					
Project area development	Failure of STP for wastewater treatment, plantation of non-fruit bearing trees, contamination of water source or agriculture fields due to inadequately treated wastewater	(i) Regular monitoring of treated effluent quality before discharge or reuse for plantation and irrigation purposes (ii) Tree plantation and landscaping in the project area as per approved plan with	O&M Contractor	Pratapgrah Nagar Parishad	Contractor's O&M cost

Field	Anticipated Impact	Mitigation Measure	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		preference to local species			

H. CONCLUSION

ADB SPS's requires that project will not be developed in critical habitat area or will not adversely affect the identified critical habitat. The below mentioned criteria should be considered for assessment of impacts on biodiversity, if project development in an identified critical habitat:

- There should be no measurable adverse impacts, or likelihood of such impacts on the critical habitat which could deteriorate its high biodiversity value or the ability to function of ecology of the area.
- The project is not anticipated to lead to a reduction in the population of any recognized endangered or critically endangered species or a loss in area of the habitat concerned such that the persistence of a viable and representative of host ecosystem be compromised.
- Any lesser impacts are mitigated.

This assessment study for Critical Habitat indicates that within the PAI there are no known species which would qualify the area as Critical Habitat for Criterion 1 - 3. Further, within the PAI there are chances of Wildlife in water reservoir (due to wastewater accumulation) located next to town limits. The migratory birds (sarus, vultures and eagle) species may be visiting the wetland. The presence of birds in nearby wetland need to be confirm by PIU by field visit and consultation with local community and divisional forest & wildlife department. The PAI does not qualify as Critical Habitat under Criteria 4 and 5.

The implementation of project component is not anticipated to trigger in a population reduction of any recognized endangered or critically endangered species or a loss in area of the habitat for wildlife. The construction activities of the project may lead to some impacts on biodiversity and ecosystem in the area, these impacts can be mitigated with application of measures in design and construction phase.

I. RECOMMENDATION

Following are the recommendations to support and reconfirm the identified potential adverse impacts and suggested mitigation measures for biodiversity due to project implementation:

- i. PIU should conduct consultation before start of work with local community in subproject area and district forest and wildlife department to confirm the presence of migratory birds in the water reservoir (wastewater accumulation) in outside of Town limits as listed in Table -2, of this assessment report.
- ii. Contract a local biodiversity expert to further verify the presence of IUCN red list species in the subproject area,
- iii. On confirmation of enlisted species in the subproject area, same will be reported to PIU and do not start of works on site until clearance from PIU
- iv. Update Environmental management plan based on findings/verification of IUCN species in the subproject area, and
- v. The finding/presence of IUCN red list species in the subproject area are confirmed in course of construction work, PIU shall stop the work and coordinate with forest department for the translocation of species.

Appendix 9: Geographical position coordinates of all project sites

COMPONENTS	Latitude	Longitude
Sewage Treatment Plant (STP) Village Talabkheda	24° 1'11.18"N	74°45'42.18"E
Sewage Pumping Station Near Deepeshwar Talab	24°1'30.93"N	74°46'23.68"
Manhole with Pump (MWP) Ward 19 near Govt. Secondary School, Gautam Nagar	24° 1'47.26"N	74°46'50.23"E

Appendix 10: Sample chance find protocol

Introduction

Project town being a heritage town, there are possibility of any chance finds (artefacts) recovery during excavations. Contractors working at heritage towns must take additional care not to destroy or damage historic features during excavations. There may be many buried historic features in heritage towns such as – idols, toys, wells, ancient drains, remains of buildings, other walls, grain pits, etc. Every care must be made not to destroy these during excavations.

Excavator drivers need to be instructed to be aware of hitting buried features and that they must be investigated before continuing work. When features are encountered during mechanical excavation, work should stop and the PIU/Consultants engineers must be informed immediately so that they can be inspected at the first opportunity.

When historic features such as walls, brick constructions and other features are encountered during excavation the excavation must be stopped immediately and the PIU/Consultants must be informed immediately.

- 1.1 **Contractors' instruction:** As soon as contractor recovers any chance find during any excavation works for pipe laying, they should immediately inform PIU/Consultant present in town about the chance find recovery. Immediately stop the excavation activity near point of recovery. After PIU/consultants engineers come at site, contractor should follow cleaning and photography in supervision of PIU/Consultant engineers.
- 1.2 **Cleaning** - When a feature/chance find is discovered it must be defined by careful cleaning. Roots must be removed and dirt must be carefully cleaned away. The section or trench base should also be cleaned back for a little distance around the feature.
- 1.3 **Record photography** – When the feature is clean good photography should be taken – vertical and face-on shots and a few general shots of the feature, also showing its position in relation to surrounding features, buildings, etc. The photographed should be catalogued (date, location, direction of shot)
- 1.4 **Drawn record** -When features/chance finds are revealed a drawn record should also be made.
 - a. General location record – measuring its position and orientation within the protected site / in relation to surrounding structures
 - b. Record drawings – detail drawings made in plan and section/profile. The extent (edges) of the feature should be drawn and the level of the existing ground surface and the top and base of the feature should be recorded. These levels should be marked on the drawings. The drawings should include detail of the construction of the feature. Perspective sketches could also be made if necessary. Explanatory notes can also be put on the drawings.
- 1.5 **Reporting finds** - When finds are made these should be reported to PIU/Consultants. Photographs and record drawings should be sent.
- 1.6 **Discovery of historic objects** - When clearance and excavation takes place artifacts and historic objects are sometimes found. These should be recovered and kept in a safe place. The place of discovery should be recorded and each find given a number and tag tied to

the find with the same number on it. A list of the finds should be kept (with the find No. And place of discovery and date of discovery recorded).

- 1.7 ***PIU/Consultants responsibility-*** PIU/Consultants should inform in written to the State Archaeological Department at the earliest with photographs and request to Archaeology Department to visit the site and hand over the chance finds to them.

Appendix 11: Excerpts on reuse from Rajasthan state Sewerage and Wastewater Policy

STATE SEWERAGE AND WASTE WATER POLICY- 2016

- viii. Design and performance specifications of wastewater treatment plants shall be as per guidelines given in the manual on sewerage treatment systems published by CPHEEO. Sufficient room in tendering for the construction of new plants shall be provided for competition to take place in both technologies and costs.

5.4. On Reuse of Treated Effluent and Sludge

1. Treated wastewater effluent is considered a water resource and is added to the water stock for reuse.
2. Priority shall be given to agricultural reuse of treated effluent for unrestricted irrigation. Blending of treated wastewater with fresh water shall be made to improve quality where possible. Crops to be irrigated by the treated effluent or blend thereof with freshwater resources shall be selected to suit the irrigation water, soil type and chemistry, and the economics of the reuse operations.
3. Crop nutrient requirements shall be determined taking into consideration the prevailing effluent quality. Overuse of nutrients shall be avoided.
4. Accumulation of heavy metals and salinity shall be monitored, managed and mitigated. Leaching of soils shall be advocated by the irrigation authorities.
5. Farmers shall be encouraged to determine the rate of water application needed for different crops, taking into consideration the value of nutrients in the treated water and other parameters.
6. Farmers shall be encouraged to use modern and efficient irrigation technologies. Protection of on-farm workers and of crops against pollution with wastewater shall be ensured.
7. Treated effluent quality should be monitored and users alerted to any emergency causing deterioration of the quality so that they will not use such water unless corrective measures are taken.
8. Studies should be conducted and projects designed and implemented to store the excess treated wastewater in surface reservoirs but artificial recharge is not permitted . Due attention shall be given to the quality of treated and groundwater and the characteristics of the strata.
9. Plans and studies for power generation from sludge, if proven technically, economically and financially feasible, shall be made with due attention to environment impacts.
10. Sludge produced from the treatment process would be processed so it may be used as fertilizer and soil conditioner. Care shall be taken to conform to the regulations of public health and environment protection norms.

11. **Industry:** Industrial reuse of reclaimed wastewater represents major reuse next only to irrigation in both developed and developing countries. Reclaimed wastewater is ideal for many industrial purposes,. Where effluent is to be used in the industrial processes, it should be the responsibility of the industry to treat it to the quality standards required. Pilot scale feasibility studies carried out in Australia have concluded that it is possible to economically treat the domestic wastewater to achieve adequate quality for reuse as cooling water. Based on the conclusions of the feasibility study, a full-scale treatment plant employing cross-flow membrane microfiltration system may be installed. The membrane filtration system can remove all suspended solids, fecal coliforms, and giardia cysts. It could also significantly reduce human enteric viruses such as *reovirus* and *enterovirus*. The water reclamation plant at Eraring Power Station demonstrates the potential for reuse of wastewater in power generation and other industrial manufacturing facilities.

Industrial uses for reclaimed water include:

- (i) Evaporative cooling water:-
 - (a) Once-through cooling system.
 - (b) Re-circulating cooling system.
 - (c) Cooling water quality requirements.
 - (ii) Boiler –Feed water- The use of reclaimed water differs little from use of conventional public supplies for boiler-feed water, as both require extensive additional treatment quality requirement for boiler feed make up water are dependent upon pressure at which boiler is operated.
 - (iii) Industrial process water-
Suitability of reclaimed water for use in industrial process depends upon particular use like-
 - (a) Pulp and paper.
 - (b) Chemical industry.
 - (c) Textile industry.
 - (d) Petroleum and coal.
12. Whenever possible, other end uses of treated effluents; such as recycling, cooling, power generation, etc. shall be considered.
13. Re-use Options: The following options for re-use of effluent have been identified: In general, public health concern is the major issue in any type of reuse of wastewater, be it for irrigation or non-irrigation utilization, especially long term impact of reuse practices. It is difficult to delineate acceptable health risks and is a matter that is still hotly debated. Potential reuse of wastewater depends on the hydraulic and biochemical characteristics of wastewater, which determine the methods and degree of treatment required. While agricultural irrigation reuses, in general, require lower quality levels of treatment, domestic reuse options (direct or indirect potable and non-potable) reuses need the highest treatment level. Level of treatment for other

reuse options lie between these two extremes. The reuse options may be (artificial recharge of aquifers is not permitted):

- i. Irrigation
 - (a) Agriculture and forestry
 - (b) Landscaping
- ii. Fish – farming
- iii. Industry
- iv. Non-potable Domestic Reuse.

The detailed project report should clearly define the best reuse option particular to town and strategy to obtain it. Action plan with clarity should be the part of Detailed Project Report (DPR), while preparing sewerage projects. Before deciding the reuse of treated waste water, authorities must full fill the water quality norms and its legal implications.

- 14. Governing local body can sell the treated waste water and digested sludge to generate the revenue.

5.5. On Pricing, Financing and Investment

- 1. In view of increasing marginal cost of wastewater collection and treatment, wastewater charges, connection fees, sewerage taxes and treatment fees shall be set to cover at least the operation and maintenance costs. It is also highly desirable that part of the capital cost of the services shall be recovered. The ultimate aim is for a full cost recovery.
- 2. Appropriate criteria in order to apply the "polluter pays" principle shall be established.
- 3. Different charges for different areas may be applied. This shall be assessed for each geographical area as a function of end users and effluent quality and will be subject to economic and social considerations.
- 4. Because of the limited financial resources available to Government of Rajasthan, setting investment priorities in wastewater will be compatible with government investment plans.
- 5. Criteria for prioritizing investments in the wastewater sector shall take into account the current and future needs of the state, needs to expand wastewater systems in urban areas and to provide wastewater systems to smaller towns and villages.
- 6. Priorities of wastewater projects shall not be disconnected from water supply projects and urbanization in general. Decisions will be made concerning them to attain optimum solutions to the need for services, availability of finance and availability of trained manpower.

Appendix 12: Guidelines for Sewerage System Operations, Reuse of Treated Effluent and Sludge from STP for Beneficial Purposes

(Source: Manual on Sewerage and Sewage Treatment Systems, CPHEEO, Ministry of Urban Development, Govt. of India)

Health Hazards during Sewage Operations

Labourers working on the sewage treatment and operations may suffer from a number of ailments directly attributed to handling of sewage. In view of this it is desirable to disinfect sewage and where feasible mechanize sewage operations.

The staff of sewage operations must be well educated in the sanitary rules on the utilization of sewage for irrigation as well as with personal hygiene. All persons working in sewage farms must undergo preventive vaccination against enteric infections and annual medical examination for helminthiasis and be provided treatment if necessary.

Sewage treatment plants should be provided with adequate space for canteens with proper sanitation, wash-stands and lockers for irrigation implements and protective clothing. Safe drinking water must be provided for the workers and for population residing within the effective range of the sewage treatment plants.

All workers should be provided with gum boots and rubber gloves, which must compulsorily be worn while at work. They should be forced to observe personal hygiene such as washing after work as well as washing before taking food. The use of antiseptics in the water used for washing should be emphasized. The farm worker should be examined medically at regular intervals and necessary curative measures enforced.

Mitigation measures to avoid Health Hazards

Personal Hygiene against Pathogen

The worker should take precautions because a large number of coliform groups, various kinds of micro-organisms, and egg parasites exist in sewage. The workers should strive to maintain good health by taking care of the following points:

- Wear clean uniform, work boots, etc.
- After work and before having a meal, always wash hands and disinfect them.
- After work, take a shower if possible.
- Do not enter the offices and lounges wearing dirty clothes.
- If necessary, take vaccinations against tetanus, leptospirosis fever and so on

Maintaining Cleanliness. The worker should maintain each facility in a clean and neat condition.

- The floors of workrooms, stairs and corridors should be cleaned at the appropriate frequency to maintain them in a clean condition
- Disinfection of relevant locations is to be carried out periodically.

Health Check Workers should receive health check once a year to maintain their health and prevent illnesses or detect them at an early stage. The results of the health check should be maintained as records. Recommended items to be inspected during the health check are as given

below.

- Examine medical history.
- Examine subjective symptoms and other objective symptoms.
- Check height, weight, vision and hearing ability.
- Chest X-ray examination.
- Blood pressure measurement.
- Check for anaemia.
- Check for liver functions.
- Check for lipids in blood.
- Check blood sugar level
- Urine analysis.
- Electrocardiogram analysis

Welfare Measures. The Sanitation Workers (Regulation of Employment and Conditions of Service) Act 2012 proposes constitution of a Sanitation Workers State Welfare Board to exercise powers conferred on it and to perform welfare functions such as the following for sanitation workers:

- Provide immediate assistance to a beneficiary in case of an accident
- Sanction of loan and advances
- Medical expenses for treatment of major ailments
- Financial assistance for education of children
- Payment of maternity benefits
- Make provision and improvement of welfare measures and facilities as may be prescribed

Corrective Measures When a worker has symptoms of an illness listed above, the plant engineer should ensure that the worker is checked-up by a specialist doctor and receives proper treatment and care and should take the following actions considering the content of work done by the worker:

- Change the workplace if necessary
- Change the content of the work
- Shorten the working hours
- Perform relevant measurements of the working environment
- Maintain the facility or equipment

Risks in use of treated effluent and sludge in agriculture practices

Cultivation of crops that are eaten raw should be banned. Cultivation of paddy in bunded fields is likely to give rise to sanitation problems and hence is undesirable. Growing of non-edible commercial crops like cotton, jute, fodder, milling varieties of sugarcane and tobacco would be suitable. Cultivation of grasses and fodder legumes, medicinal and essential oil yielding plants like menthol and citronella may be allowed. Cultivation of cereals, pulses, potatoes and other crops that are cooked before consumption may be permitted, if sewage is treated and care is taken in handling the harvests to ensure that they are not contaminated. Cultivation of crop exclusively under seed multiplication programmes would be advantageous as these are not consumed. As an additional safeguard, sewage irrigation should be discontinued at least two months in advance of harvesting of fruits and berries, one month for all kinds of vegetables and a fortnight for all other crops. Direct grazing on sewage irrigated farms should be prohibited.

Risks of Nutrient Loading in Agriculture

Crops receiving excessive dosage of nitrogen show superfluous vegetative growth and decrease in grain or fruit yield. The phosphate deficit of sewage, therefore, should be made good by supplementing with phosphate fertilizers, the extent of phosphate fortification depending upon the nature of crop and its phosphate requirements. As the availability of phosphate is low in the irrigation water it would be desirable to apply the required quantity of phosphatic fertilizer at the time or even (about a fortnight) before the sowing or planting of the crop. Even when sewage nutrients are balanced by fortification, irrigation with such sewage may supply excessive amount of nutrients resulting in waste or unbalanced growth of plants with adverse effects on yields. It may therefore be necessary to dilute the sewage. Dilution also helps in reducing the concentration of dissolved salts and decomposable organic matter in the sewage thus, decreasing hazards to the fertility of the soil. It is desirable to limit the BOD and total suspended solids of sewage to be disposed on land for irrigation, as per relevant standards. There is a need to take caution on describing nutrient supply capacity of sewage particularly in the case of availability of phosphorus because there is a possible conversion of available phosphorus in unavailable mode in the presence of heavy metals present in the sewerage. This happens commonly in high as well as low pH soils.

Alternative Arrangement during Non-irrigating Periods

During rainy and non-irrigating seasons, agricultural practices may not need any water for irrigation. Even during irrigating season, the water requirement fluctuates significantly. Hence, satisfactory alternative arrangements have to be made for the disposal of sewage on such occasions either by storing the excess sewage or discharging it elsewhere without creating environmental hazards. The following alternatives are generally considered: a) Provision of holding lagoons for off-season storage. They enable irrigation of a fixed area of land to varying rates of crop demand. They may also serve as treatment units such as aerated or stabilization lagoons, provided the minimum volume required for treatment is provided beyond the flow-balancing requirement. b) Provision of additional land where treated sewage is not required on the main plot of land c) Discharge of surplus treated sewage to river or into sea with or without additional treatment. Combining surface discharge facilities with irrigation system is quite common and often quite compatible. d) Resorting to artificial recharge in combination with an irrigation system where feasible.

Treated Sewage into Perennial Rivers

When sewage is treated and discharged into perennial flowing rivers and the blended river water is drawn downstream of the point of such blending as raw water for treatment in public water supply schemes. This is indirect potable use after blending. This is historical and ongoing all around. However, of late, the organic load due to the discharged treated, partially treated and non-point sewage becomes in excess of the self-purifying capacity of the river. Thus, the river water is not actually fresh water. The water quality of Yamuna river for Agra water supply scheme requires to be first treated in MBBR to purify the river water to a level as raw water for the downstream WTP. When it passes through flowing surface water it has the potential disadvantages of contamination by human and animal activities adding organic matter and waterborne pathogens unless the river stretch is protected from such activities. The guiding principle in such cases for the ULBs will be to at least intercept the sewage outfalls and provide adequate STPs and follow the recommended quality criteria for the treated sewage.

Treated Sewage into Non-Perennial / Dry River Courses

There are locations where the rivers are not perennial or almost dry throughout the year except some monsoon runoff. In this case the discharged treated sewage sinks into the aquifer zone and is extracted by infiltration wells or galleries. The advantage of direct dilution from surface water is lost, but the additional purification in the soil and dilution from the aquifer water are happening. An example is the case of the Palar river course in Tamilnadu. The surface water flow in this occurs only for about a week if the monsoon is normal and if the water spills beyond the upstream impoundments. The aquifer however supports the public water supply of over 30 habitations along its dry tract of nearly 80 km before the sea. The partly treated sewage of the en-route habitations does reach this river course as intervals. So far, no epidemics have been met with. This may be due to the above said additional purification in the soil and dilution by aquifer water. However, if these are exceeded by the contamination load, there can be immediate health problems. The guiding principle in such cases for the ULBs will be (a) to keep a check on the raw water quality from the infiltration wells to detect sudden increase in contaminants and (b) at least intercept the sewage outfalls and provide adequate STPs.

Appendix 13: Sample Asbestos containing material (ACM) Management Plan

BACKGROUND OF ASBESTOS

1. The purpose of this Asbestos Management Plan (AMP) is to identify, use appropriate methodology and scientifically handling /disposal of the Asbestos Containing Materials (ACM) in order to comply with the applicable National legislation and International standards in sync with norms of ADB's SPS 2009. ADB has mandated as per Appendix 5 - prohibit the investment activities list - production of, trade in, or use of un-bonded asbestos fibers is deliberated. As per SPS 2009 Safeguard Requirement 1, it is emphasized "that the borrower/client will provide workers with a safe and healthy working environment" in the work areas with accounted risks inherent to the work zone and defined safety instructions and standard operating procedures identifying roles and responsibilities.

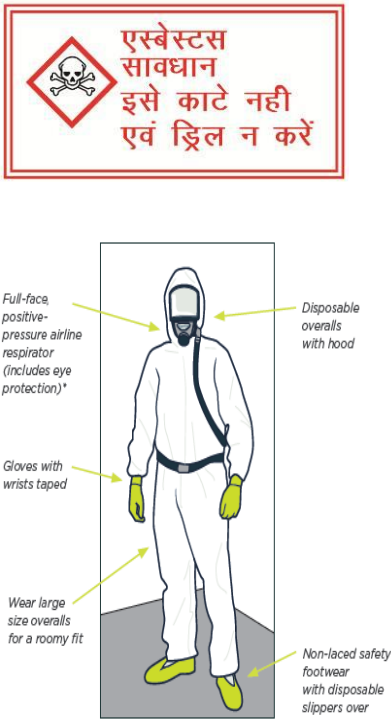
2. Asbestos is a collective name given to a group of minerals that occur naturally as fiber bundles and possess high tensile strength, flexibility, heat resistance, non-biodegradability with chemical and physical durability. Asbestos is hydrated silicates with complex crystal structures. It is found in two configurations: chrysotile (derived from serpentine minerals) and amphibole is a naturally occurring mineral with long thin fibers. The most abundant asbestos used in the world is chrysotile. The use of ACM propagated due to its economic viability.

3. The purpose of this AMP is to identify, use appropriate methodology and scientifically handling /disposal of the Asbestos Containing Materials (ACM) in order to comply with the applicable National legislation and International standards in sync with norms of ADB's SPS 2009.. As per SPS 2009 Safeguard Requirement 1, it is emphasized "that the borrower/client will provide workers with a safe and healthy working environment" in the work areas with accounted risks inherent to the sector and defined safety instructions and standard operating procedures identifying roles and responsibilities.

REGULATORY FRAMEWORK, STANDARDS AND PROTOCOL

Table 1

Government of India Laws, Regulations and standards on Asbestos Applicable to the projects	Requirements for the project
IS 11768: 1986/2005: Recommendations for disposal of asbestos waste material	The standard emphasis that every employer who undertakes work which is liable to generates asbestos containing waste, shall undertake adequate steps to prevent and /or reduce the generation of airborne dust during handling, storing, transportation and final disposal of final disposal of asbestos and asbestos containing products. • The crux is waste avoidance: the practice inculcated should focus the on minimal waste generation. • Waste Collection: In the project circumstance, the waste is referred to the damaged powered asbestos which will be collected in the Permissible plastic bags to be disposed off to the nearest TSDF

	facilities.
IS 12081: Pictorial Warning to be implemented on equipment containing Asbestos Contaminated Products.	The objective of the caution is to make the person handling to take all pre-cautionary measures and make them aware of all the possible risk. 
IS 11451: Safety and Health Requirements related to Occupational Exposure to Asbestos contaminated Products.	In the project the norms pertaining to limiting number of hours working with ACM will be 8.0 hrs/48 hrs a week and the medical examination has to be periodic, the environmental monitoring has to be done as per the protocol. The safety at work place shall be enforced.
IS 11768: Waste Disposal Procedure for Asbestos Containing Products.	The protocol pertaining to disposal of the waste is emphasized, the collection of ACM powered will be in permissible plastic bags, which will be twisted tight at the neck so that the wear and tear due to abrasion will be minimum and the transportation of the asbestos waste has to be done by the authorized vendor to the approved landfill site that in the project case id TSDF.
Sampling of asbestos fiber (as per BIS-11450) has to be done regularly using personal sampler and determined using phase contrast microscope.	The Sampling and analysis protocol is emphasized. Details are given as above.

Further, there are several legislations that regulate the use and handling of asbestos as applicable, namely:

- a. The Supreme Court of India – Banned ACM use in 21 January 2011.
- b. National Green Tribunal - In pursuant to the above order, in 2015, NGT issued an order- “that there is no asbestos mining presently operational anywhere in the country and the operations of the mines of associated minerals with asbestos has also been halted.”
- c. Environmental (Protection) Act (1986)-Environmental monitoring.

RISK ASSESMENT:

4. The process of evaluation of risk at all the working sites was evaluated with the inventorization of the unscientific storage pipes-in case of worst scenario. The site identified and evaluated was Sardarshar. Site visit was conducted to evaluate the risk associated with the ACM handling and re- handling. Working with or handling AC pipes in manner that produces dust, fibers, air borne particles etc., is very harmful and hazardous to the workers and general public in and around the work sites. The condition of existing underground AC pipes are not known, however, as these are old certain pipes will be in deteriorated conditions. So the Conditions were presumed if it is in friable form or in a condition in which it can release fibers before it is subjected any disturbance or removal, all safeguard measures needs to be adopted. There were certain areas where the AC pipes were subjected to shear and are powered, and AC Pipe ends were damaged these were the high risk zones in the campus. The probability of the air borne asbestos fibers in the areas cannot be over ruled.

5. Thus, it is necessitated to draft standard operating procedure for disposal of ACM. The purpose of this standard operating procedure (SOP) is to ensure the safe handling of AMC including protection from hazards associated with uncontrolled distribution, encounter and removal of Asbestos Cement (AC) Pipes and pipe fittings. The scope of this SOP encompasses all aspects of safe AC pipe handling including identification of site, re-handling and encountering of ACM, site selection and proper identification for storage, inventorization, monitoring, final disposal, training and maintenance of records.

6. The fatal health hazard with inhalation of air borne asbestos fibers and its adverse health impact are known and needs a proper attention and planning with defined roles and responsibilities to ensure the work zone is at minimal risk and safe for the workers. It is also necessary to mandate the standard operating procedures with implementation of all requisite safety gears.

7. The assessment of the ACM disposal will be vested with the DOB Operator. The undamaged pipe-where the pipe ends are intact that there is no damaged on the entire length of pipe-to be stored in isolated storage with secured pipe ends either by wrapping the ends with permissible plastic bags. The damaged/broken pipes/powered pipes will be disposed off, by bagging the same in permissible plastic bags. All the records pertaining to the inventorization has to be kept by the DBO Contractor. The same shall be cross verified by RUIDP.

EMERGENCY RESPONSE PLAN & CHANCE FIND PROTOCOL

8. The emergency procedures should include managing an uncontrolled release of asbestos materials into the workplace. The onus of the same shall be ensured with immediate action of the field staff-DOB Operator/ HSE Staff. Steps should be taken to:

- Warn anybody who may be affected.
- Exclude from the area anyone not needed to deal with the release.
- Identify the cause of the uncontrolled release.

- Regain adequate control as soon as possible.
- Make sure anyone in the work area affected, who is not wearing personal protective equipments (PPEs), including respiratory protective equipment (RPE), leaves the affected area immediately.
- Minimize the spread of asbestos by ensuring they are suitably decontaminated.
- Clean up dust and debris.
- Decontaminate anyone who is contaminated with dust and debris.
- Ensure rags, clothing or PPE is decontaminated or disposed of as contaminated waste.
- Consider alone and/or remote workers to ensure they can alert someone if necessary.

Check what you're working on before you start:

- Avoid using a sweeping brush as this can spread asbestos.
- Make sure no unauthorised personnel enter the area.
- The clean-up of any accidental release of higher risk materials, eg asbestos cuttings, powered asbestos that may release the asbestos fibers, to be done by authorized person

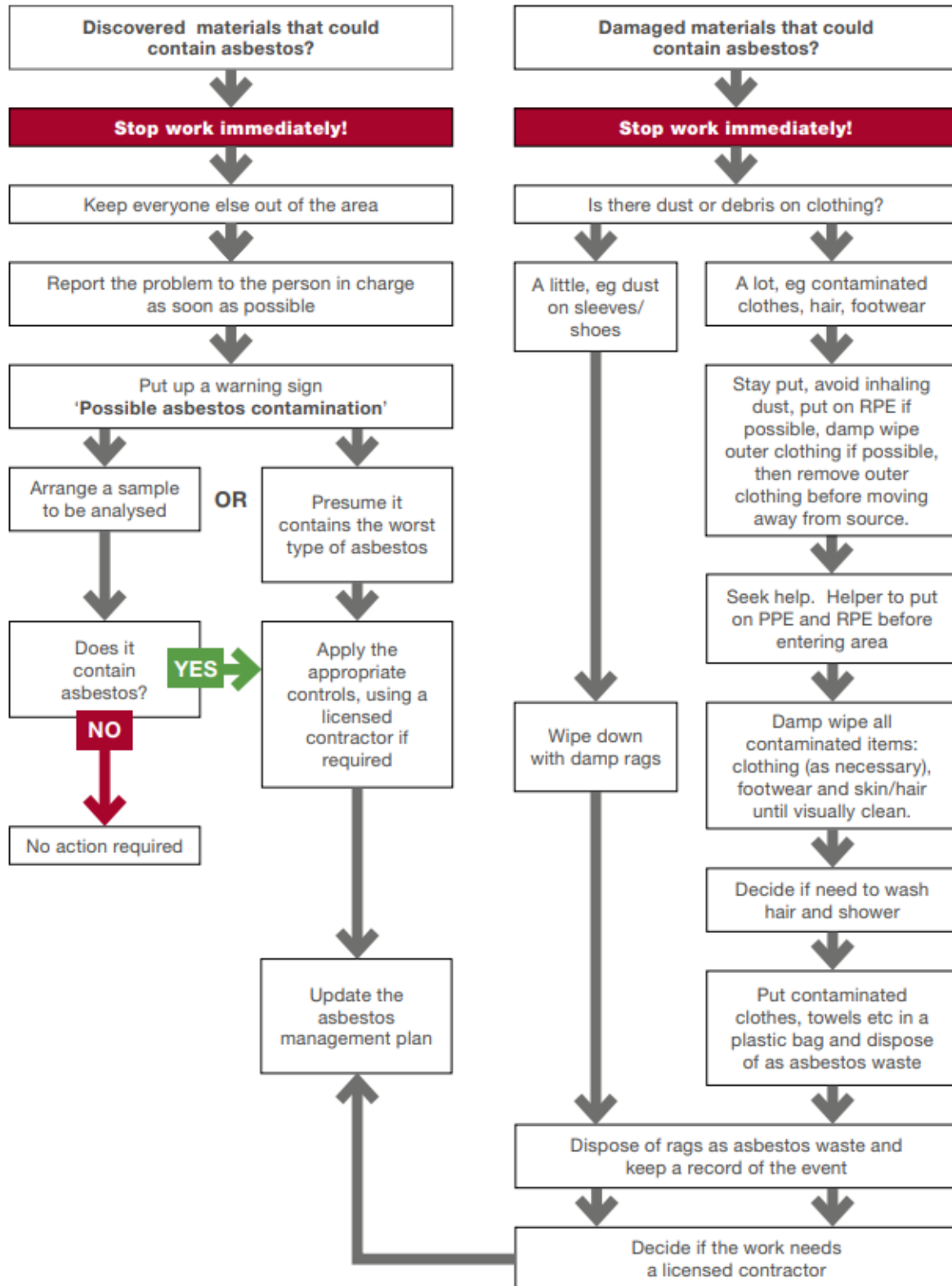


Fig.No.1-Showing Flow chart of ERP

Table.no.2-Roles and Responsibilities

PRE-CONSTRUCTION				
Activities	Responsibilities	Associated Documents	Estimated Cost	Remark
Design to encounter minimal ACM, and then Identification & Inventorization ACM - AC pipes & fittings	RUIDP & DBO CONTRACTOR	Form-I	Rs.100/km	The onus of the minimal encounter of ACM is vested upon the RUIDP and inventory will be with the DOB Operator and has to be annually verified by RUIDP.
Define & confine ACM storage area-in-situ			Rs.65/Sq.m	The storage area made available will be confined and fenced.
Warning signage near the ACM work site, storage and on AC pipes in local language**			Rs.500/label	The signage labels can be printed, sticker pamphlets or painted.
Training of personals handling the AC pipes and fittings	DBO CONTRACTOR	Form-II	Rs.1000/Person	All requisite safety gears should be made available at all sites.
Use of safety Gears			Rs.6000/Person	All the safety gears should be silicon based and suitable for Asbestos protection.
Briefing of Emergency Response Plan			Rs.500/Person	All the risk zones with respect to white card has to be briefed.
Confined storage with access control plan			Rs.5000/site	Inward and outward movement of authorized person must be allowed and has to be guarded or should be under key control.
Pre-history medical records of the ACM handling team			Rs.3000/Person	All requisite medical test, Respiratory test, lungs /Chest X-ray/CT Scan, Blood Test, Lower Abdomen examination etc
CONSTRUCTION PHASE				
Monthly Inspection & Annual Environmental Monitoring.	DBO CONTRACTOR	Form-III	Rs.40,000/sample	The sampling zone should be 500 m from the storage site and personal sampling has to be as per SOP-2
Reporting in SEMR	RUIDP/ DBO CONTRACTOR	None	Nil	As per ADB Format
Collection of Health records in compliance to the local laws	DBO CONTRACTOR/R UIDP/PHED/LSG	Form-IV	Nil	For regular evaluation & identification of any aboronmality.

Ensure adoption of all standard operating procedure		SOP-1&2	Nil	As revision desired on basis of Site specific information may be upgraded in the SOP 1&2 if required
Collection, Segregation, Reception and Disposal as per National norms of ACM		Form-V	Nil	Standard Regulatory format has to be filled and disposed off within 90 days.
Use of safety gears prior to handling of ACM based on White Card.		White Card-Page-11	Nil	Periodic training can be site specific
Disposal of ACM to the identified TSDF Facility to be done as per procedure within or prior to 90 days		SOP-2	1500/ton of waste plus freight as per actual.	Within 90 days from the generation of waste, in case of existing waste it has to be disposed off within 90 days from the Project Start.
To inform and fill the returns in the prescribed manifest as per HWMR.		Form-V (Form-10 of the Rule HWMR	Nil	90 days from the start of work
To facilitated a restricted confined storage space with access control with proper inventorization.		Form-II	Nil	Site Specific
In-situ storage of ACM.	DBO CONTRACTOR	Form-VI		The storage of existing and encountered ACM pipes (more than 4.0 ft) will be stacked end to end at 90 deg. With vertical stacks, 8 inches above the ground, covered with permissible plastic sheet. The campus custodian-viz PHED etc should also be informed about the In-situ storage of ACM and its impact.
ACM removal	DBO CONTRACTOR	--	--	Follow ACM Removal
Record maintenance of ACM in-situ and disposed off to TSDF	DBO CONTRACTOR	Form-I & Form-IV	Nil	The copies of inventory generated and collected will have to be shared with Land Custodian (LC), RUIDP and DOB Operator. To distinguish the forms they can be

				numbered. FORM-I(LC),Form-IV(LC)
Transits ACM storage of waste to be disposed off to TSDF	DBO Contractor	Form-IV	50,000/room	An isolated storage room should be constructed with 10x10 with height of 3.5 ft roofed properly for transit disposal of ACM to TSDF. DISPOSABLE ASBESTOS WASTE STORAGE ROOM HAZARDOUS WASTE CATEGORY-15.2 (as per Hazardous waste management & Handling Rules 2015).
POST CONSTRUCTION PHASE				
Compliance of AAQM, Asbestos Fiber monitoring and Soil Quality monitoring and Periodic Work zone monitoring(Asbestos fiber count) records to be maintained	DBO Contractor	SOP-2	Rs.40,000/sample	The Asbestos Fiber count monitoring has to be conducted prior to ACM handling operation and after ACM Handling operation by an Accredited Laboratory. List of accredited laboratory will be available at Rajasthan State Pollution Control Board website- rspcb.nic.in
Health records & Periodic Medical Checkup of the personals handling ACM to be maintained.	PHED/LSG/DBO CONTRACTOR	Form-II	Rs.3000/Person	All the concerned employees deputed to handle or deal with ACM has to have Pre medical history and periodic medical examination done

Permissible Levels

9. Permissible Exposure Limit (PEL) for asbestos is 0.1 fibers per cubic centimeter of air as an eight hour time weighted average (TWA), with an excursion limit (EL) of 1.0 asbestos fiber per cubic centimeter over a 30 minutes period.

ACM REMOVAL

ACM Removal has to be checked in sync with the design and emphasis has to be laid to avoid the removal of ACM, in case it is unavoidable, then all the requisite safety gears are to be adopted:

- Inform the Asbestos Expert/HSE Expert prior to removal.

- Isolate the area with access to only trained staff/employees under supervision of Asbestos /HSE Expert.
- Exhibit all warnings



Fig.No.2 Asbestos warning signage

- Undertaken Asbestos fiber Monitoring
- The trained Employees have to be deputed for removal of ACM.
- The removal ACM material has to be check with the status and extent of damage.
- Efforts should be made to remove the ACM as minimal as possible.
- The ACM removal has to be manual; it should neither be cut nor drilled.
- All removal operation should be undertaken with ACM in wet condition.
- The removed ACM will then be labeled and placed on permissible plastic sheet. It should not be put on ground directly.
- The dimension of plastic sheet should be larger than the ACM placed.
- If the ACM pipe is not damaged as about 4.0 ft and above, the ACM will be subjected for in-situ disposal.
- If the ACM is damaged and broken then it has to be packed in permissible plastic bags and disposed off to TSDF.
- Prior to disposal it can be stored in isolated room-showing board of –Hazardous waste storage room.
- The hazardous waste to be disposed off to TSDF should not be stored over 90 days after the removal date of ACM at site.
- All the safety procedures and safety gears should be worn by all the employees engaged in the ACM Removal operation.
- The Asbestos fiber monitoring, soil monitoring has to be undertaken during the operation as well.

- The process of removal of ACM will be completed after the removed ACM and its suitably disposed off either in -situ or to the isolated room prior to disposal at TSDF.
- Post ACM Removal asbestos fiber monitoring has to be undertaken to ensure the work zone is safe to resume further operations.

Safe Practices in Handling ACM

10. Proper handling and PPE:

- Cover up and wear PPE (Personal Protection Equipment). including respirator or dust mask
- Make sure the mask has two straps to hold it firmly in place. Don't use masks that only have one
- Also wear a Hard hat, gloves, disposable coveralls with a hood, and safety glasses or goggles to protect eyes
- Do not eat, drink or smoke in the work area as you may inhale or eat dust. Wash your hands and face with soap and water before meal breaks and when finished work for the day.
- Do not use power tools Asbestos fibers can be released if power tools are used for anything other than the removal of screws.
- Do not water blast or scrub with a stiff broom or brush. It is illegal to water blast asbestos cement sheets. If the material has been accidentally water blasted or has suddenly deteriorated in some way, you should call a licensed asbestos removal DOB Operator
- Wet gently with water when removing asbestos cement pipes, use a pump spray to lightly dampen the pipes and keep the dust down. Remember: Not to waterblast asbestos cement materials.
- Avoid drilling and cutting into asbestos products.
- Do not drill holes through and never cut Instead remove the entire product and replace it with a non-asbestos product
- Don't drop fiber pipes remove them carefully, Lower them to the ground, don't drop them, to minimize breakage.
- Lay plastic sheeting under the work area to prevent any dust contaminating the ground. Use 200 micron thick plastic sheeting or bags or as permissible these must not be made from recycled materials or re-used for any other purpose.
- The work area has to be barricaded and there should be no un-authorized person allowed. Only Trained ACM expert should be allowed to handle the ACM along with EHS Expert.
- Close windows and doors and seal vents to stop dust getting into the house; ask neighbors' to do the same.
- Seal off other places where dust can get in.
- Remove soft furnishings like rugs, clothes, jute bags from the work area, and seal anything with plastics if it cannot be moved.
- All the AC broken pipes have to be collected and stacked properly with 200micron plastic wrapping with warning signage.
- Do not leave plastic sheet lying about where they may be further broken or crushed by people or traffic.
- Remove all ACM by the trained handler.
- Since we are amidst of dry climatic conditions due care must be taken to see that no waste broken pipes or fittings are left loose and outside the confined area and may be dampened as required.

t. Mark and add signage.

11. Due care has to be taken to collect the dampened waste in a permissible standard bags with proper warning signage's.

12. The wastages packed have to be disposed off to Treatment, Storage or Disposal Facility (TSDF). The plastic bags must have legible note:

- a. Waste Type:
- b. Date of packing:
- c. Qty/Numbers:
- d. Packed by:
- e. Warning Signage:
- f. Disposal



Fig.No.3- ACM: In-situ storage warning

13. The AMP procedures-**Standard Operating Procedure-01-** are as follows and are summarized as above

- a. Objectives – to keep the work zone safe and secured.
- b. Requirements – identify all the requirements needed for handling AC in the specific site and project
- c. Conduct and ensure awareness and vocational training to ACM handlers
- d. Conduct a comprehensive identification and risk assessment of ACMs
- e. Apply restriction / re-handling of ACM on ground-use of PPE. Ensure that workers handling ACM have the right PPEs as follows:
 - i. Hard helmet
 - ii. Overall suit
 - iii. Gloves
 - iv. Mask to be strapped tight
 - v. Safety goggles
 - vi. Safety shoes
 - vii. Ear plugs
- f. Avoid underground encountering of ACM
 - i. Ensure that an authorized person (HSE) are supervising the work
 - ii. Barricade the area with signage
 - iii. Damp ACM
 - iv. Use safety gears

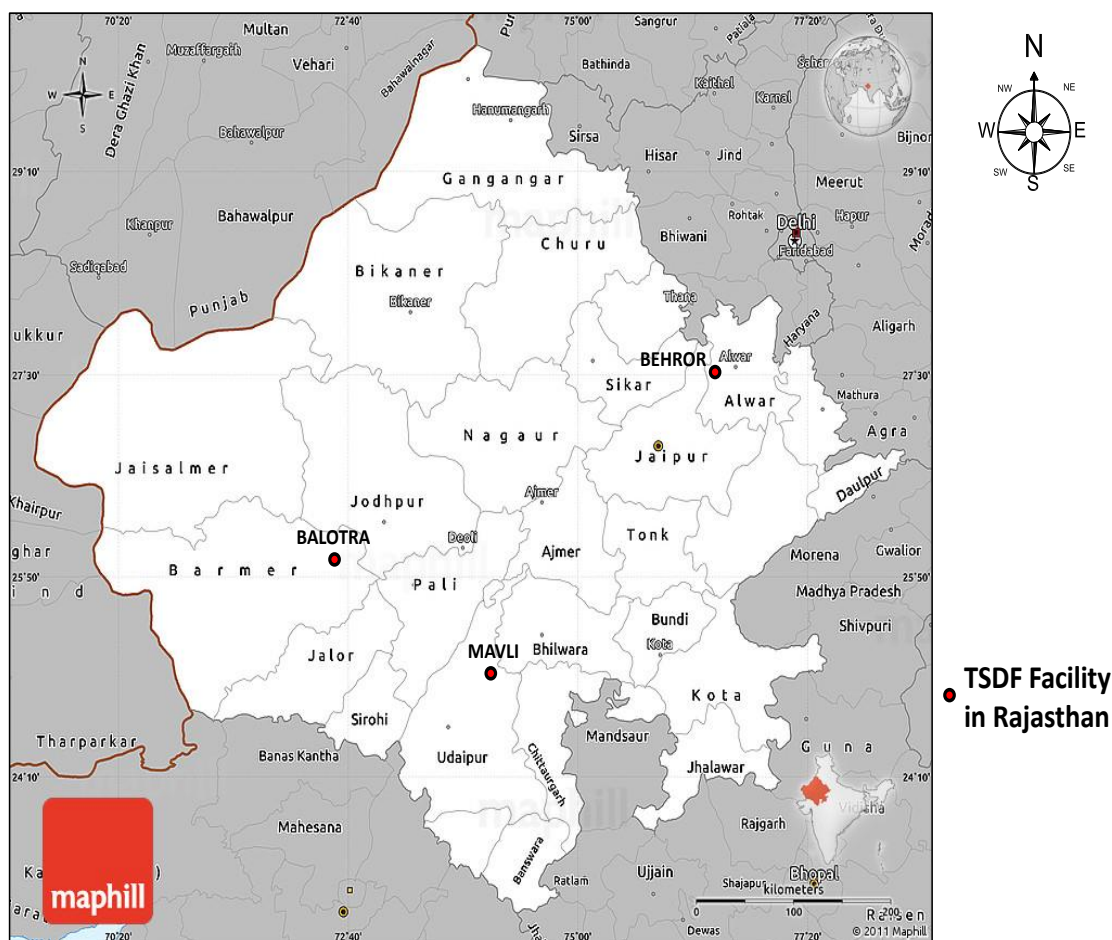
- v. Dismantle ACM to be labeled, kept on plastic grounding and packed in permissible bags
 - vi. Label the bags properly
 - vii. Ensure shipping to proper disposal sites
- g. Site selection – the disposal site should be ready to handle ACM and protect the nearby people as well The site selection criteria are as follows:
- i. Away from habitation
 - ii. Avoid low lying areas
 - iii. Away from water storage
 - iv. To be enveloped with minimum of 8-feet height enclosure
 - v. Avoid high vertical stacks
 - vi. Access controlled
 - vii. Proper signage enclosure
- h. Proper re-handling of AMC, labeling and packing
- i. Control access and ensure proper monitoring of records, specifically:
- i. Environment
 - ii. Health
 - iii. Reporting to regulators

Dispose the ACM through qualified DOB Operators up to the Total Sanitary Disposal Facility (TSDF)

LIST OF APPROVED TSDF OPERATORS IN RAJASTHAN

S. No	Operator	Address	Remark
1.	Rajasthan Waste Management Project (M/s Ramky Enviro Engineers Ltd)	Survey 1018/13, Vill-Gudli, Tehsil-Mavli, Zinc Choraha to Debari Railway Station Road, Dist Udaipur (Rajasthan).	This TSDF is for all kind of hazardous waste as listed in the hazardous waste (Management & Handling) Rules.
2.	Ramky Enviro Engineers Ltd, Balotra	Ramky BWMP Rd, Rajasthan 344032.	This TSDF is for all kind of hazardous waste as listed in the hazardous waste (Management & Handling) Rules
3.	Continental Petroleum Ltd	Bheror, Distt- Alwar	Only for Incineration

Label/display for TSDF disposal bags has to have clear display of the content in both English and local language as displayed under:



The above map clearly depicts the location of approved TSDF in Rajasthan.

IN-SITU STORAGE ACM PIPES AREA

The removed undamaged ACM pipes have to be stacked properly as shown below to avoid any rolling of the pipes and eventual damage. The existing ACM Pipe stacking has to be re-handled to stack the ACM pipes properly. If the removed ACM Pipes is less than the full length of the ACM pipes, then separate stack of the same should be done with proper pre-caution and safety measures and gears.

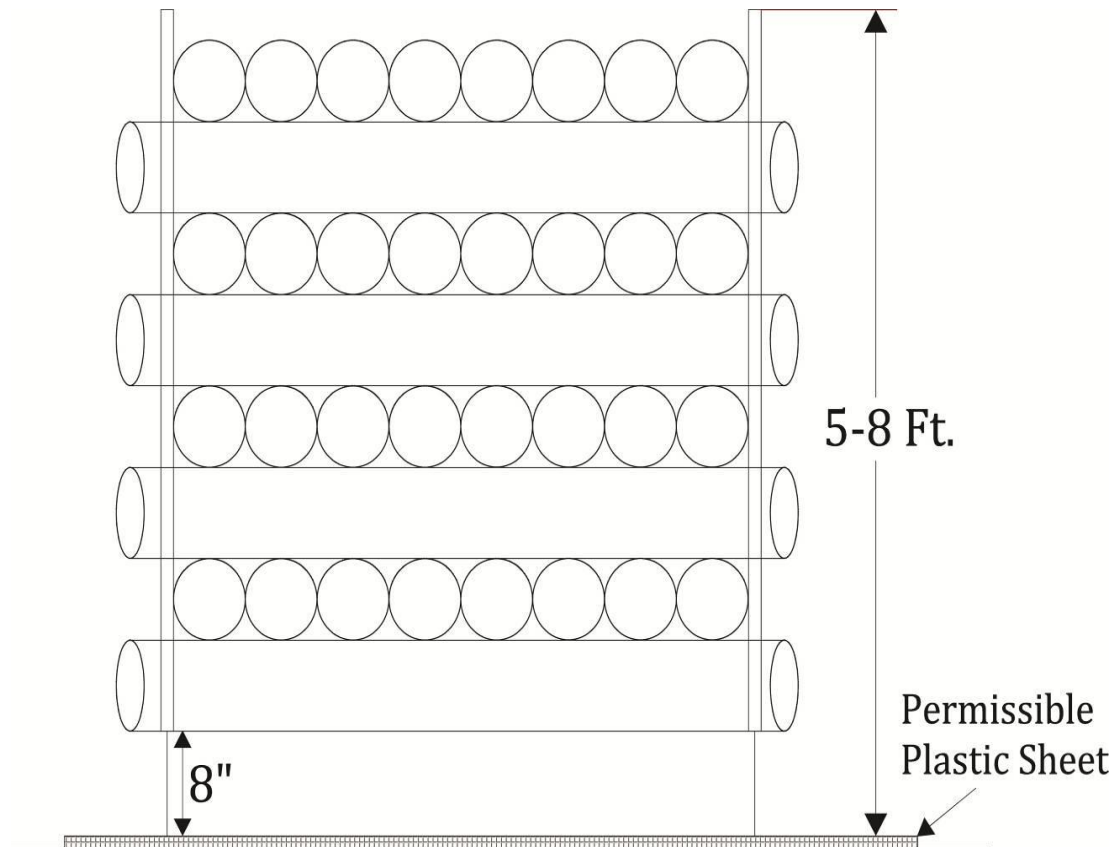


Fig.No.5: Schematic diagram showing ACM Pipes stacking

The ACM stack has to be enveloped with proper fencing showing internal movement of person with 4.0ft corridor all around the stack. The Storage area will have display of all requisite warning and access control of the authorized person's entry and exit.

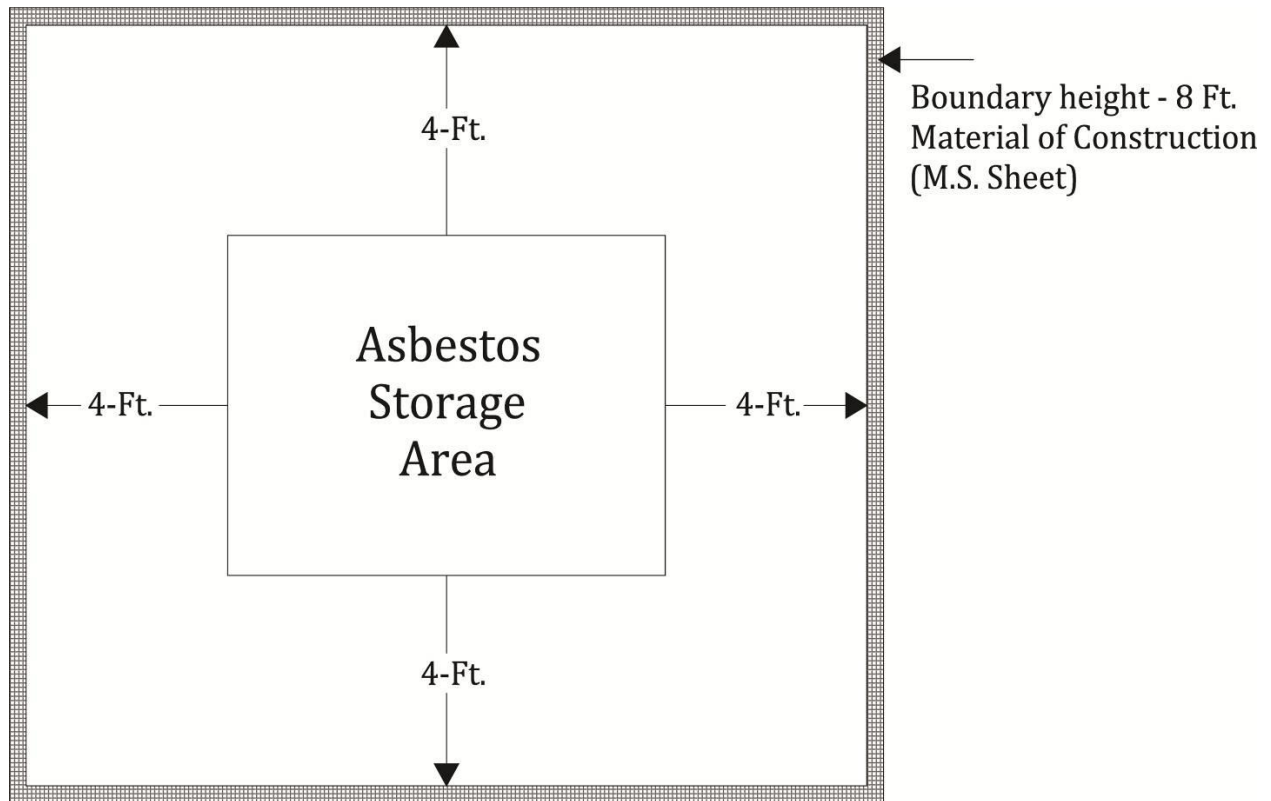
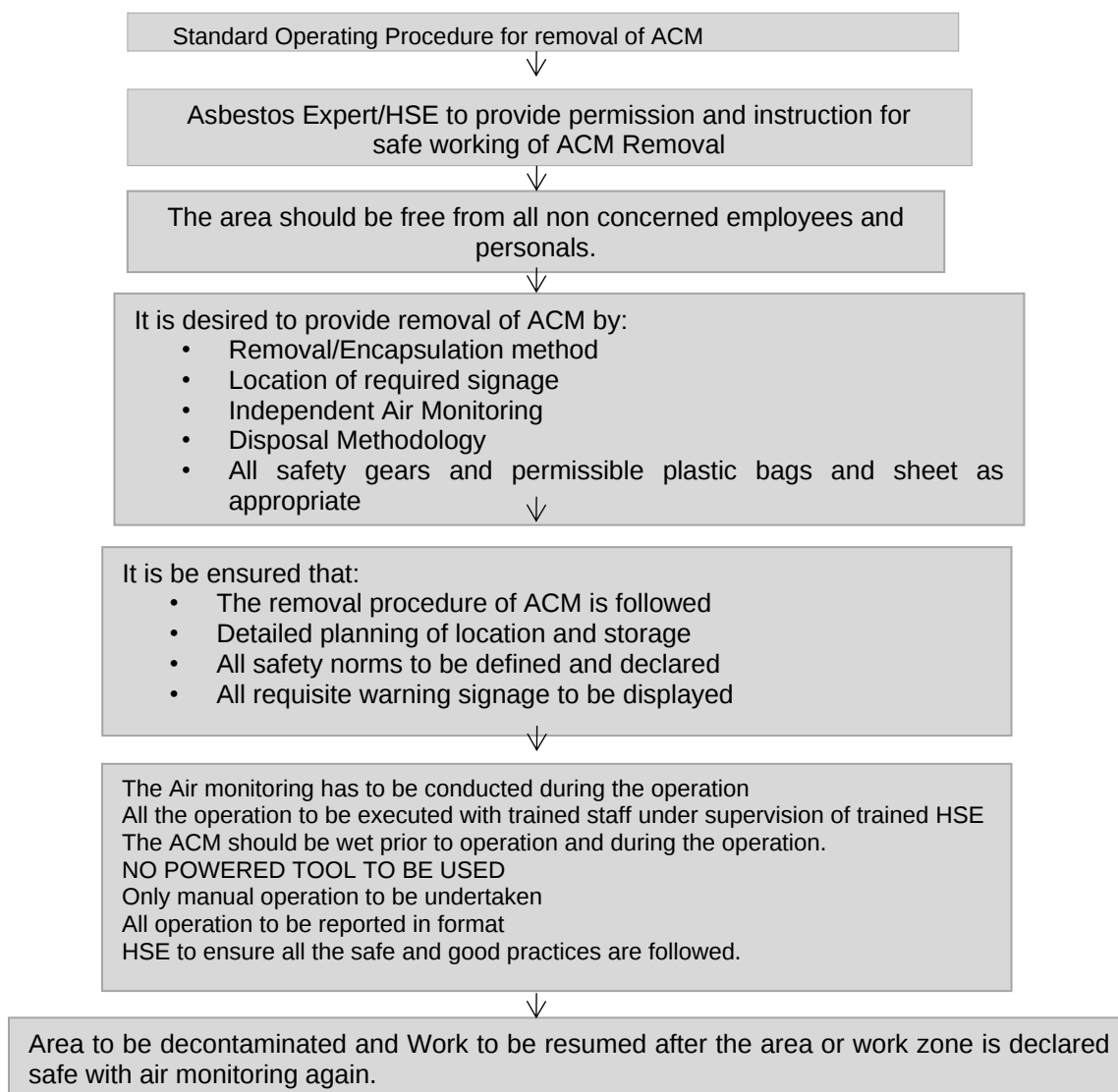


Fig.No.6: Schematic diagram showing ACM Pipes storage area

Fig.no.2-Standard Operating Procedure Flow Sheet

14. All the records in the pre-determined format are to be maintained and the disposal as stated in the applicable National legislation is to be followed. Any innovative use of the discarded ACM with the permissible law frame must be approved by respective Regulators prior to practice.

15. The format of Inventorization & records at all locations must be maintained irrespective of generation of ACM waste. The format of documentation must be uniform in order to track and trace the details as desired.

16. Based on the outcome of the workshop it was essential to enumerate the standard operating procedure & define the roles and responsibilities (already discussed as above) and the re-handling cost of the ACM as stated below:

Table.03- Suggestive Protective measures & Estimation of the cost of Re-Handling of ACM

1	Re-Handling	- Re-Handling of the old AC Pipes in the premises needs to be quantified and a proper inventorization has to be prepared. - The isolated enveloped storage sites should be away from the habitation, the pipes used for fencing, tree guard needs to be re-handled & stored in the nearest isolated storage site and the damaged pipes/broken pipes have to be disposed off to the TSDF with all pre-cautionary measures. NOTE: Only powered/ grounded ACM will have to be disposed off to TSDF.	Manpower engaged: Trained labor, Supervisor, HSE Experts/Asbestos Expert	The re-handling cost will be part of the laying program. The disposal cost is Rs.1500/MT plus freight as per actual
	Removal of encountered AC Pipes	The damaged / broken AC Pipes have to be cautiously handled with prior moistening and packed in plastic bags (permissible plastic bags) and sent for re-use in road making or to TSDF with all signage and precautionary measures as suggested above.	Manpower engaged: Trained labor, Supervisor, HSE Experts/Asbestos Expert	As stated above
	Storage	The existing storage stacks have to be shielded with 8.0 ft height and above ground (min1.0 ft) The Pipes shall be stored in stacks with stoppers provided at the bottom layer to keep the pipe stack stable. The stack, particularly of smaller diameter pipes, shall be in pyramid shape. Pipes shall not be stacked more than 1.5 m high. Each stack shall have pipes of the same type and size only. Removal of pipes shall start from the top layer and by pulling from one end, if required, with all safety precautions. A pipe shall not be stored inside another pipe. The pipes may also be placed alternately length and crosswise. They shall be stored on horizontal racks supported throughout their lengths on a	Manpower engaged: Trained labor, Supervisor, HSE Experts/Asbestos Expert	As on daily wages

		reasonably flat surface free from stones and sharp projections. They should not be stacked in large piles, especially under warm conditions. Open ends of pipes to be sealed with permissible polythene.		
	Transportation	• Full length pipes • Damaged/Broken Pipes	Authorised agency	As per actual.
	Disposal			
	Isolated storage	The storage area should be twice the area required for storage of ACM	Manpower engaged: Trained labor, Supervisor, HSE Experts/Asbestos Expert. Authorised vendor. Boundary, signage, safety aspects etc	As stated in Table1.1.
	Sent to TSDF	The damaged/broken pipes will be packed in permissible Poly bags and has to be stored in defined location within the isolated storage. The records pertaining to the disposal (within 90 days of generation) have to be made systematic. Possibilities of using the broken pipes in wet conditions in road making in order to bind the asbestos fibers can be explored.	Authorised agency	Freight as per actual.
	Estimation of suggestive protective and preventive measures			
	Air Quality sampling & Analysis- Asbestos fiber count	Personal sampler, phase contrast microscope, In case of asbestos dust, the same shall not exceed 2 mg/Nm ³ . Per the OSHA standards for asbestos, exposure monitoring and medical surveillance of workers is required when the Workers are or will be exposed to airborne concentrations of fibers of asbestos at or above OSHA's exposure limits for a combined total of 30 or more days per year; Workers perform work that disturbs asbestos-containing material (ACM) or presumed asbestos-containing material (PACM) for a combined total of 30 or more days per year. Minimum 3 locations (@120deg from each location) at min 500 m from the isolated storage of ACM and one sampling near the encountered site. The frequency of monitoring should be bi-annually.	Approved/accredited laboratory	As stated above.
	PPE's	Hard helmet, double strapped mask, safety tapes, boots(non laced),	Standard make, minimum-4 sets at	As stated Above

		gloves, safety suits, goggles, ear plugs,	each site	
	Education & Training	Awareness, New induction training and inspections	Asbestos expert/HSE Experts	As stated Above
	Medical Check up	As per norms or in consultation with Medical Practitioner.	Medical Doctor	As stated Above

Note:

Efforts should be made to minimize the existing AC water pipes. In areas where ACM are stored, it is required to have induction training of AMP, complete the formats and maintain the records.

Removals of used AC Pipes for fencing, boundary wall etc have to be carefully removed from use and stored in isolated storage.

At certain locations, it was observed that the discarded pipes was used as tree guard, when the sapling was planted as on date the tree is fully grown, in that case the removal of ACM has to be done with all precautions and use of total safety gears. Hand tools or slow-running tools producing coarse dust or chips should be used where practicable rather than high-speed machines or those which cut by abrading the material after wetting. Alternatively, the same can also be bounded properly by bitumen paint.

The coarse dust and pieces in wet conditions will have to be collected in permissible plastic bags with use of all safety gears.

The collected wastes are to be labeled as stated above and disposed off to TSDF. The records of the same will have to be kept on daily basis and summarized to monthly basis.

FORM I – ASBETOS INVENTORY, INSPECTION AND ACTION FORM		
Format: RUIDP/IIA/ LOCATION/NAME OF DBO CONTRACTOR/HSE 002/YEAR		
Location:		
Site co-ordinates:		
Elevation:	Team:	
Date of visit	Sign:	
Present Status		Indicate if installed, operational, in storage, etc.
Original age		Months or years since installation
Diameter		mm or inches
Length		meters
Volume		
Total packet		
Packing date		
Disposal date		
Existing Site (Photo or illustrations):		
Illustration/ Design of Activities On-site with respect to existing asbestos (include details such as size of new pipes, distance from existing AC pipes, other notable observations)		
DBO Contractor Handling Asbestos:		
Number of persons handling waste		
Medical Records		
Safety Gears		
Vocational Training Last Conducted: Number of attendees: Conducted by Schedule:		
Required Actions:		
Remarks		
Conclusion/Remark		
HSE Signatory		

FORM-II – MATRIX FOR TRAINING & RECORDS

Format: RUIDP/INSP. MATRIX/LOCATION/NAME OF DBO CONTRACTOR /HSE 001/YEAR			
S. No.	Aspects of ACM	Check points	Remarks
Training Schedule:			
Trainer Details:			
Date/Location of Training:			
Number of attendees:			

Training Schedule, Training Materials & Attendance Sheet, Feedback of Trainees.			
Understanding of:			
A. DOCUMENTS AND RECORDS			
1.	Site Inventory		
2.	List of ACM storage and installation points		
3.	Structure of ACM management committee		
B. INVENTORY			
1.	Inventorization of ACM		
	Number of ACM/ pipes		
	Dimensions of ACM/ pipes		
	Total volume of ACM/ pipes		
2.	Storage facility/ installation location:		
A.	In-use	Location	
		Condition	Intact/ damaged
		Purpose	
		Accessibility by the workers	
		Evidence of physical damage and approximate size (length, width, volume) without coming into contact with The damaged ACM	
		Impacts on the environment (Based on Asbestos fiber Monitoring)	
3.	LABELING AND SIGNAGE		
	Notification to workplace safety and health		
	Working instruction		
	The risks associated with exposure to asbestos fibers		
	Cautionary statement to not disturb materials containing asbestos		
4.	PERSONAL PROTECTIVE EQUIPMENT (PEP)		
	Record of pep		
	Mask		
	Eye glasses		
	Gloves		
	Ear muffs		
	Others		
	Training		
	On occupational risks of asbestos to the workers		Date: Time: In-house/ external: Faculty: No of workers attended:
	Training for maintenance, repair and renovation		Date: Time: In-house/ external: Faculty: No of workers attended:

	Training for workers working with asbestos	Date: Time: In-house/ external: Faculty: No of workers attended:
	Periodic air quality monitoring records	• Within the permissible limits • Not within the permissible limits (specify the reason)
	Workers medical check-up records	Date: In-house/ external: Performed by: Remarks: No of workers attended:
Conclusion/Remark HSE Signatory		

The all the data required in Form-II will be filled by the DOB Operator (HSE-Officer), the records of this document has to be maintained for a pre-decided life. Details of training imparted have to be file with appropriate evidence like photographs, feedback form, videos etc. There has to be a proper documentation of the records kept with highest level of transparence to retrieve, trace and track the records as necessary. The records maintained by the DOB Operator, has to be audited regularly by the ACM-Expert.

Form-I has to be accompanied with Form-II. Defined period of Air Quality monitoring and health will have to be minimum twice a year. Whereever the fiber counts are found/ recorded beyond the permissible norms, corrective action, like:

- ☐ Cordon off the area of ACM
- ☐ HSE team with trained experts to be deputed for the task
- ☐ Moisten the ACM prior to handling
- ☐ Storage area of the ACM stacks to be covered
- ☐ The damaged/deteriorated ACM to be re-handled in presence of Asbestos Expert/ HSE (Trained) with all defined norms and safety gears.
- ☐ Disposal of damaged/deteriorated ACM to be done as per the Norms.
- ☐ Records of disposal to be maintained.
- ☐ Keep all requisite evidence in form of documentation, geo-tagged photographs etc
- ☐ Frequency of health monitoring at such locations to be increased.

Form-III-Air Quality Monitoring and Results

Format: RUIDP/AQMR/ LOCATION/NAME OF DBO CONTRACTOR/HSE 003/YEAR				
Vendor details				
Approvals				
S.No	Location	Agency	Results& Norms	Permissible
Conclusion/Remark HSE Signatory				

FORM-IV-Medical History

Format: RUIDP/MH/ LOCATION/NAME OF DBO CONTRACTOR/HSE 004/YEAR																			
Employee code:																			
Employer Details:																			
PPE Used:																			
Insurance/ESI																			
S.No	Name	Age/Sex/D OB	Address/ Contact details:	Period of Employment/ Job Title	Pre-History	Doctor's comments	HSE Remarks												
					<table border="1"> <tr><td>Height</td><td></td></tr> <tr><td>Weight/B MI</td><td></td></tr> <tr><td>Blood group</td><td></td></tr> <tr><td>X-Ray</td><td></td></tr> <tr><td>CT Scan</td><td></td></tr> <tr><td>others</td><td></td></tr> </table> Smoker: Tobacco: Alcohol Consumption: Family History: Medication if any: Eye sight: Hearing: Others:	Height		Weight/B MI		Blood group		X-Ray		CT Scan		others			
Height																			
Weight/B MI																			
Blood group																			
X-Ray																			
CT Scan																			
others																			

FORM -V

[FORM-10- as per rule 19 (1) of Hazardous waste Handling & Management Rules-2016]
MANIFEST FOR HAZARDOUS AND OTHER WASTE

1.	Sender's name and mailing address (including Phone No. and e-mail)		
2.	Sender's authorisation No.		•
3.	Manifest Document No.		•
4.	Transporter's name and address: (including Phone No. and e-mail)		
5.	Type of vehicle	•	(Truck/Tanker/Special Vehicle)
6.	Transporter's registration No.	•	
7.	Vehicle registration No.	•	
8.	Receiver's name and mailing address (including Phone No. and e-mail)		
9.	Receiver's	Authorisation No.	
10.	Waste description		•

11.	Total quantity No. of Containers	•	m ³ or MTNos.											
12.	Physical form		(Solid/Semi-Solid/Sludge/Oily/Tarry/Slurry/Liquid)											
13.	Special handling instructions and additional information													
14.	Sender's Certificate		I hereby declare that the contents of the consignment are fully and accurately described above by proper shipping name and are categorised, packed, marked, and labeled, and are in all respects in proper conditions for transport by road according to applicable National Government regulations.											
	Name and stamp:	Signature:	Month		Day				Year					
15.	Transporter acknowledgement of receipt of Wastes													
	Name and stamp:	Signature:	Month		Day				Year					
16.	Receiver's certification for receipt of hazardous and other waste													
	Name and stamp:	Signature:	Month		Day				Year					

FORM –VI
In-situ Storage of ACM

S.No	Activity	Number of Stacks	Area occupied	Details of ACM Pipes		Day/month/year Of storage
Site History						
For existing Stacks, details of re-handling of pipes in number or volume to be mentioned under supervision of Authorized Experts.						
Details of Location of re-handled ACM storage, new area should be • Minimum 10-15 ft away from campus habitation. • 250 m away from the water sources • 500-800 m away from Children play area • The area should be isolated and covered from all the sides with restricted Access for Authorised Experts Only. • Register to be maintained for Entry& Exit of personals. • Register to be maintained for Entry & Exit of ACM • Labels to be displayed in legible format • Specific training of ACM to be inducted in the ACM storage area for residing population in the campus.						
Details of transit storage of ACM to be maintained as per norms in an isolated storage room full covered						

Standard Operating Procedure-02 Asbestos Fiber Monitoring, Analysis and Identification

Principle

1. The collection of environmental samples including air must follow an appropriate sampling procedure. A review of method for sampling of asbestos fibers has been published (IPCS, 1986). The most commonly used analytical method involves phase contrast optical microscopy (PCOM) in the workplace and transmission electron microscopy (TEM) in the general environment. The phase contrast optical microscopy (POCM) is universally recommended for asbestos analysis (Eaché and Groff, 1997; Dion and Perrault, 1994) including Bureau of Indian Standard. POCM coupled with polarized light is largely used for asbestos analysis in solid samples (USEPA, 1993). The fiber monitoring has to be done by any NABL/MOEF&CC accredited laboratory either in-house or by third party.

Monitoring of Asbestos Fiber in Air

2. A general survey of inside and outside the storage sites of the work zone has to be conducted to choose the sampling sites. Sampling is to be carried out at visually selected locations appeared more prone to emission or possibility of release of asbestos fiber. The sample collected by drawing a measured quantity of air through cellulose ester a membrane filter by a battery-operated sampling pump that was fully charged to operate continuously over the chosen sampling time. The exposed filters will then be placed into plastic petri dishes and transferred carefully to the laboratory.

3. Two types of samples are to be taken, one within the workers breathing zone that is 300 mm radius extending in front of the face, and measured from the midpoint of a line bisecting the ears called *personal samples*. The samples taken at a fixed location mostly near to the source point called *area or static samples*. Personal sampler model "XX 5700000" and low volume vacuum/pressure pump model "XX5622050" attached with monitor or cowl model "MAWP025AC" of Millipore Corporation, USA are to be used for the collection of personal and area samples, respectively. The flow rate of pump is to be adjusted to 1litre per minute. The flow rate checked before and after in each monitoring, those samples showing the difference by >10 percent from the initial flow rate are to be rejected. In both the samples filter holder (Cowl) always pointed downward position to avoid the deposition of heavy particles. An ester cellulose membrane filters "AAWP02500" having 0.8 µm-1.2 µm pore size diameter are to be used throughout the sampling for asbestos counts at work environment.

Mounting Procedure

4. Complete filter is to be placed on clean microscopic slide, dust side up at room temperature. Electrostatic force keeps the filter usually on the slide. Filters are to be exposed to acetone fumes and triacetin (Glycerol triacetate, Sigma). In this procedure a small quantity of acetone in round bottom flask (500-1000ml) heated at the boiling point underwater bath, the vapors condensed in a simple condensing column. When the sufficient fumes of acetone become ready then pass it throughout on the filter for 3-5 seconds at a distance of 15-25 mm. put the 1-3 drops of Glycerol Triacetate (Triacetin) on the acetone-cleared filter. Place a cover slip on cleared filter by avoiding the air bubbles. Heat the cleared filter at 50°C for 15 minutes and leave it at room temperature for 24 hours under the action of triacetin to clear entire filter. Alternatively, membrane filter can also be made transparent with immersion oil (Leica Microsystems Wetzlar GmbH, Wetzlar). Using a

phase contrast microscope with polarized light, Laborlux S (of M/s Leica, Germany) and then counting has to be done at magnification 400X-500x

$$C = A/a \times N/n \times 1/r \times 1/t$$

Where:

C= concentration in fibers per cubic centimeter rounded to first place of decimal,

N = total no. of fiber counted,

n = number of graticule areas observed,

A= effective filter area in mm²

a= graticule counting area in mm²,

r= flow rate of air through filter in cm³/min., and

t= single sample duration in minutes

5. To rule out the probability of the air borne asbestos in the existing scenario at the said site as well as other similar sites at the different work zones, it is necessary to have the asbestos fiber monitoring and sampling counts to be recorded at regular intervals. The environmental air sampling stations will have to be minimum three at 120-degree angle, within 1000-500 m from the ACM. The sampling frequency has to be in all three stages-Pre-Construction, Construction and Post Construction, while the personal sampling has to be done as stated above.

6. Bureau of Indian Standards (BIS) Guidelines for Safe Use of Products containing Asbestos states that "Asbestos cement products (such as AC pipes) generally contain about 10-15% asbestos fibers in a cement matrix that comprises the rest of the materials and are termed as locked in asbestos products as these products have the asbestos fibers bound in cement. The possibilities of air borne asbestos fiber will be in case of mishandling of encountered pipes with unsafe practice. During storing and installation; recommended work practices shall be followed to avoid harmful exposure". According to Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016, any waste with asbestos concentration limit of 10,000 mg/kg (i.e. 1%), however this will apply only if the asbestos containing substances are in a friable, powdered or finely divided state. Under the Basel Convention,⁵¹ asbestos or asbestos waste in the form of dust and fibers is classified as hazardous waste. The applicable legislation under the present scenario are:

⁵¹ Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal, adopted in 1989.

Summary of Asbestos Management Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Remark
Clearing, transfer and disposal of ACM pipes	Possibilities of air borne asbestos if handled unsafely, cut, drilled or broken into pieces that may cause: ☐ Inflammation of the lungs ☐ Mesothelioma ☐ Peritoneal mesothelioma ☐ Pleural plaques ☐ Asbestosis ☐ Bronchogenic Carcinoma ☐ Second hand-exposure	Implement the AMP strictly that includes identification of hazards, the use of proper safety gear and disposal methods.	DBO Contractor /RUIDP	There has to be a suitable call to be taken for in-situ disposal if the removed ACM pipes are not damaged, full length or 4.0 ft length not damaged.
Work in narrow streets	Possibilities of air borne asbestos if handled unsafely cut, drilled or broken into pieces that may cause: ☐ Inflammation of the lungs ☐ Mesothelioma ☐ Peritoneal mesothelioma ☐ Pleural plaques ☐ Asbestosis ☐ Bronchogenic Carcinoma Second hand-exposure	Conduct awareness program on safety during the construction work Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day Provide barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches Identify risk of intervention with existing AC pipes. If there is significant risk, implement the AMP strictly that includes identification of hazards, the use of proper safety gear and disposal methods.	DBO Contractor/RUIDP	All provision of safe working with proper signage has to be undertaken prior to work initiation, during the work and after the work.

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Remark
Interventions in existing AC pipelines	Possibilities of air borne asbestos if handled unsafely cut, drilled or broken into pieces that may cause: ☐ Inflammation of the lungs ☐ Mesothelioma ☐ Peritoneial mesothelioma ☐ Pleural plaques ☐ Asbestosis ☐ Bronchogenic Carcinoma Second hand-exposure	Appropriate actions as defined in the Asbestos Management Plan will have to be adhered to	DBO Contractor/RUIDP	Measure to avoid the encounter & removal has to be prioritized and if the same is not avoided then the measures stated have to be strictly followed.
Documentation /record	Unmonitored ACM might be handled incorrectly and can cause release of airborne asbestos	To be formatted and kept as mentioned in the Asbestos Management Plan	DBO Contractor/RUIDP	To be kept intact for easy tracking and reference in legible format. The same can be kept in soft format as well.

Appendix 14: Sample Outline Spoil Management Plan

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

I. Spoils information

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

II. Spoils management

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

III. Documentation

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

Appendix 15: Sample Outline Traffic Management Plan

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

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

B. Operating Policies for TMP

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

C. Analyze the impact due to street closure

4. Apart from the capacity analysis, a final decision to close a particular street and divert the traffic should involve the following steps:
 - (i) approval from the ULB/Public Works Department (PWD) to use the local streets as detours;
 - (ii) consultation with businesses, community members, traffic police, PWD, etc., regarding the mitigation measures necessary at the detours where the road is diverted during the construction;
 - (iii) determining of the maximum number of days allowed for road closure, and incorporation of such provisions into the contract documents;
 - (iv) determining if additional traffic control or temporary improvements are needed along the detour route;
 - (v) considering how access will be provided to the worksite;

- (vi) contacting emergency service, school officials, and transit authorities to determine if there are impacts to their operations; and
- (vii) developing a notification program to the public so that the closure is not a surprise. As part of this program, the public should be advised of alternate routes that commuters can take or will have to take as result of the traffic diversion.

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

Figure A1: Policy Steps for the TMP



D. Public awareness and notifications

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

6. The awareness campaign and the prior notification for the public will be a continuous activity which the project will carry out to compensate for the above delays and minimize public claims as result of these problems. These activities will take place sufficiently in advance of the time when the roadblocks or traffic diversions take place at the particular streets. The reason for

this is to allow sufficient time for the public and residents to understand the changes to their travel plans. The project will notify the public about the roadblocks and traffic diversion through public notices, ward level meetings and city level meeting with the elected representatives.

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

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

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

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

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

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

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

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

11. Procedures for installing traffic control devices at any work zone vary, depending on road configuration, location of the work, construction activity, duration, traffic speed and volume, and pedestrian traffic. Work will take place along major roads, and the minor internal roads. As such,

the traffic volume and road geometry vary. The main roads carry considerable traffic; internal roads in the new city areas are wide but in old city roads very narrow and carry considerable traffic. However, regardless of where the construction takes place, all the work zones should be cordoned off, and traffic shifted away at least with traffic cones, barricades, and temporary signs (temporary “STOP” and “GO”).

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

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

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

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

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

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

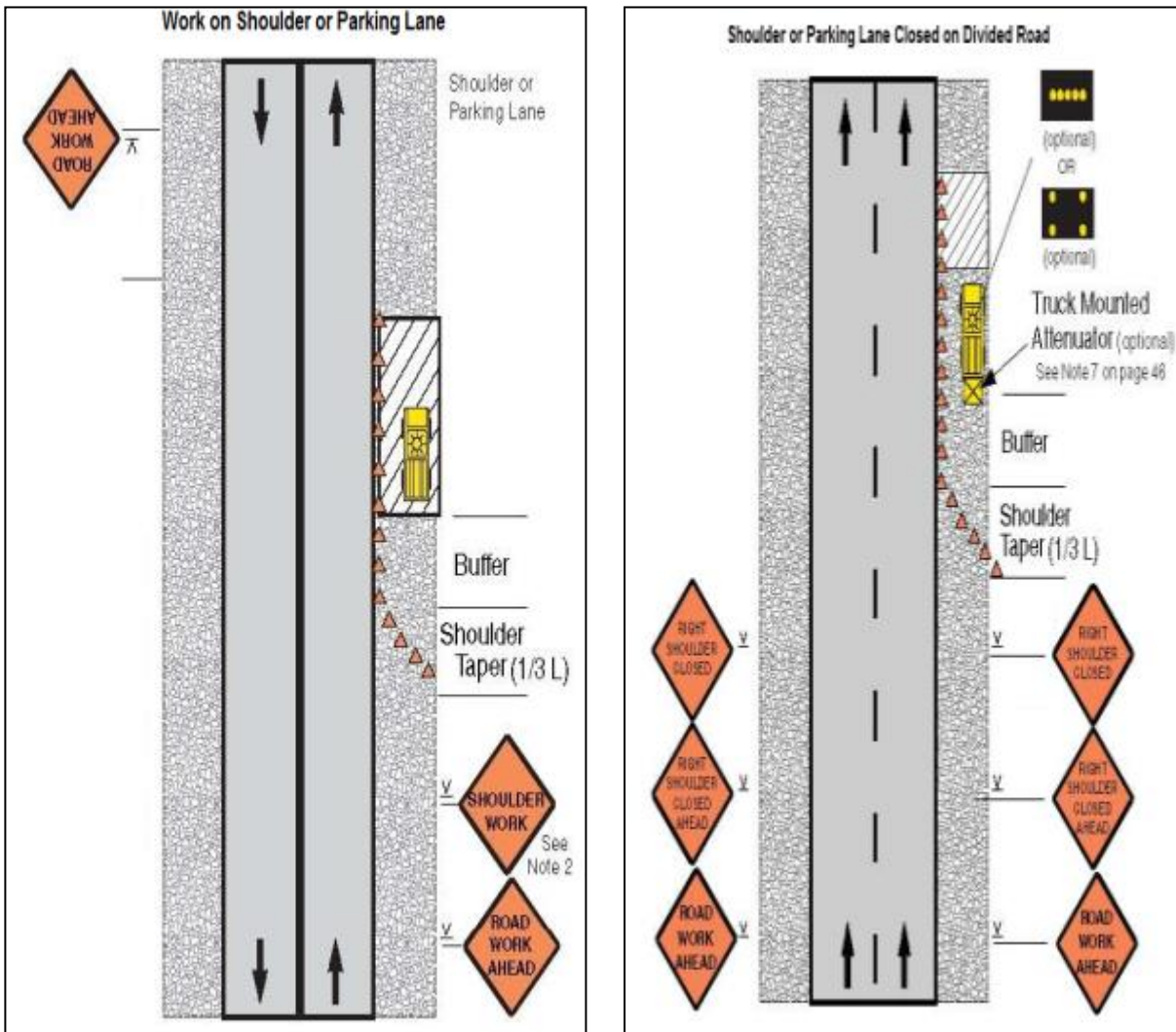


Figure A4 & A5: Work in Travel lane & Lane closure on road with low volume

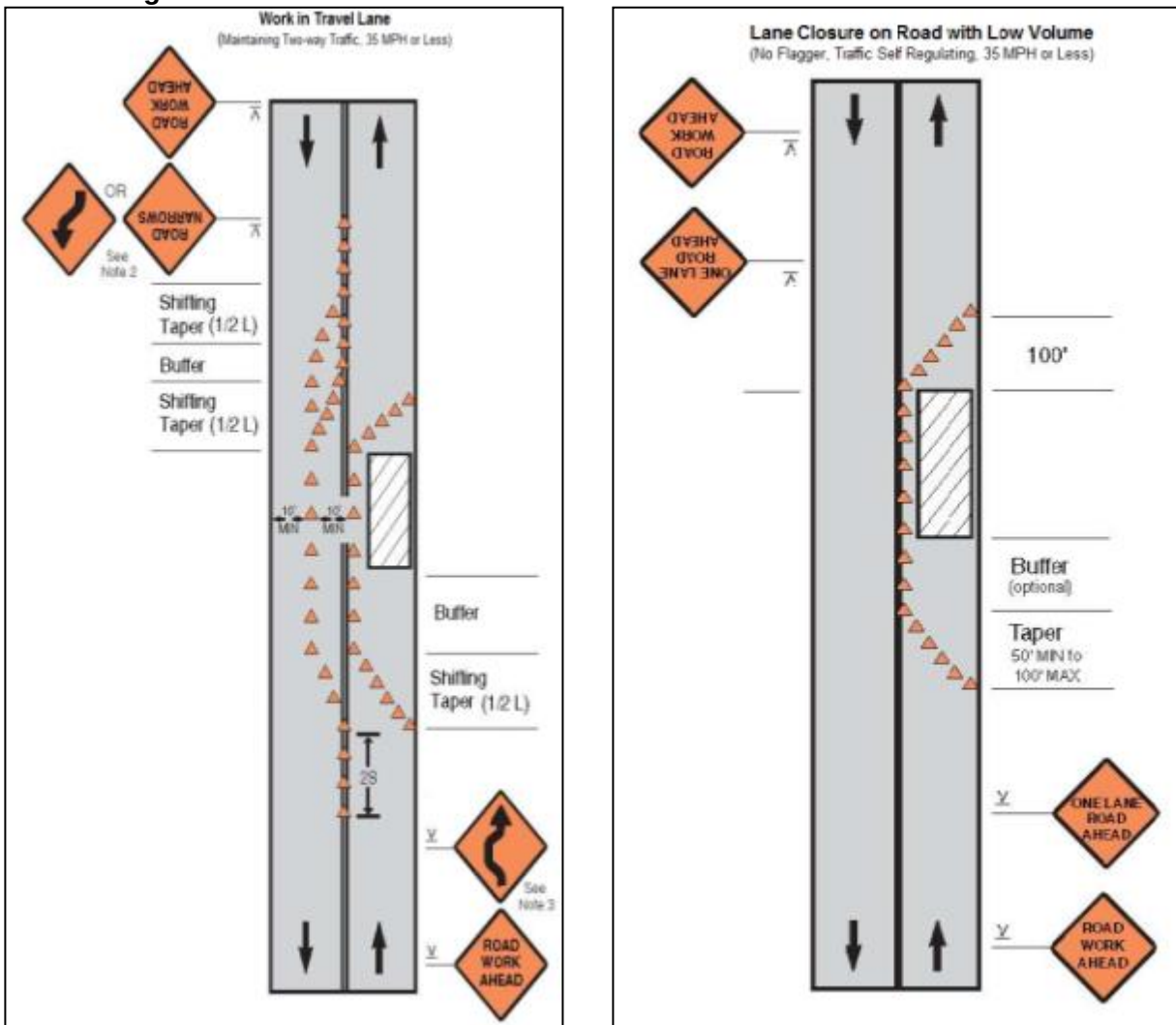


Figure A6 & A7: Lane closure on a two-line road with low volume (with yield sign) & Lane closure on a two-line road with low volume (one flagger operation)

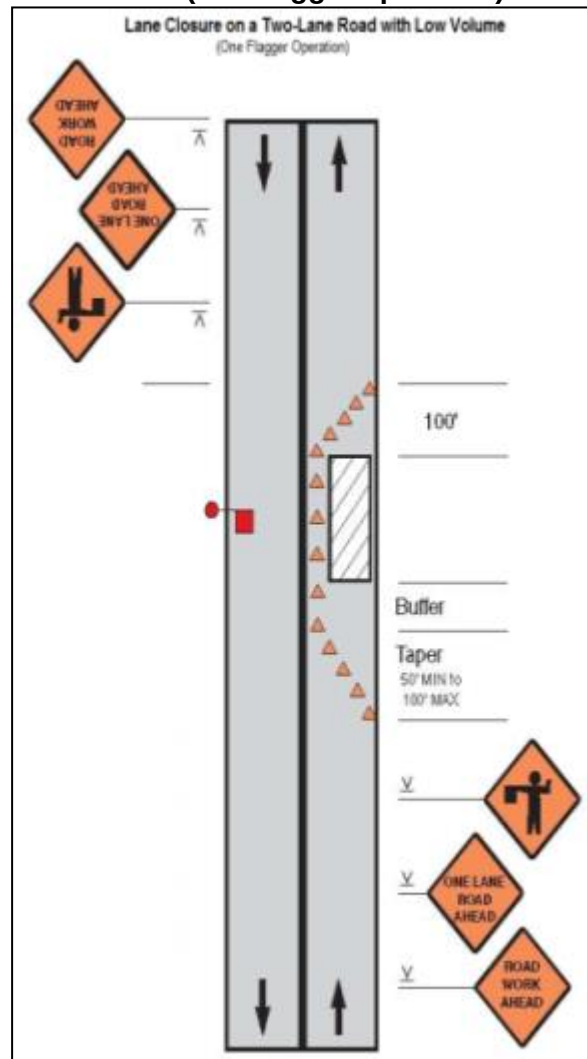
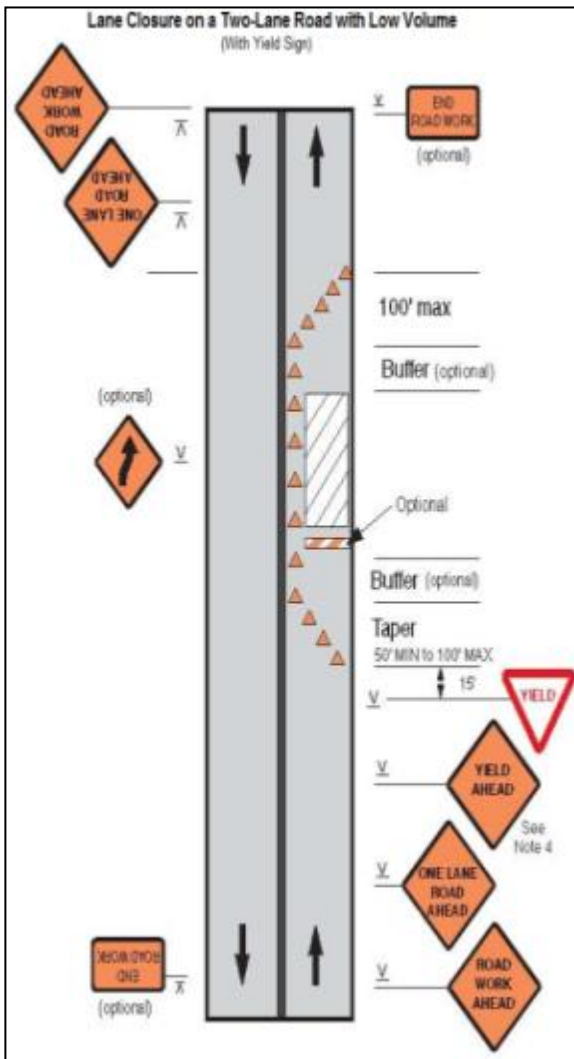


Figure A8 & A9: Lane Closure on a Two-Lane Road (Two Flagger Operation) & Lane Closure on a Four-Lane Undivided Road

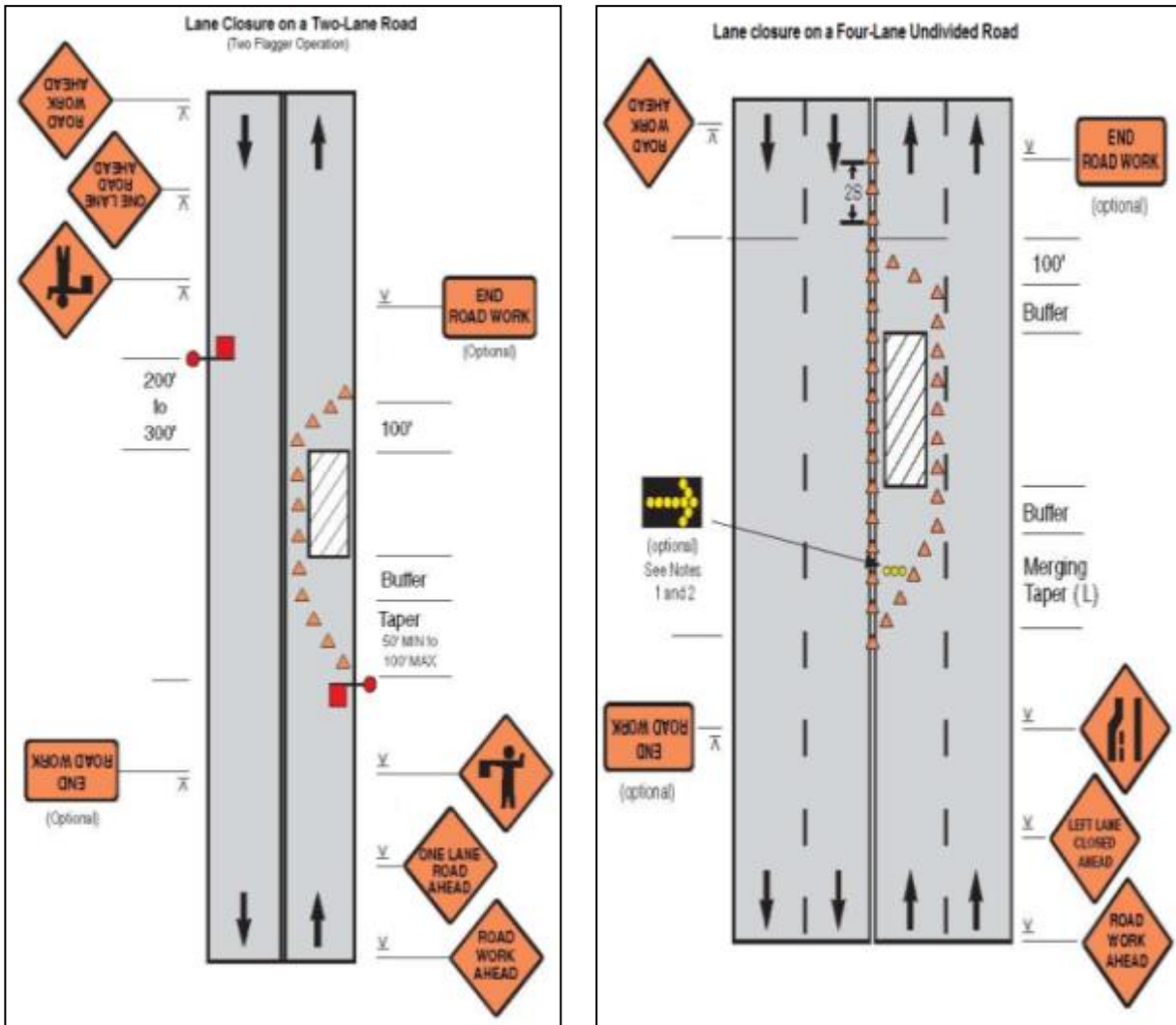


Figure A10 & A11: Lane Closure on Divided Roadway & Half Road Closure On Multi-Lane Roadway

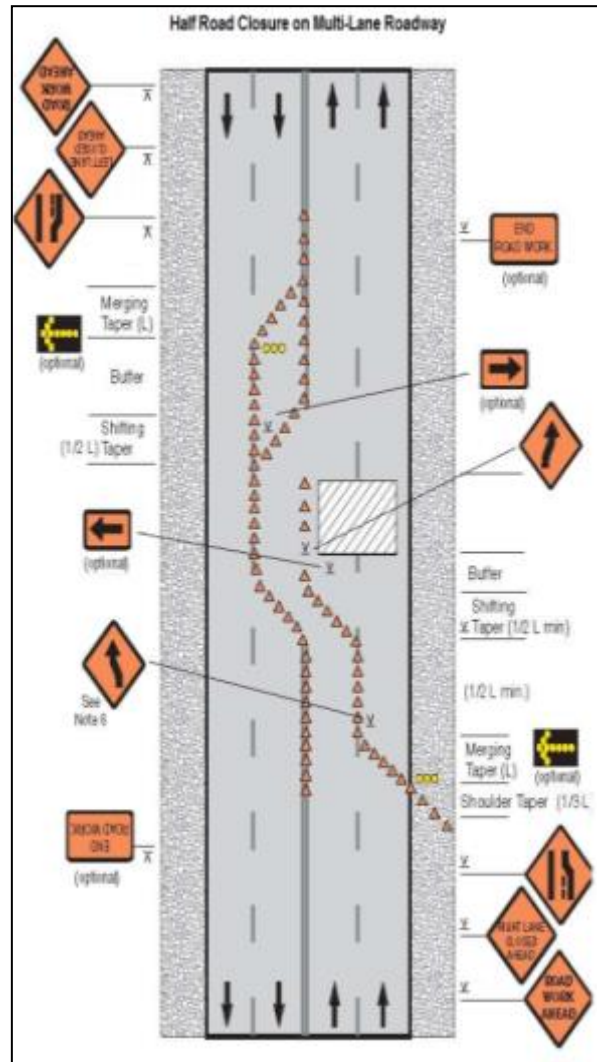
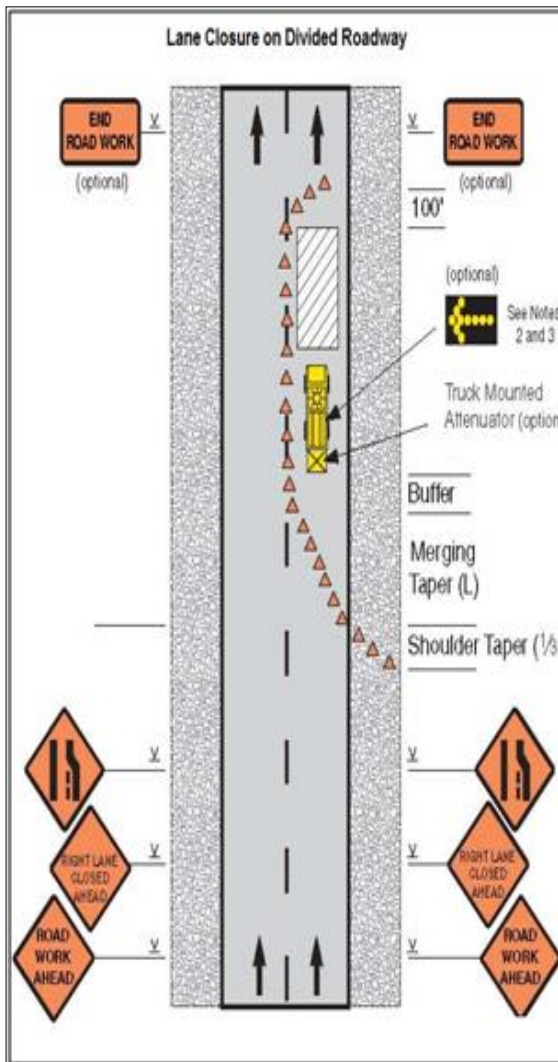
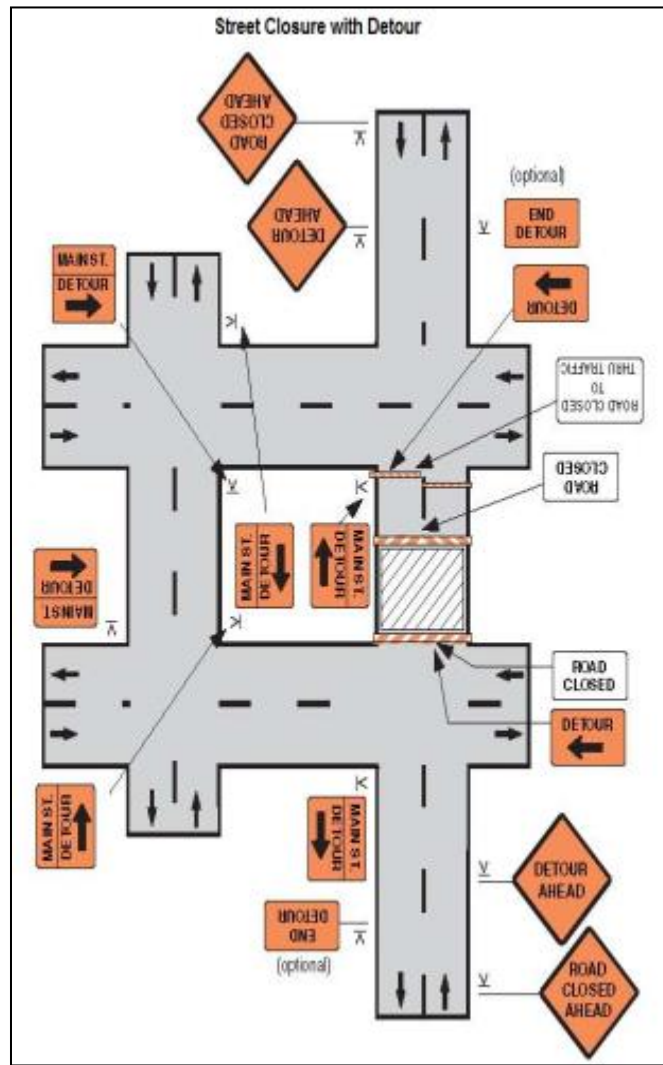


Figure A12: Street closure with detour



Appendix 16: IFC benchmark standards for workers accommodation

August 2009

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PART II: STANDARDS FOR AND MANAGEMENT OF WORKERS' ACCOMMODATION

I. Standards for workers' accommodation

This section looks at the principles and standards applicable to the location and construction of workers' accommodation, including the transport systems provided, the general living facilities, rooms/dormitories facilities, sanitary facilities, canteen and cooking facilities, food safety, medical facilities and leisure/social facilities.

A. National/local standards

The key standards that need to be taken into consideration, as a baseline, are those contained in national/local regulations. Although it is quite unusual to find regulations specifically covering workers' accommodation, there may well be general construction standards which will be relevant. These may include the following standards:

- **Building construction:** for example, quality of material, construction methods, resistance to earthquakes.
- **Housing and public housing:** in some countries regulations for housing and public housing contain requirements on issues such as the basic amenities, and standards of repair.
- **General health, safety and security:** requirements on health and safety are often an important part of building standards and might include provisions on occupation density, minimal air volumes, ventilation, the quality of the flooring (slip-resistant) or security against intrusion.
- **Fire safety:** requirements on fire safety are common and are likely to apply to housing facilities of any type. This can include provision on fire extinguishers, fire alarms, number and size of staircases and emergency exits, restrictions on the use of certain building materials.
- **Electricity, plumbing, water and sanitation:** national design and construction standards often include very detailed provisions on electricity or plumbing fixtures/fittings, water and sanitation connection/equipment.

Benchmark

1. The relevant national and local regulations have been identified and implemented.

B. General living facilities

Ensuring good standards in living facilities is important in order to avoid safety hazards and to protect workers from diseases and/or illness resulting from humidity, bad/stagnant water (or lack of water), cold, spread of fungus, proliferation of insects or rodents, as well as to maintain a good level of morale. The location of the facilities is important to prevent exposure to wind, fire, flood and other natural hazards. It is also important that workers' accommodation is unaffected by the environmental or operational impacts of the worksite (for example noise, emissions or dust) but is sufficiently close that workers do not have to spend undue amounts of time travelling from their accommodation to the worksite. Living facilities should be built using adequate materials and should always be kept in good repair, clean and free from rubbish and other refuse.

Benchmarks

1. Living facilities are located to avoid flooding and other natural hazards.
2. Where possible, living facilities are located within a reasonable distance from the worksite.
3. Transport from the living facilities to worksite is safe and free.
4. The living facilities are built with adequate materials, kept in good repair and kept clean and free from rubbish and other refuse.

Drainage

The presence of stagnant water is a factor of proliferation of potential disease vectors such as mosquitoes, flies and others, and must be avoided.

Benchmarks

1. The building site is adequately drained to avoid the accumulation of stagnant water.

Heating, air conditioning, ventilation and light

Heating, air-conditioning and ventilation should be appropriate for the climatic conditions and provide workers with a comfortable and healthy environment to rest and spend their spare time.

Benchmarks

1. For facilities located in cold weather zones, the temperature is kept at a level of around 20 degrees Celsius notwithstanding the need for adequate ventilation.
2. For facilities located in hot weather zones, adequate ventilation and/or air conditioning systems are provided.
3. Both natural and artificial lighting are provided and maintained in living facilities. It is best practice that the window area represents not less than 5% to 10% of the floor area. Emergency lighting is provided.

Water

Special attention to water quality and quantity is absolutely essential. To prevent dehydration, water poisoning and diseases resulting from lack of hygiene, workers should always have easy access to a source of clean water. An adequate supply of potable water must be available in the same buildings where bedrooms or dormitories are provided. Drinking water must meet local or WHO drinking water standards⁷ and water quality must be monitored regularly. Depending on the local context, it could either be produced by dedicated catchment and treatment facilities or tapped from existing municipal facilities if their capacity and quality are adequate.

Benchmarks

1. Access to an adequate and convenient supply of free potable water is always available to workers. Depending on climate, weather conditions and accommodation standards, 80 to 180 litres per person per day are available.
2. Drinking water meets national/local or WHO drinking water standards.⁸
3. All tanks used for the storage of drinking water are constructed and covered as to prevent water stored therein from becoming polluted or contaminated.

4. Drinking water quality is regularly monitored.

Wastewater and solid waste

Wastewater treatment and effluent discharge as well as solid waste treatment and disposal must comply with local or World Bank effluent discharge standards⁹ and be adequately designed to prevent contamination of any water body, to ensure hygiene and to avoid the spread of infections and diseases, the proliferation of mosquitoes, flies, rodents, and other pest vectors. Depending on the local context, treatment and disposal services can be either provided by dedicated or existing municipal facilities.

Benchmarks

1. Wastewater, sewage, food and any other waste materials are adequately discharged, in compliance with local or World Bank standards – whichever is more stringent – and without causing any significant impacts on camp residents, the biophysical environment or surrounding communities.
2. Specific containers for rubbish collection are provided and emptied on a regular basis. Standards range from providing an adequate number of rubbish containers to providing leak proof, non-absorbent, rust and corrosion-resistant containers protected from insects and rodents. In addition it is best practice to locate rubbish containers 30 metres from each shelter on a wooden, metal, or concrete stand. Such containers must be emptied at regular intervals (to be determined based on temperatures and volumes generated) to avoid unpleasant odours associated with decaying organic materials.
3. Pest extermination, vector control and disinfection are carried out throughout the living facilities in compliance with local requirements and/or good practice. Where warranted, pest and vector monitoring should be performed on a regular basis.

7. www.who.int/water_sanitation_health/dwq/en/
8. Ibid

9. As per the "Pollution Prevention and Abatement Handbook", World Bank Group, July 1998, available from www.worldbank.org

C. Room/dormitory facilities

The standards of the rooms or dormitory facilities are important to allow workers to rest properly and to maintain good standards of hygiene. Overcrowding should be avoided particularly. This also has an impact on workers' productivity and reduces work-related accidents. It is generally acknowledged that rooms/dormitories should be kept clean and in a good condition. Exposure to noise and odour should be minimised. In addition, room/dormitory design and equipment should strive to offer workers a maximum of privacy. Resorting to dormitories should be minimised and single or double rooms are preferred. Dormitories and rooms must be single-sex.

Benchmarks

1. Rooms/dormitories are kept in good condition.
2. Rooms/dormitories are aired and cleaned at regular intervals.
3. Rooms/dormitories are built with easily cleanable flooring material.
4. Sanitary facilities are located within the same buildings and provided separately for men and women.
5. Density standards are expressed either in terms of minimal volume per resident or of minimal floor space. Usual standards range from 10 to 12.5 cubic metres (volume) or 4 to 5.5 square metres (surface).
6. A minimum ceiling height of 2.10 metres is provided.
7. In collective rooms, which are minimised, in order to provide workers with some privacy, only a reasonable number of workers are allowed to share the same room. Standards range from 2 to 8 workers.
8. All doors and windows should be lockable, and provided with mosquito screens where conditions warrant.
9. There should be mobile partitions or curtains to ensure privacy.
10. Every resident is provided with adequate furniture such as a table, a chair, a mirror and a bedside light.
11. Separate sleeping areas are provided for men and women, except in family accommodation.

Additional issue

Irrespective of whether workers are supposed to keep their facilities clean, it is the responsibility of the accommodation manager to ensure that rooms/dormitories and sanitary facilities are in good condition.

Bed arrangements and storage facilities

The provision of an adequate numbers of beds of an appropriate size is essential to provide workers with decent, safe and hygienic conditions to rest and sleep. Here again, particular attention should be paid to privacy. Consideration should be given to local customs so beds could be replaced by hammocks or sleeping mats for instance.

Benchmarks

1. A separate bed for each worker is provided. The practice of "hot-bedding" should be avoided.
2. There is a minimum space between beds of 1 metre.
3. Double deck bunks are not advisable for fire safety and hygiene reasons, and their use is minimised. Where they are used, there must be enough clear space between the lower and upper bunk of the bed. Standards range from 0.7 to 1.10 metres.
4. Triple deck bunks are prohibited.
5. Each worker is provided with a comfortable mattress, pillow, cover and clean bedding.
6. Bed linen is washed frequently and applied with repellents and disinfectants where conditions warrant (malaria).
7. Facilities for the storage of personal belongings for workers are provided. Standards vary from providing an individual cupboard for each worker to providing 475-litre big lockers and 1 metre of shelf unit.
8. Separate storage for work boots and other personal protection equipment, as well as drying/airing areas may need to be provided depending on conditions.

D. Sanitary and toilet facilities

It is essential to allow workers to maintain a good standard of personal hygiene but also to prevent contamination and the spread of diseases which result from inadequate sanitary facilities. Sanitary and toilet facilities will always include all of the following: toilets, urinals, washbasins and showers. Sanitary and toilet facilities should be kept in a clean and fully working condition. Facilities should also be constructed of materials that are easily cleanable and ensure privacy. Sanitary and toilet facilities are never shared between male and female residents, except in family accommodation. Where necessary, specific additional sanitary facilities are provided for women.

Benchmarks

1. Sanitary and toilet facilities are constructed of materials that are easily cleanable.
2. Sanitary and toilet facilities are cleaned frequently and kept in working condition.
3. Sanitary and toilet facilities are designed to provide workers with adequate privacy, including ceiling to floor partitions and lockable doors.
4. Sanitary and toilet facilities are not shared between men and women, except in family accommodation.

Toilet facilities

Toilet arrangements are essential to avoid any contamination and prevent the spread of infectious disease.

Benchmarks

1. An adequate number of toilets is provided to workers. Standards range from 1 unit to 15 persons to 1 unit per 6 persons. For urinals, usual standards are 1 unit to 15 persons.
2. Toilet facilities are conveniently located and easily accessible. Standards range from 30 to 60 metres from rooms/dormitories. Toilet rooms shall be located so as to be accessible without any individual passing through any sleeping room. In addition, all toilet rooms should be well-lit, have good ventilation or external windows, have sufficient hand wash basins and be conveniently located. Toilets and other sanitary facilities should be ("must be" in cold climates) in the same building as rooms and dormitories.

Showers/bathrooms and other sanitary facilities

Hand wash basins and showers should be provided in conjunction with rooms/dormitories. These facilities must be kept in good working condition and cleaned frequently. The flooring for shower facilities should be of hard washable materials, damp-proof and properly drained. Adequate space must be provided for hanging, drying and airing clothes. Suitable light, ventilation and soap should be provided. Lastly, hand washing, shower and other sanitary facilities should be located within a reasonable distance from other facilities and from sleeping facilities in particular.

Benchmarks

1. Shower/bathroom flooring is made of anti-slip hard washable materials.
2. An adequate number of handwash facilities is provided to workers. Standards range from 1 unit to each 15 persons to 1 unit per 6 workers. Handwash facilities should consist of a tap and a basin, soap and hygienic means of drying hands.
3. An adequate number of shower/bathroom facilities is provided to workers. Standards range from 1 unit to 15 persons to 1 unit per 6 persons.
4. Showers/bathrooms are conveniently located.
5. Shower/bathroom facilities are provided with an adequate supply of cold and hot running water.

E. Canteen, cooking and laundry facilities

Good standards of hygiene in canteen/dining halls and cooking facilities are crucial. Adequate canteen, cooking and laundry facilities and equipments should also be provided. When caterers are contracted to manage kitchens and canteens, special attention should be paid to ensure that contractors take into account and implement the benchmarks below, and that adequate reporting and monitoring mechanisms are in place. When workers can individually cook their meals, they should be provided with a space separate from the sleeping areas. Facilities must be kept in a clean and sanitary condition. In addition, canteen, kitchen, cooking and laundry floors, ceilings and walls should be made of easily cleanable materials.

Benchmarks

1. Canteen, cooking and laundry facilities are built in adequate and easy to clean materials.
2. Canteen, cooking and laundry facilities are kept in a clean and sanitary condition.
3. If workers can cook their own meals, kitchen space is provided separate from sleeping areas.

Laundry facilities

Providing facilities for workers to wash both work and non-work related clothes is essential for personal hygiene. The alternative is for the employer to provide a free laundry service.

Benchmarks

1. Adequate facilities for washing and drying clothes are provided. Standards range from providing sinks or tubs with hot and cold water, cleaning soap and drying lines to providing washing machines and dryers.
2. When work clothes are used in contact with dangerous substance (for example, application of pesticide), special laundry facilities (washing machines) should be provided.

Additional issue

When workers are provided with facilities allowing them to individually do their laundry or cooking, it should be the responsibility of each worker to keep the facilities in a clean and sanitary condition. Nonetheless, it is the responsibility of the accommodation manager to make sure the standards are respected and to provide an adequate cleaning, disinfection and pest/vector control service when necessary.

Additional issue

When the employer provides family accommodation, it is best practice to provide each family with a private kitchen or the necessary cooking equipment to allow the family to cook on their own.

Canteen and cooking facilities

Canteen and cooking facilities should provide sufficient space for preparing food and eating, as well as conform to hygiene and safety requirements.

Benchmarks

1. Canteens have a reasonable amount of space per worker. Standards range from 1 square metre to 1.5 square metres.
2. Canteens are adequately furnished. Standards range from providing tables, benches, individual drinking cups and plates to providing special drinking fountains.
3. Places for food preparation are designed to permit good food hygiene practices, including protection against contamination between and during food preparation.
4. Kitchens are provided with facilities to maintain adequate personal hygiene including a sufficient number of washbasins designated for cleaning hands with clean, running water and materials for hygienic drying.
5. Wall surfaces adjacent to cooking areas are made of fire-resistant materials. Food preparation tables are also equipped with a smooth durable washable surface. Lastly, in order to enable easy cleaning, it is good practice that stoves are not sealed against a wall, benches and fixtures are not built into the floor, and all cupboards and other fixtures and all walls and ceilings have a smooth durable washable surface.
6. All kitchen floors, ceiling and wall surfaces adjacent to or above food preparation and cooking areas are built using durable, non-absorbent, easily cleanable, non-toxic materials.
7. Wall surfaces adjacent to cooking areas are made of fire-resistant materials. Food preparation tables are equipped with a smooth, durable, easily cleanable, non-corrosive surface made of non-toxic materials. Lastly, in order to enable easy cleaning, it is good practice that stoves are not sealed against a wall, benches and fixtures are not built into the floor, and all cupboards and other fixtures have a smooth, durable and washable surface.
8. Adequate facilities for cleaning, disinfecting and storage of cooking utensils and equipment are provided.
9. Food waste and other refuse are to be adequately deposited in sealable containers and removed from the kitchen frequently to avoid accumulation.

F. Standards for nutrition and food safety

When cooking for a number of workers, hygiene and food safety are absolutely critical. In addition to providing safe food, providing nutritious food is important as it has a very direct impact on workers' productivity and well-being. An ILO study demonstrates that good nutrition at work leads to gains in productivity and worker morale, prevention of accidents and premature deaths and reductions in health care costs.¹⁰

Benchmarks

1. The WHO 5 keys to safer food or an equivalent process is implemented (see Box 6 below).
2. Food provided to workers contains an appropriate level of nutritional value and takes into account religious/cultural backgrounds; different choices of food are served if workers have different cultural/religious backgrounds.
3. Food is prepared by cooks. It is also best practice that meals are planned by a trained nutritionist.

Box 6 - Five keys to safer food

Keep clean

Wash your hands before handling food and often during food preparation.
Wash your hands after going to the toilet.
Wash and sanitise all surfaces and equipment used for food preparation.
Protect kitchen areas and food from insects, pests and other animals.

While most micro organisms do not cause disease, dangerous micro organisms are widely found in soil, water, animals and people. These micro organisms are carried on hands, wiping cloths and utensils, especially cutting boards and the slightest contact can transfer them to food and cause food borne diseases.

Separate raw and cooked

Separate raw meat, poultry and seafood from other foods.
Use separate equipment and utensils such as knives and cutting boards for handling raw foods.
Store food in containers to avoid contact between raw and prepared foods.

Raw food, especially meat, poultry and seafood, and their juices, can contain dangerous micro organisms which may be transferred onto other foods during food preparation and storage.

Cook thoroughly

Cook food thoroughly, especially meat, poultry, eggs and seafood.
Bring foods like soups and stews to boiling to make sure that they have reached 70°C. For meat and poultry, make sure that juices are clear, not pink. Ideally, use a thermometer.
Reheat cooked food thoroughly.

Proper cooking kills almost all dangerous micro organisms. Studies have shown that cooking food to a temperature of 70°C can help ensure it is safe for consumption. Foods that require special attention include minced meats, rolled roasts, large joints of meat and whole poultry.

Keep food at safe temperatures

Do not leave cooked food at room temperature for more than 2 hours.
Refrigerate promptly all cooked and perishable food (preferably below 5°C).
Keep cooked food piping hot (more than 60°C) prior to serving.
Do not store food too long even in the refrigerator.
Do not thaw frozen food at room temperature.

Micro organisms can multiply very quickly if food is stored at room temperature. By holding at temperatures below 5°C or above 60°C, the growth of micro organisms is slowed down or stopped. Some dangerous micro organisms still grow below 5°C.

Use safe water and raw materials

Use safe water or treat it to make it safe.
Select fresh and wholesome foods.
Choose foods processed for safety, such as pasteurised milk.
Wash fruits and vegetables, especially if eaten raw.
Do not use food beyond its expiry date.

Raw materials, including water and ice, may be contaminated with dangerous micro organisms and chemicals. Toxic chemicals may be formed in damaged and mouldy foods. Take care in selection of raw materials and implement simple measures such as washing.

Source: World Health Organization, Food Safety
www.who.int/foodsafety/publications/consumer/en/5keys_en.pdf

10. C. Wanjek (2005), "Food at Work – Workplace solutions for malnutrition, obesity and chronic disease", International Labour Organization, Geneva.

G. Medical facilities

Access to adequate medical facilities is important to maintain workers' health and to provide adequate responses in case of health emergency situations. The availability or level of medical facilities provided in workers' accommodation is likely to depend on the number of workers living on site, the medical facilities already existing in the neighbouring communities and the availability of transport. However, first aid must always be available on site.

First aid facilities

Providing adequate first aid training and facilities can save lives and prevent minor injuries becoming major ones.

Other medical facilities

Depending on the number of workers living on site and the medical services offered in the surrounding communities, it is important to provide workers with additional medical facilities. Special facilities for sick workers and medical services such as dental care, surgery, a dedicated emergency room can, for instance, be provided.

Benchmarks

1. A number of first aid kits adequate to the number of residents are available.
2. First aid kits are adequately stocked. Where possible a 24/7 first aid service/facility is available.
3. An adequate number of staff/workers is trained to provide first aid.
4. Where possible and depending on the medical infrastructures existing in the community, other medical facilities are provided (nurse rooms, dental care, minor surgery).

Box 7 - UK/HSE First Aid facilities

What should be in a first aid kit?

There is no standard list and it very much depends on the assessment of the needs in a particular workplace:

- a leaflet giving general guidance on first aid, for example HSE leaflet *Basic advice on first aid at work*
- individually wrapped sterile adhesive dressings (assorted sizes)
- two sterile eye pads
- four individually wrapped triangular bandages (preferably sterile)
- six safety pins
- six medium-sized (approximately 12 cm x 12 cm) individually wrapped sterile unmedicated wound dressings
- two large (approximately 18 cm x 18 cm) sterile individually wrapped unmedicated wound dressings
- one pair of disposable gloves.

What should be kept in the first aid room?

The room should contain essential first aid facilities and equipment. Typical examples of these are:

- a sink with hot and cold running water
- drinking water and disposable cups
- soap and paper towels
- a store for first aid materials
- foot-operated refuse containers, lined with disposable yellow clinical waste bags or a container for the safe disposal of clinical waste
- a couch with waterproof protection, clean pillows and blankets
- a chair
- a telephone or other communication equipment
- a record book for recording incidents where first aid has been given.

Source: UK Health and Safety Executive

H. Leisure, social and telecommunication facilities

Basic leisure and social facilities are important for workers to rest and also to socialise during their free time. This is particularly true where workers' accommodation is located in remote areas far from any communities. Where workers' accommodation is located in the vicinity of a village or a town, existing leisure or social facilities can be used so long as this does not cause disruption to the access and enjoyment of local community members. But in any case, social spaces should also be provided on site. Exercise and recreational facilities will increase workers' welfare and reduce the impact of the presence of workers in the surrounding communities. In addition it is also important to provide workers with adequate means to communicate with the outside world, especially when workers' accommodation is located in a remote location or where workers live on site without their family or are migrants. Consideration of cultural attitudes is important. Provision of space for religious observance needs to be considered, taking account of the local context and potential conflicts in certain situations.

Benchmarks

1. Basic collective social/rest spaces are provided to workers. Standards range from providing workers multi-purpose halls to providing designated areas for radio, TV, cinema.
2. Recreational facilities are provided. Standards range from providing exercise equipment to providing a library, swimming pool, tennis courts, table tennis, educational facilities.
3. Workers are provided with dedicated places for religious observance if the context warrants.
4. Workers have access to public phones at affordable/public prices (that is, not inflated).
5. Internet facilities can also be provided, particularly where large numbers of expatriates/Third Country Nationals (TCNs) are accommodated.

Box 8 - Examples of social/leisure facilities

In Qatar there is a newly built 170-hectare complex which accommodates contractors and more than 35,000 workers for a project run by a major oil company. At the heart of this complex, the recreation area includes extensive sport facilities, a safety-training centre, an outdoor cinema and a park. The purpose of those facilities goes beyond providing adequate accommodation to the large numbers of contractors and workers on this project but is designed to provide the same level of services as a small town. The accommodation complex has a mayor, as well as a dedicated welfare team which is responsible for the workers' welfare, cultural festivals and also acts as the community's advocates.

II. Managing workers' accommodation

Once the living facilities have been constructed and are operational, effective ongoing management of living facilities is essential. This encompasses issues such as the physical maintenance of buildings, security and consultation with residents and neighbouring communities in order to ensure the implementation of the housing standards in the long term.

A. Management and staff

Worker camps and housing facilities should have a written management plan, including management policies or plans on health and safety, security, living conditions, workers' rights and representation, relationships with the communities and grievance processes. Part of those policies and plans can take the form of codes of conduct. The quality of the staff managing and maintaining the accommodation facilities will have a decisive impact on the level of standards which are implemented and the well-being of workers (for instance on the food safety or overall hygiene standards). It is therefore important to ensure that managers are competent and other workers are adequately skilled. The manager will be responsible for overseeing staff, for ensuring the implementation of the accommodation standards and for the implementation of the management plans. It is important the accommodation manager has the corresponding authority to do so.

If the facility is being managed by a contractor, as is often the case, the expected housing and management standards should be specified in the relevant contract, and mechanisms to ensure that those standards are implemented should be set up. As part of this process, the accommodation manager (or contractor) should have a duty to monitor the application of the accommodation standards and to report frequently on their implementation to the client.

Benchmarks

1. There are management plans and policies especially in the field of health and safety (with emergency responses), security, workers' rights, relationships with the communities.
2. An appointed person with the adequate background and experience is in charge of managing the workers' accommodation.
3. If contractors are being used, there are clear contractual management responsibilities and monitoring and reporting requirements.
4. Depending on the size of the accommodation, there is a sufficient number of staff in charge of cleaning, cooking and of general maintenance.
5. Such staff are recruited from the local communities.
6. Staff have received basic health and safety training.
7. Persons in charge of the kitchen are trained in nutrition and food-handling and adequately supervised.

B. Charging fees for accommodation and services

Charging fees for the accommodation or the services provided to workers such as food or transport should be avoided where workers do not have the choice to live or eat anywhere else, or if deemed unavoidable, should take into account the specific nature of workers' accommodation. Any charges should be transparent, discussed during recruitment and specified in workers' contracts. Any such charges should still leave workers with sufficient income and should never lead to a worker becoming indebted to an employer.

Benchmarks

1. When fees are charged, workers are provided with clear information and a detailed description of all payments made such as rent, deposit and other fees.
2. When company housing is considered to be part of workers' wages, it is best practice that workers are provided with an employment contract clearly specifying housing arrangements and regulations, in particular rules concerning payments and fees, facilities and services offered and rules of notice.
3. When fees are charged, the renting arrangements are fair and do not cost the worker more than a small proportion of income and never include a speculative profit.
4. Food and other services are free or are reasonably priced, never above the local market price.
5. The provision of accommodation or other services by employers as a payment for work is prohibited.

Additional issue

To avoid that fair renting arrangements turn into unfair ones, any deposit of advance should be set at a reasonable level and it is best practice that renting prices include a fixed fee covering the water needed and the use of the energy required to the functioning of the heating/cooling/ventilation/cooking systems. However, in such cases it might be necessary to raise workers' awareness to ensure that workers will use the facilities responsibly, particularly in areas where water is scarce.

C. Health and safety on site

The company or body in charge of managing the workers' accommodation should have the prime responsibility for ensuring workers' physical well-being and integrity. This involves making sure that the facilities are kept in good condition (ensuring that sanitary standards or fire regulations are respected for instance) and that adequate health and safety plans and standards are designed and implemented.

Benchmarks

1. Health and safety management plans including electrical, mechanical, structural and food safety have been carefully designed and are implemented.
2. The person in charge of managing the accommodation has a specific duty to report to the health authorities the outbreak of any contagious diseases, food poisoning and other important casualties.
3. An adequate number of staff/workers is trained to provide first aid.
4. A specific fire safety plan is prepared, including training of fire wardens, periodic testing and monitoring of fire safety equipment and periodic drills.
5. Guidance on the detrimental effects of the abuse of alcohol and drugs and other potentially harmful substances and the risk and concerns relating to HIV/AIDS and of other health risk-related activities is provided to workers. It is best practice to develop a clear policy on this issue.
6. Workers have access to adequate preventive measures such as contraception (condoms in particular) and mosquito nets.
7. Workers have easy access to medical facilities and medical staff. Where possible, female doctors/nurses should be available for female workers.
8. Emergency plans on health and fire safety are prepared. Depending on the local context, additional emergency plans are prepared as needed to handle specific occurrences (earthquakes, floods, tornadoes).

D. Security of workers' accommodation

Ensuring the security of workers and their property on the accommodation site is of key importance. To this end, a security plan must be carefully designed including appropriate measures to protect workers against theft and attacks. Policies regarding the use of force (force can only be used for preventive and defensive purposes in proportion to the nature and the extent of the threat) should also be

carefully designed. To implement those plans, it may be necessary to contract security services or to recruit one or several staff whose main responsibility is to provide security to safeguard workers and property. Before making any security arrangements, it is necessary to assess the risks of such arrangements to those within and outside the workers' accommodation and to respect best international practices, including IFC PS4 and EBRD PR4 and applicable law.¹¹ Particular attention should be paid to the safety and security of women workers.

Benchmarks

1. A security plan including clear measures to protect workers against theft and attack is implemented.
2. A security plan including clear policies on the use of force has been carefully designed and is implemented.
3. Security staff have been checked to ensure that they have not been implicated in any previous crimes or abuses. Where appropriate, security staff from both genders are recruited.
4. Security staff have a clear mandate and have received clear instruction about their duties and responsibilities, in particular their duties not to harass, intimidate, discipline or discriminate against workers.
5. Security staff have received adequate training in dealing with domestic violence and the use of force.
6. Security staff have a good understanding about the importance of respecting workers' rights and the rights of the communities.
7. Body searches are only allowed in specific circumstances and are performed by specially trained security staff using the least-intrusive means possible. Pat down searches on female workers can only be performed by female security staff.
8. Security staff adopt an appropriate conduct towards workers and communities.
9. Workers and members of the surrounding communities have specific means to raise concerns about security arrangement and staff.

11. See for instance the Voluntary Principles on Security and Human Rights. www.voluntaryprinciples.org/principles

E. Workers' rights, rules and regulations on workers' accommodation

Freedoms and human rights of workers should be recognised and respected within their living quarters just as within the working environment. House rules and regulations should be reasonable and non discriminatory. It is best practice that workers' representatives are consulted about those rules. House rules and regulations should not prevent workers from exercising their basic rights. In particular, workers' freedom of movement needs to be preserved if they are not to become effectively "trapped". To this end it is good practice to provide workers with 24/7 access to the accommodation and free transport services to and from the surrounding communities. Any restriction to this freedom of movement should be limited and duly justified. Penalties for breaking the rules should be proportional and implemented through a proper procedure allowing workers to defend themselves and to challenge the decision taken. The relationship between continuing employment and compliance with the rules of the workers' accommodation should be clear and particular attention should be paid to ensure that housing rules do not create indirect limitation of the right to freedom of association. Best practice might include a code of conduct relating to the accommodation to be signed together with the contract of employment.

Box 9 - Dole housing plantation regulation in Costa Rica

In every plantation there is an internal accommodation regulation that every worker is required to sign together with his/her employment contract. That document describes the behaviour which is expected from workers at all times and basic rules such as the prohibition of alcohol and the interdiction to make noise after a certain time at night. In case there is any problem concerning the application of those internal rules, a set of disciplinary procedures which have been designed with the workers' representatives can be enforced. Workers are absolutely free to enter or leave the site and do not have any restrictions in relation to accessing their living quarters. Families are not allowed in the living quarters unless they have been registered for a visit.

Benchmarks

1. Restriction of workers' freedom of movement to and from the site is limited and duly justified. It is good practice to provide workers 24/7 access to the accommodation site. Any restrictions based on security reasons should be balanced by the necessity to respect workers' freedom of movement.
2. Where possible, an adequate transport system to surrounding communities is provided. It is good practice to provide workers with free transportation to and from local communities.
3. Withholding workers' ID papers is prohibited.
4. Freedom of association is expressly respected. Provisions restricting workers' rights on site should take into account the direct and indirect effect on workers' freedom of association. It is best practice to provide trade union representatives access to workers in the accommodation site.
5. Workers' gender and religious, cultural and social backgrounds are respected. In particular, workers should be provided with the possibility of celebrating religious holidays and observances.
6. Workers are made aware of their rights and obligations and are provided with a copy of the internal workers' accommodation rules, procedures and sanction mechanisms in a language or through a media which they understand.
7. Housing regulations, including those relating to allocation of housing, should be non-discriminatory. Any justifiable discriminatory rules – for example all-male dormitories – should be strictly limited to the rules which are necessary to ensure the smooth running of the worker camp and to maintain a good relationship with the surrounding communities.
8. Where possible, visitor access should be allowed.
9. Decisions should be made on whether to prohibit alcohol, tobacco and third party access or not from the camp and the relevant rules should be clearly communicated to all residents and workers.
10. A fair and non-discriminatory procedure exists to implement disciplinary procedures including the right of workers to defend themselves (see also next section).

F. Consultation and grievance mechanisms

All residents should be made aware of any rules governing the accommodation and the consequences of breaking such rules. Processes that allow for consultation between site management and the resident workers will assist in the smooth running of an accommodation site. These may include a dormitory or camp committee as well as formal processes that allow workers to lodge any grievances about their accommodation.

Benchmarks

1. Mechanisms for workers' consultation have been designed and implemented. It is best practice to set up a review committee which includes representatives elected by workers.
2. Processes and mechanisms for workers to articulate their grievances are provided to workers. Such mechanisms are in accordance with PS2/PR2.
3. Workers subjected to disciplinary proceedings arising from behaviour in the accommodation should have access to a fair and transparent hearing with the possibility to contest decisions and refer the dispute to independent arbitration or relevant public authorities.
4. In case conflicts between workers themselves or between workers and staff break out, workers have the possibility of easily accessing a fair conflict resolution mechanism.
5. In cases where more serious offences occur, including serious physical or mental abuse, there are mechanisms to ensure full cooperation with the police authority (where adequate).

Additional issue

Alcohol is a complex issue and requires a very clear policy from the workers' accommodation management. If a non-alcohol policy is taken, special attention should be paid to clearly communicate the interdiction, how it applies and the consequences for breaching this rule. Special attention should also be paid to enforce it adequately.

G. Management of community relations

Workers' living facilities have various ongoing impacts on adjacent communities. In order to manage these, it is good practice to design a thorough community relations management plan. This plan will contain the processes to implement the findings of the preliminary community impact assessment and to identify, manage, mitigate or enhance ongoing impacts of the workers' accommodation on the surrounding communities.

Issues to be taken into consideration include:

- community development – impact of workers' camp on local employment, possibility of enhancing local employment and income generation through local sourcing of goods and services
- community needs – ways to identify and address community needs related to the arrival of specific infrastructures such as telecommunications, water sanitation, roads, health care, education, housing
- community health and safety – addressing and reducing the risk in the increase in communicable diseases, corruption, trade in illegal substances such as drugs, alcohol (in the Muslim context), petty crimes and other sorts of violence, road accidents
- community social and cultural cohesion – ways to mitigate the impact of the presence of large numbers of foreign workers, often males, with different cultural and religious background, ways to mitigate the possible shift in social, economic and political structures due to changes in access to income generation opportunities.

Benchmarks

1. Community relations plans addressing issues around community development, community needs, community health and safety and community social and cultural cohesion have been designed and implemented.
2. Community relations plans include the setting up of a liaison mechanism allowing a constant exchange of information and consultation with the local communities in order to identify and respond quickly to any problems and maintain good working relationships.
3. A senior manager is in charge of implementing the community relations management plan and liaising with the community.

-
4. The impacts of workers' accommodation on local communities are periodically reviewed, mitigated or enhanced.
 5. Community representatives are provided with an easy means to voice their opinions and to lodge complaints.
 6. There is a transparent and efficient process for dealing with community grievances, in accordance with PS1/PR10.

Box 10 - Examples of community relations management

Community consultation in the Baku-Tbilisi-Ceyhan (BTC) pipeline

The BTC pipeline's Environment and Social Management Plans incorporated a Worker Camp Management Plan to be implemented by the construction contractor. As part of ongoing community liaison over the project as a whole, community liaison officers were appointed for worker camps who were responsible for meeting regularly with communities, identifying issues and addressing community concerns. A particular responsibility was to review HR records and disciplinary logs at worker camps to assess that rules were being implemented effectively and that any community liaison after any incidents was effective.

Appendix 17: Guidelines and Emergency plan for handling and storing chlorine

Instructions for Storage and Handling of Chlorine Cylinders (Based on the 'Manual on Operation and Maintenance of Water Supply Systems' published by the Central Public Health and Environmental Engineering Organization (CPHEEO) in 2005)

1.1 Storage Area

- a. Obtain storage license from controller of explosives under Gas Cylinder Rules 2004 if the quantity of Cl₂ containers to be stored is more than 5 Nos.
- b. Storage area should be cool, dry, well ventilated, and clean of trash and protected from external heat sources. Please refer to Manual on "Water Supply and Treatment", (1999 Edition), for further details.
- c. Ventilation must be sufficient to prevent accumulation of vapour pockets. The exhaust should be located either near the floor or duct be provided extending to the floor. All fan switches should be outside the storage area.
- d. Do not store container directly under the sun.
- e. Weather cock should be installed near the storage to determine wind direction.
- f. The storage building should be of non-combustible construction with at least two exits opening outside.
- g. Neutralization system should be provided.
- h. Continuous monitoring of chlorine leak detection equipment with alarm should be installed in the storage area.
- i. The area should be free and remote from elevators, gangways or ventilating system to avoid dangerous concentration of Chlorine during leak.
- j. Two portable foam type fire extinguishers should be provided in the premises.
- k. Corrosive substances shall not be stored nearby which react violently with each other.
- l. Unauthorized person should not be allowed to enter into the storage area.
- m. The floor level of storage shed should be preferably 30 cms (at least one foot) higher from the ground level to avoid water logging.
- n. Ensure that all containers are properly fitted with safety caps or hooks.

1.2. Cylinder & Drum Containers

- a. Store chlorine cylinders upright and secure them so that they do not fall.
- b. Drum containers should be stored on their sides on rails, a few inches above the floor. They should not be stacked one upon the other. They should be stored such that the valves are in vertical plane.
- c. Keep enough space between containers so as to have accessibility in case of emergency.
- d. Store the containers in a covered shed only. Keep them away from any source of heat as excessive heat may increase the pressure in container which will result into burst.
- e. Do not store explosives, acids, turpentine, ether, anhydrous ammonia, finely divided metals or other flammable material in the vicinity of Chlorine.
- f. Do not store containers in wet and muddy areas.
- g. Store filled and empty containers separately.
- h. Protective covers for valves are secured even when the containers are empty, except during use in the system.
- i. Never use containers as a roller to move other equipment.

- j. Never tamper with fusible plugs of tonners.
- k. Check leakages every day by means of ammonia torch. However, it should not be touched to brass components like valves of container for safety.
- l. Never carry out any welding work on the chlorine system as combustion of steel takes place at 2510C in presence of chlorine.
- m. The boxes containing emergency kit, safety applications and self contained breathing apparatus should be kept in working order in an easily approachable area.

1.3. Use of Cylinders & Drum Containers in Process System

- a. Use containers in the order of their receipt, as valve packing can get hardened during prolonged storage and cause gas leaks.
- b. Do not use oil or lubricant on any valve of the containers.
- c. Badly fitting connections should not be forced and correct tool should always be used for opening and closing valves. They should never be hammered.
- d. The area should be well ventilated with frequent air changes.
- e. Transport the cylinders to the process area by using crane, hoist or railings etc.
- f. The drum containers should be kept in a horizontal position in such a way that the valves are in a vertical plane. The upper valve gives out gas and the lower one gives out liquid chlorine.
- g. The cylinder should be kept in upright position in order to release gas from the valve. For liquid chlorine withdrawal, it should be inverted with the help of an inverted rack.
- h. Connect the containers to the system by using approved accessories.
- i. Use copper flexible tube, with lead washer containing 2 to 4% antimony or bonded asbestos or teflon washer. Use yoke clamp for connecting chlorine container.
- j. Never use rubber tubes, PVC tubes etc. for making connections.
- k. Use the right spanner for operating the valve. Always keep the spanner on the valve spindle. Never use ill fitting spanner.
- l. After making the flexible connection, check for the leakage by means of ammonia torch but it should not come in contact with a valve.
- m. Keep minimum distance between the container valve and header valve so that during change-over of the container, minimum amount of gas leaks.
- n. The material of construction of the adopter should be same as that of valve outlet threads. o. The valve should not be used as a regulator for controlling the chlorine. During regulation due to high velocity of Chlorine, the valve gets damaged which in turn can cause difficulty in closing.
- o. The tools and other equipment used for operating the container should be clean and free of grease, dust or grit.
- p. Wear breathing apparatus while making the change-over of the container from the process header.
- q. Do not heat the container to withdraw more gas at faster rate.
- r. Use pressure gauge and flow measuring device to control the flow and to know the quantity of gas left in the container.
- s. Use an inverted U type barometric leg or vacuum breaking arrangement for connecting the container to the process piping.
- t. Withdrawal of the gas should be stopped when the gas pressure inside the container is between 0.1 to 0.5 kg/cm² approximately.

- u. If withdrawal of the gas from the container connected to the process system has to be suspended for long intervals, it should be disconnected from the system, and the valve cap and hood replaced.
- v. Gas containers should be handled by trained persons only.

1.4. Disconnecting Containers from Process System

- a. Use breathing apparatus before disconnecting the container.
- b. First close the container valve fully. After removal of chlorine the process valve should be closed.
- c. Remove the flexible connection, plug the flexible connection in order to avoid entry of humid air. Replace the valve cap or hood on the container.
- d. Put the tag on the empty container & bring it to storage area marked for empties.
- e. Check for the leakage.

1.5. Loading and Unloading of Containers

- a. The handling of containers should be done under the supervision of trained and competent person.
- b. It should be done carefully with a crane, hoist or slanted ramp. Do not use magnet or sharp object for lifting the containers.
- c. Small cylinders should not be lifted by means of valve caps as these are not designed to carry the weight.
- d. The containers should not be allowed to strike against each other or against any hard object.
- e. Vehicles should be braked and isolated against any movement.
- f. After loading, the containers should be secured properly with the help of wooden wedges, rope or sling wire so that they do not roll away.
- g. The containers should never be dropped directly to the ground or on the tyre from the vehicle.
- h. There should be no sharp projection in the vehicle.
- i. Containers must have valve caps and plugs fitted properly.
- j. Check containers for leakage before loading/unloading.

1.6. Transportation of Container

- a. The name of the chemical along with diamond pictorial sign denoting the dangerous goods should be marked on the vehicle.
- b. The name of the transporter, his address and telephone number should be clearly written on the vehicle.
- c. The vehicle should not be used to transport any material other than what is written on it.
- d. Only trained drivers and cleaners should transport hazardous chemical
- d. The driver should not transport any leaking cylinder.
- e. The cylinder should not project outside the vehicle.
- f. The transporter must ensure that every vehicle driver must carry "Trem Card" (Transport Emergency Card) and 'Instructions in writing booklet' and follow them.
- g. Every driver must carry safety appliances with him, viz; Emergency kit, breathing apparatus etc.
- h. The vehicles must be driven carefully, specially in crowded localities and on bumpy roads. Do not apply sudden brakes.
- i. Check for the leakage from time to time.

- j. In the case of uncontrollable leakage the vehicle should be taken to an open area where there is less population.

1.7. Emergency Kit. It consists of various tools and appliances like gaskets, yokes, studs, tie rods hoods, clamps, spanners, mild steel channels, screws, pins, wooden pegs etc. of standard sizes. Separate kits are used for cylinders and tonners. All the gadgets are designed for using in controlling or stopping the leakages from valves, fusible plug and side walls of cylinders and containers used for handling chlorine.

- a. Leakage may occur through the valve. There are basically four types of valve leaks.
 - Valve packing
 - Valve seat
 - Defective inlet thread
 - Broken valve thread
- b. Leakage may occur through container wall. For controlling such leakages, clamps are used for cylinders and chain and yoke arrangement is used for tonner. Sometimes wooden peg is used by driving into the leaking hole as a temporary arrangement.
- c. Leakage may occur through fusible plug.
 - If the leakage is through the threads of fusible plug, yoke, hood and cap nut arrangement is used to control the leak.
 - ii. If fusible metal itself in the plug is leaking, yoke and stud arrangement is used to control the leak.

1. First Aid to be Provided for a Person Affected by Chlorine

a. General. Remove the affected person immediately to an uncontaminated area. Remove contaminated clothing and wash contaminated parts of the body with soap and plenty of water. Lay down the affected person in cardiac position and keep him warm. Call a physician for medical assistance at the earliest. Caution: Never attempt to neutralize chlorine with other chemicals.

b. Skin Contact. Remove the contaminated clothes, wash the affected skin with large quantity of water. Caution: No ointment should be applied unless prescribed by the physician.

c. Eye Contact. If eyes get affected with liquid chlorine or high concentration of chlorine gas, they must be flushed immediately with running water for atleast 15 minutes keeping the eyelids open by hand. Caution: No ointment should be used unless prescribed by an eye specialist.

d. Inhalation. If the victim is conscious, take him to a quiet place and lay him down on his back, with head and back elevated (cardiac position). Loosen his clothes and keep him warm using blankets. Give him tea, coffee, milk, peppermint etc. for making good effect on breathing system. If the victim is unconscious, but breathing, lay him down in the position mentioned above and give oxygen at low pressure until the arrival of doctor. If breathing has stopped, quickly stretch him out on the ground or a blanket if available, loosen his collar and belt and start artificial respiration without delay. Neilson arm lift back pressure method is useful. Automatic artificial respiration is preferable if available. Continue the respiration until the arrival of the doctor. Amboo bag can also be used for this purpose.

3. On-Site Emergency Plan to Cover the Leakage of Chlorine

3.1. Introduction As chlorine is a hazardous chemical, handling and storage of it demand adequate precautions to avoid possible hazards. Leakage of chlorine may develop into a major

emergency. Therefore, the emergency procedure to cover this eventuality is essential. It is drawn in the form of on-site emergency plan. The elements of onsite emergency plan are as follows:

3.2. Identification of Hazard Chart

In this case the site risk is evaluated by the expert and the extent of the probable damage is calculated on the basis of stored chlorine quantity, nearby population, wind direction, type of equipment failure etc. For this purpose hazard analysis is conducted in which case all the hazardous properties of chlorine are considered. If evacuation is required, the range of it is calculated.

3.3. Appointing Key Persons In order to control the incident like chlorine leakage, it is essential to appoint various persons with their well-defined responsibilities. Taking into account the various activities likely to be involved, the following key persons are appointed (i) Site Controller, (ii) Incident controller, (iii) Shift Executive In charge, (iv) Communication Officer, (v) Safety Officer, (vi) Fire and Security Officer, (vii) Utilities and Services In charge, (viii) Traffic Controller, (ix) First Aider

3.4. Assembly Points These points are set up where persons from the plant would assemble in case of chlorine leakage. At these points the in-charge for counting the heads will be available.

3.5. Emergency Control Center

The control centre is the focal point in case of an emergency from where the operations to handle the emergency from are directed and coordinated. It contains site plan, telephone lines, public address system, safety equipment, first aid boxes, loud speaker, torches, list of essential telephone numbers, viz. fire brigade, police, hospital, civil defence, collector, factory inspector, organizational authorities, chlorine suppliers, mutual aid group, social workers, list of key persons and their addresses, copy of chemical fact sheet, location plan of fire hydrant, details of dispersion model of chlorine gas, population distribution pattern, location of alarm system.

3.6. Procedure to Meet Emergency

The actions to be taken by the staff and authority are given below; Emergency Alarm: An audible emergency alarm system is installed throughout the plant. On hearing the alarm the incident controller will activate the public address system to communicate with the staff about the emergency and give specific instructions for evacuations etc. anyone can report the occurrence of chlorine leakage to section in-charge or incident controller through telephone or intercom or in person.

3.7. Communication

Communication officer shall establish the communication suitable to that incident.

3.8. Services

For quickness and efficient operation of emergency plan the plant is divided into convenient number of zones and clearly marked on the plan. These are emergency services viz. fire fighting, first aid, rescue, alternative source of power supply, communication with local bodies etc. The incident controller will hand over the charge to the site controller of all these coordinating activities, when the site controller appears on the site. The site controller will coordinate all the activities of the key persons. On hearing the emergency alarm system all the key persons will take their charge. In case of their absence other alternatives are nominated. The person nominated for personnel and administration purposes will be responsible for informing all statutory authorities, keeping account of all persons in the plant including contract labour, casual workers and visitors. He will be responsible for giving information to press or any outside agencies. He is also

responsible for organizing canteen facilities and keeping informed the families of affected persons. The person nominated as security officer should guide police, fire fighting and control the vehicle entries. The site controller or any other nominated person will announce resumption of normalcy after everything is brought under control. The onsite emergency plan needs to be evaluated by mock drill. Any weaknesses noticed during such drills should be noted and the plan is modified to eliminate the weaknesses.

3.9. Emergency

Measures In case of leakage or spillage of Chlorine, the following emergency measures should be taken:

- a. Take a shallow breath and keep eyes opened to a minimum.
- b. Evacuate the area.
- c. Investigate the leak with proper gas mask and other appropriate Personal protection.
- d. The investigator must be watched by a rescuer to rescue him in emergency.
- e. If liquid leak occurs, turn the containers so as to leak only gas.
- f. In case of major leakage, all persons including neighbours should be warned.
- g. As the escaping gas is carried in the direction of the wind all persons should be moved in a direction opposite to that of the wind. Nose should be covered with wet handkerchief.
- h. Under no circumstances should water or other liquid be directed towards leaking containers, because water makes the leak worse due to corrosive effect.
- i. The spillage should be controlled for evaporation by spraying chilled water having temperature below 9.4oC. With this water crystalline hydrates are formed which will temporarily avoid evaporation. Then try to neutralize the spillage by caustic soda or soda ash or hydrated lime solution carefully. If fluoroprotein foam is available, use for preventing the evaporation of liquid chlorine.
- j. Use emergency kit for controlling the leak.
- k. On controlling the leakage, use the container in the system or neutralize the contents in alkali solution such as caustic soda, soda ash or hydrated lime. Caution: Keep the supply of caustic soda or soda ash or hydrated lime available. Do not push the leaking container in the alkali tank. Connect the container to the tank by barometric leg.
- l. If container commences leak during transport, it should be carried on to its destination or manufacturer or to remote place where it will be less harmful. Keeping the vehicle moving will prevent accumulation of high concentrations.
- m. Only specially trained and equipped workers should deal with emergency arising due to major leakage.
- n. If major leak takes place, alert the public nearby by sounding the siren.
- o. Any minor leakage must be attended immediately or it will become worse.
- p. If the leakage is in the process system, stop the valve on the container at once.

3.10. Safety Systems Required at Chlorination Plant

The following safety systems should be kept ready at the chlorination plant:

- a. Breathing apparatus.
- b. Emergency kit.
- c. Leak detectors.
- d. Neutralisation tank.
- e. Siren system.
- f. Display of boards in local language for public cautioning, first aid and list of different authorities with phone numbers.
- g. Communication system.

- h. Tagging system for equipments.
- i. First aid including tablets and cough mixtures.
- j. Exhaust fans.
- k. Testing of pressure vessels, chlorine lines etc. every year as per factory act.
- l. Training & mock drill.
- m. Safety showers.
- n. Eye fountain.
- o. Personal protective equipment.
- p. Protecting hoods for ton-containers.
- q. Fire extinguishers.
- r. Wind cock.

Appendix 18: Details of Public Consultations

During detailed design, site visit was conducted in April 2018 to assess potential social and environmental impacts of proposed components. Discussions with public including vendors, shopkeepers and hawkers were held to understand their perception about the proposed works and their co-operation during implementation of project. During consultations it was found that most of the public is aware about the proposed works and shown their interest to co-operate during construction works. Details of public consultations are given below-

S.No	Name of Persons	Location	Topic Discussed	Peoples Perceptions/ Outcome
1	Jagdish Mali, Ramesh Mali, Manoj Sahu	Gandhi Circle	Present Status of Sewerage in the town, Work Proposed by RUDSICO (EAP), Willingness to pay for improved services Environmental, Health & Sanitation in the town. Environment, Health & Safety Safety of residents during construction phase and applying of vehicle for construction activities Presence of any forest, wild life or any sensitive/ unique environmental components nearby the project	People are aware supportive of the project. People are willing to pay for improved services. By the proposed sewerage project all the measures of environment will definitely improved and quality of life, health and sanitation will also improved. Environment, Health & Safety should be a priority in proposed subproject. All the measures of environment should be strictly followed and complied as per Rules and Regulation of Competent Authority. People are concerned about the existing sewer problems in the town which is flows in open drains. By the proposed sewerage project, foul smell and vector borne diseases will be removed and mitigated Adequate safety measures to be adopted during construction time in view point of environment, health and safety. Health and safety of workers and nearby residents . Proper care and all necessary arrangement to be ensured at the site regarding environmental, health and safety. There is no such environmental sensitive components in the vicinity of project area.
2	Prakash Chandra Jatia, Mummna Khan, Raju Kushwaha,	Bus stand	Present Status of Sewerage in the town, Work Proposed by RUDSICO (EAP), Willingness to pay for improved services STP Disposal point, SPS etc.	People are supportive of the project. People are willing to pay for improved services. All the measures should be taken care while selecting the disposal location of STP.

S.No	Name of Persons	Location	Topic Discussed	Peoples Perceptions/ Outcome
				Treated effluent water may be used in Agricultural activities or discharge and discharge in nearby natural nallahs/waterbody after meeting prescribed standard of STP. By the proposed project of sewerage in the town, aesthetic quality of town will be improved. Health and hygiene condition will improve
3	Kalulal, Aayodhaya Bai, BrajmohanPaliwal, Deepak	Near Govt Hospital	Present Status of Sewerage in the town, Work Proposed by RUDSICO (EAP), Willingness to pay for improved services. Dust control measures by proposed sewerage work during construction. Air quality and Noise level in the town during proposed sewerage work.	People are aware of the project and supportive of the project. (Especially women), People are willing to pay for improved services. Dust should be controlled by water sprinkling measures regularly at site. Plantation activities in the area will help to mitigating the dust and fugitive emission in the nearby area of subproject. Ambient air quality and noise level should be kept as National Ambient Air Quality Standards. Environmental Monitoring to I be done and report submitted to concerned authority to check the existing scenario of environmental quality of Air and Noise in the town during subproject work. All the mitigation measures of environment must I be adopted at site. By the proposed project of sewerage in the town, aesthetic quality of town will be improved. Health and hygiene condition will improve
4	Roop Chandra Mali, Pritiviraj, Firoj Khan, Dharamendra Mali, Bhanwarlal,	Near Nagar Parishad	Present Status of Sewerage in the town, Work Proposed by RUDSICO (EAP), Willingness to pay for improved services. Environment, Health &	Peopleaware are supportive of the project and indicated their willingness to participate; they are willing to pay for improved services. By the proposed sewerage work,

S.No	Name of Persons	Location	Topic Discussed	Peoples Perceptions/ Outcome
	MangilalMaili		Hygiene issues etc.	environmental quality of town, health and hygiene will improved. By proposed STP, the waste water should be be treated and discharge in the environment at agreeable standards. Treated water may be reuse in agriculture etc. There are need for treated water in agriculture and ground water resources shall be conserved. By the proposed project of sewerage in the town, aesthetic quality of town will be improved. Health and hygiene condition will improve
5.	Suresh Kumar Meghwal, Varvi Gori Goswami, Anchal Goswami, Prakash, Jannat&Kala Bai	In around the Town and SPS sites	Awareness of the project–including Project Coverage area. Employment during construction time Environmental Impacts of proposed sewerage work Present Status of Sewerage in the town, Work Proposed by RUDSICO (EAP), Environmental Health & Hygiene Treated water reuse etc. Present Status of Sewerage in the town, Work Proposed by RUDSICO (EAP). Remove the foul smell and vector borne diseases Dust and noise pollution and disturbances during construction work Drainage and Sewerage Problem facing Requirement of enhancement of other facilities	People are aware about the project and their benefits People will be employed from nearby habitation, preference will be given to nearby habitants Environmental impact will be positive after implementation of the proposed sewerage project in the town. People expresses willingness and supportive of the project. Sewerage condition in the city is not satisfactory. By the proposed project of sewerage, better environment health and hygiene maintained in the town. Treated water can be reuse in agricultural activities. People are concerned about the existing sewer problems in the town which is flows in open drains. By the proposed sewerage project, foul smell and vector borne diseases will be removed and mitigated. There is no proper sewerage system in the town. People feel necessity of the proposed sewerage in the town. Drainage and sewerage condition is poor in the town. People are aware of the the

S.No	Name of Persons	Location	Topic Discussed	Peoples Perceptions/ Outcome
			Ambient air quality, soil and groundwater problems etc. Safety of residents during construction phase and applying of vehicle for construction activities Presence of any forest, wild life or any sensitive/ unique environmental components nearby the project	project. Solid waste collection and disposal is major issue in the town. There is no waste disposal system in the town. People suggested to implant the tree along the roads and unworked area to enhance aesthetic beauty of the town. Present condition of sewerage is poor in the town and not satisfactory. The proposed project of sewerage in the town is a good effort in town make neat and cleanness. Adequate safety measures to be adopted during construction time in view point of environment, health and safety. Health and safety of workers and nearby residents . Proper care and all necessary arrangement to be ensured at the site regarding environmental, health and safety. There are no such environmental sensitive components in the vicinity of project area.

Consultation with Stakeholder and public held on 11 April 2018 at Nagar Parishad office

Meeting with Stakeholder and public was held and project components, Importance of sewerage system, property connection, Environment, health and hygiene issues were discussed along with desired public participation. Public was satisfied with the components identified and assured for required support.

Attendance Sheet

Pratapgarh

S.No.	Name	Occupation	Signature
1	સુરેશ કુમાર બિશ્વાલ	મિલકત	Shy
2	વરવી ગિરી ગોસ્વામી	આપત	Pratapgarh
3	મીરા/ર/	સી/ય/ર/	Pratapgarh
4	Nanchal Lodumani	Student	Nanchal
5	ગુલા વર્ધ	-	Pratapgarh
5.	ગુલા વર્ધ	વિદ્યાર્થી	Pratapgarh

Comm. H.C. Pratapgarh

Date:- 11/04/2018 Pratapgarh

S.No.	Name	Occupation	Signature
1	સુરેશ કુમાર બિશ્વાલ	મિલકત	Shy
2	વરવી ગિરી ગોસ્વામી	આપત	Pratapgarh
3	મીરા/ર/	સી/ય/ર/	Pratapgarh
4	Nanchal Lodumani	Student	Nanchal
5	ગુલા વર્ધ	-	Pratapgarh
5.	ગુલા વર્ધ	વિદ્યાર્થી	Pratapgarh

Comm. H.C. Pratapgarh

Consultation Photographs**Consultation at Nagar Parishad Office****Consultation near Bus Stand****Consultation near District Hospital****Consultation at Bhatpura gate near SPS site****Consultation at NH circle****Consultation near Deepeshwar Talab**



Bus Stand



Near Govt. Hospital

Appendix 19: Minutes of City level Stakeholder Committee (CLC) Meeting

Minutes of CLC meeting- Pratapgarh

RUIDP

Government of Rajasthan
Office of Project Director
Rajasthan Urban Infrastructure Development Project
 AVS Building, Jawahar Circle, JLN Marg, Jaipur - 302017
 Tel No.: 141 2721966, Fax No.: 141 2721919, email : mailruidp@gmail.com, mail.ruidp@rajasthan.gov.in
 web site : www.ruidp.rajasthan.gov.in

Minutes of CLC meeting held on 26.08.17 at Pratapgarh for sewerage Project Pratapgarh under RUIDP phase-IV

A City Level Committee (CLC) meeting was held under the chairmanship of District Collector Pratapgarh on 26.08.2017 to discuss the sewerage project proposed under RUIDP phase-IV. List of members/officers attended the meeting is at Annex-A.

RUIDP Personnel informed that the sewerage project DPR which was prepared by the Consultant M/s Creative computers Jaipur engaged by the Municipal Council Pratapgarh is considered by RUIDP for Phase-IV project. RUIDP apprised the DPR and suggestions were given to the engaged consultant. Consultant has submitted modified DPR along with revised estimate as per RUIDP SOR- 2017.

The scope of work was briefed to the committee. It was informed that the DPR prepared is for capital cost of work proposed & 10 year O&M cost. The capital cost part execution is to be done by RUIDP for which funds are to be made available by Government through ADB under phase-IV. The O&M cost is to be borne by the Municipal Council as per actual basis along with power charges. The scope under project to provide sewer network of about 105 Km length, one STP for 9 MLD (round off 8.68 MLD) & one sewage pumping station near Govt. secondary school in ward no.19 to pump sewage of low laying area to main sewer. It was informed that STP is proposed on latest Sequential Batch Reactor (SBR) technology to meet out the latest effluent parameters & treated water will be used by Nagar Parishad at his own level such as irrigation, gardening and industrial etc. Property house sewer connections are included and approx 95% area of Pratapgarh city is covered in this project. The O&M payment will be on performance based under the contract. To reduce inconvenience to public deeper depth (3.5 mtr above) & crossing of NH & circles where traffic is move, trenchless technology for laying of sewer is proposed.

For sewer pipes the matter was discussed considering PHED experience of water line work. It was informed that strata in Pratapgarh is varying from mostly is rocky, therefore it was proposed that HDPE pipe should be considered in place of DWC pipe which may be damaged during laying in rocky strata & got punctured from outside.

Chairman Municipal Council was of the view that project will also put up in their board meeting in 1st week of September-17. The total estimated cost of project is Rs. 159.57 cr (works cost Rs. 145.50 crore + 10 yr O&M cost Rs. 14.12 cr). It was also deliberated that for public complaint redressal, provision of toll free number along with set up of a control room should be taken in the provision. The project was agreed by the committee for further course of action by RUIDP level.

Meeting ended with vote of thanks to the chair

Executive Engineer
RUIDP, Udaipur
 Date: 04.09.2017

F3(201) (4)/RUIDP/PMU/Ph-IV/Pratapgarh/189-201
 Copy to the following for information and necessary action:

1. Shri C.P. Joshi, Hon'ble M.P. Chittorgarh.
2. Sh. Nand Lal Meena, Hon'ble Minister of Tribal Area Development, Government of Rajasthan, Jaipur.
3. The Project Director, R.U.I.D.P., Jaipur.
4. The District Collector & Chairman, City Level Committee, Pratapgarh
5. The Chairman/Vice Chairman/Commissioner, Nagar Parishad, Pratapgarh.
6. The Deputy Town Planner, Udaipur
7. The Superintending Engineer, (WW), R.U.I.D.P., Jaipur.
8. The Superintending Engineer, (WS), R.U.I.D.P., Jaipur.
9. The Superintending Engineer, P.W.D. / PHED/ WRD, Pratapgarh.
10. The Executive Engineer, Nagar Parishad, Pratapgarh.
11. The city stake holders, Pratapgarh.

Executive Engineer
RUIDP, Udaipur

RUIDP PHASE-4 CLC MEETING				
TOWN-PRATAPGARH			DATE-26-08-2017	
क्र. सं.	नाम अधिकारी	पद	मोबाईल नं.	हस्ताक्षर
1	Sh. C.P. Joshi	M.P. Chittor Garh	9414111371	
2	Sh. Kamlesh Doshi	Chairman NP	9413315499	
3	Smt. Neha Giri	DM		
4	Hemendra Nagar	ADM	9680935865	
5	Vidhyas Rathore	Vice chairman	9461849289	
6	Bhaskar Tapan	Xen-Ruidp	9462713505	
7	Dr. D R Jambid	SE(W) RUIDP	9166002200	
8	Ashok K. Jain	Comm. M.C. Pratapgarh	9414021572	
9	Ramkesh Meena	XEN PHEDDY	9414568461	
10	VIRENDRA SINGH PARIHAR	D.T.P. Udaipur	9413166696	
11	manish verma	PRO office	9001431501	
12	Avinash Singh Kanaawat	DTP, UPR ZONE	9329990030	
13	Prem Kumar Kilaria	ARN WRD PH	9636560101	
14	Mohan Kumar	Consultant (creative computer)	9461823211	

बैठक

जिले में आरयूआईडीपी का चौथा चरण देगा राहत

सीवर लाईन में
प्रतापगढ़ जिले में
आई नई सौगात

पत्रिका न्यूज नेटवर्क
rajasthanpatrika.com

प्रतापगढ़, मिनी सचिवालय सभागार में शनिवार को सीएलसी को लेकर अधिकारियों की बैठक आयोजित की। बैठक में जिला कलक्टर नेहा गिरि ने प्रतापगढ़ शहर के लिए सीवर लाईन की जयपुर से आई डीपीआर स्वीकृति पर चर्चा की। सीवर लाईन बनाने की स्वीकृति जारी की। बैठक में बताया कि प्रतापगढ़ जिले में आरयूआईडीपी का कार्यालय खुलेंगा जिसमें अधिशाषी अभियंता स्तर के अधिकारियों का पदस्थापन किया जाएगा। आरयूआईडीपी का चौथा चरण शहर में जलापूर्ति समस्या से परेशान उपभोक्ताओं को राह देगा। शहरी क्षेत्र में सिवरेज का कार्य होगा। इसके लिए तैयार की गई डीपीआर को अनुमोदित कर दिया गया है। सिवरेज लाईन का कार्य 159 करोड़ की लागत से 2018 में फरवरी- मार्च से कार्य को प्रारंभ किया जाएगा। इससे गंदा पानी की निकासी इस तरह की जाएगी जिससे आमजन को कोई परेशानी का सामना नहीं करना पड़ेगा। खासबाड़ा रोड़ स्थित राजकीय



बैठक... प्रतापगढ़ मिनी सचिवालय में बैठक में मौजूद अधिकारी।

अभियंता स्तर के अधिकारियों का पदस्थापन किया जाएगा। आरयूआईडीपी का चौथा चरण शहर में जलापूर्ति समस्या से परेशान उपभोक्ताओं को राह देगा। शहरी क्षेत्र में सिवरेज का कार्य होगा। इसके लिए तैयार की गई डीपीआर को अनुमोदित कर दिया गया है। सिवरेज लाईन का कार्य 159.00 करोड़ की लागत से 2018 में

फरवरी, मार्च माह से कार्य को प्रारंभ किया जाएगा। गंदे पानी की निकासी इस तरह की जाएगी, जिससे आमजन को कोई परेशानी नहीं करना पड़ेगा। एसवीएस का खासबाड़ा रोड़ स्थित राजकीय स्कूल के पास सिवरेज पम्प स्टेशन बनाया जाएगा। शहर से निकलने वाले गंदा पानी के लिए एक प्लान्ट लगाया जाएगा। जिससे उस पानी को शुद्ध करके खेतों के उपयोग के लिए लिया जा सके। इसमें टॉल प्रे नक्का भी बनाया जाएगा। डीपीआर इस प्रोजेक्ट पर डीपीआर की ओर से दस साल की अनुमति दी गई। जो 13.20 करोड़ रूपय की लागत से ठेकेदार की ओर से दस साल तक देखभाल एवं

रखरखाव की जाएगी। पूरे प्रतापगढ़ में 105 किलोमीटर के दायरे में सीवर लाईन पाईप बिछाया जाएगा। प्रतापगढ़ के सभी वार्डों एवं पूरे जिले को सीवर लाईन में जोड़ा जाएगा। मुक्तिधाम के पीछे एसटीपी आठ एमएलडी बनाया जाएगा। बैठक के दौरान अतिरिक्त जिला कलक्टर हेमेश नागर, नगर परिषद सभापति कमलेश डोसी, उपसभापति विद्या राठी, एसई डॉ. डीआर जांगी, नगर परिषद आयुक्त अशोक जैन, पीएचडीई एक्सईन रामकेश मीणा, उदयपुर डीटीपी विरेंद्र सिंह परिहार, अरविन्द सिंह कुमावत, एईन प्रेम कुमार, मोहनलाल तंवर सहित कई अधिकारी मौजूद थे।

प्रतापगढ़ सीवरलाइन को मिली मंजूरी

प्रतापगढ़। जिला कलक्टर नेहा गिरि की अध्यक्षता में शनिवार को सीएलसी को लेकर मिनी सचिवालय कलक्टर सभागार में अधिकारियों की बैठक आयोजित हुई।

बैठक में जिला कलक्टर नेहा गिरि ने प्रतापगढ़ शहर के लिए सिवर लाईन की जयपुर से आई डीपीआर स्वीकृति पर चर्चा की। बैठक में जिला कलक्टर नेहा गिरि ने बताया कि प्रतापगढ़ जिले में आरयूआईडीपी का कार्यालय खुलेंगा जिसमें अधिशाषी अभियंता स्तर के अधिकारियों का पदस्थापन किया जाएगा। आरयूआईडीपी का चौथा चरण शहर में जलापूर्ति समस्या से परेशान उपभोक्ताओं को राह देगा। पूरे शहरी क्षेत्र में सिवरेज का कार्य होगा। इसके लिए तैयार की गई डीपीआर को अनुमोदित कर दिया गया है। सिवरेज लाईन का कार्य 159 करोड़ की लागत से 2018 में फरवरी- मार्च से कार्य को प्रारंभ किया जाएगा।

इससे गंदा पानी की निकासी इस तरह की जाएगी जिससे आमजन को कोई परेशानी का सामना नहीं करना पड़ेगा। खासबाड़ा रोड़ स्थित राजकीय



प्रतापगढ़। सीएलसी को लेकर आयोजित बैठक की संबोधित करती जिला कलक्टर नेहा गिरि।

स्कूल के पास सिवरेज पम्प स्टेशन बनाया जाएगा एवं शहर से निकलने वाले गंदे पानी के लिए एक प्लान्ट लगाया जाएगा जिससे उस पानी को शुद्ध करके खेतों के उपयोग में लिया जाएगा। डीपीआर इस प्रोजेक्ट पर डीपीआर द्वारा दस साल की अनुमति दी गई जो कि 13.20 करोड़ रूपय की लागत से ठेकेदार द्वारा दस साल तक देखभाल एवं रखरखाव की जाएगी। पूरे प्रतापगढ़ में 105 किलोमीटर के दायरे में सिवर लाईन के पाईप बिछाये

जाएंगे। प्रतापगढ़ के सभी वार्डों एवं पूरे जिले को सिवर लाईन में जोड़ा जाएगा।

बैठक में अतिरिक्त जिला कलक्टर हेमेश नागर, सभापति कमलेश डोसी, उपसभापति विद्या राठी, सुपरीटेन्डेंट इंजिनियर डॉ. डीआर जांगी, आयुक्त अशोक जैन, पीएचडीई एक्सईन रामकेश मीणा, उदयपुर डीटीपी विरेंद्र सिंह परिहार, अरविन्द सिंह कुमावत, एईन प्रेम कुमार, मोहनलाल तंवर आदि मौजूद थे।

Appendix 20: Sample Grievance Registration Form

The _____ Project welcomes complaints, suggestions, queries and comments regarding project implementation.

Aggravated persons may provide grievance with their name and contact information to enable us to get in touch for clarification and feedback.

In case, someone chooses not to include personal details and wants that the information provided to remain confidential, please indicate by writing/typing ***(CONFIDENTIAL)*** above Grievance Format.

Thank you.

Date		Place of registration			
Contact Information/Personal Details					
Name		Gender	☐ * Male ☐ *Female	Age	
Home Address					
Place					
Phone no.					
E-mail					
Complaint/Suggestion/Comment/Question Please provide the details (who, what, where and how) of your grievance below: If included as attachment/note/letter, please tick here:					
How do you want us to reach you for feedback or update on your comment/grievance?					

FOR OFFICIAL USE ONLY

Registered by: (Name of Official registering grievance)	
Mode of communication: Note/Letter E-mail Verbal/Telephonic	
Reviewed by: (Names/Positions of Official(s) reviewing grievance)	
Action Taken:	
Whether Action Taken Disclosed:	☐ Yes ☐ No
Means of Disclosure:	

Appendix 21: Officer order for establishing GRM

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RUIDP

Government of Rajasthan
Office of Project Director
Rajasthan Urban Infrastructure Development Project
 AVS Building, Jawahar Circle, JLN Marg, Jaipur - 302017

Tel No.: 0141-2721966, Fax No.: 0141-2721919, email : mail@ruidp.gov.in, web site : www.ruidp.gov.in
 F3(301)(50)RUIDP/PMU/PH-IV/WS/GENERAL/1282 Dated: 04.2018
 04/05/18

Office - Order

Subject:- Grievance Redress Mechanism for Rajasthan Secondary Town Development Investment Program (RSTDIP) - RUIDP Phase IV

Reference:- Agreed Resettlement & Environmental framework -3183 IND (RUIDP Phase III) - <https://www.adb.org/projects/42267-026/main#project-documents>

It is directed that Grievance Mechanism of RUIDP Phase III will be replicated in RUIDP Phase IV and accordingly, PIU will maintain/ ensure proper records of safeguard related Grievances received in their town. PIU will also ensure that the safeguard related Grievances received are resolved as per Grievance Redress Mechanism (GRM) prescribed in RP which is summarized as under (for ready reference):-

Methodology of multi-tier GRM	Responsibility/Action to be taken	Time Frame	Record Keeping
1st level: Grievances that are immediate and urgent in the perception of the complainant, the contractor, and supervision personnel from PIU will provide the most easily accessible or first level of contact for quick resolution of grievances	SE/EE PIU will resolve issues in consultation with supervision personnel, Contractor.	PIU will resolve issues within 3 days of receipt of a complaint/ grievance.	The grievance register will be endorsed by all field agencies involved in implementation of EMP and RP.
2nd level: All grievances that cannot be redressed within 3 days at field will be referred to PMU through PO Social/Environment by PIU.	Project Officers (Environment/Social) PMU in consultation with PMU, PIU and the Contractor will resolve the issued referred.	PMU will resolve issues within 7 days of receipt of a complaint/ grievance	PIU will keep records of the matter referred to PMU and will documents the outcome of each grievance resolved in the Grievance Register.
3rd level: All the grievances that are not addressed by PMU within 7 days, will be brought to the notice of Grievance Redress Committee (GRC). The City Level Committee (CLC), which will be established in every project town will act as GRC	SE/EE PIU will coordinate with PO Social/ Environment or other official of PMU and will prepare agenda for the GRC meeting accordingly and ensure keeping the same in GRC.	The GRC will resolve the grievance within 15 days of receiving the complaint	PIU will be responsible to see through the process of redress of each grievance and document the outcomes.
4th level: Very major issues that are beyond the jurisdictional authority of the CLC or those that have the potential to cause social conflicts or environmental damage or those that remain unresolved at PMU/CLC level, will be referred to the Empowered Committee (EC).	SE/EE PIU will assist PMU officials to prepare agenda for the Empowered committee meeting.		SE/EE PIU will keep records of Empowered committee meeting and will ensure documentation of outcome.

Please note that an aggrieved person shall have access to the country's legal system at any stage, and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM.

PIUs will be responsible to ensure redressal of grievances as per GRM procedures summarized above and intimate to the complainant.

Contractor's will keep information board depicting Grievance registration numbers at each working site. Grievance registration form and will maintain Grievance Registers (refer annexure 1 & 2).

Addl. Project Director, RUIDP
 Dated: 04.2018
 04/05/18

F3(301)(50)RUIDP/PMU/PH-IV/WS/GENERAL/ 1283-84

Copy to following for information and necessary action.

- 1) PA to PD /CE /FA/DyPD(A)/SE(WS)/SE(WW)/PO(Environment)/PO(Social)/, RUIDP, Jaipur
- 2) All EE, PIU, Phase-IV for ensuring maintenance of the Grievance register and helpline and for resolving of Grievances.

(K. M. Mandawaria)
 PO(Co-ord.&Social)

Appendix 22: Sample Environmental Site Inspection Checklist

Project Name
Contract Number

NAME: _____ DATE: _____

TITLE: _____ DMA: _____

LOCATION: _____ GROUP: _____

WEATHER: _____

Project Activity Stage	Survey	
	Design	
	Implementation	
	Pre-Commissioning	
	Guarantee Period	

Monitoring Items	Compliance
Compliance marked as Yes / No / Not applicable (NA) / Partially Implemented (PI)	
EHS supervisor appointed by contractor and available on site	
Construction site management plan (spoils, safety, schedule, equipment etc.,) prepared	
Traffic management plan prepared	
Dust is under control	
Excavated soil properly placed within minimum space	
Construction area is confined; no traffic/pedestrian entry observed	
Surplus soil/debris/waste is disposed without delay	
Construction material (sand/gravel/aggregate) brought to site as & when required only	
Tarpaulins used to cover sand & other loose material when transported by vehicles	
After unloading, wheels & undercarriage of vehicles cleaned prior to leaving the site	
No chance finds encountered during excavation	
Work is planned in consultation with traffic police	
Work is not being conducted during heavy traffic	
Work at a stretch is completed within a day (excavation, pipe laying & backfilling)	
Pipe trenches are not kept open unduly	
Road is not completely closed; work is conducted on edge; at least one line is kept open	
Road is closed; alternative route provided & public informed, information board	

provided	
Pedestrian access to houses is not blocked due to pipe laying	
Spaces left in between trenches for access	
Wooden planks/metal sheets provided across trench for pedestrian	
No public/unauthorized entry observed in work site	
Children safety measures (barricades, security) in place at works in residential areas	
Prior public information provided about the work, schedule and disturbances	
Caution/warning board provided on site	
Guards with red flag provided during work at busy roads	
Workers using appropriate PPE (boots, gloves, helmets, ear muffs etc)	
Workers conducting or near heavy noise work is provided with ear muffs	
Contractor is following standard & safe construction practices	
Deep excavation is conducted with land slip/protection measures	
First aid facilities are available on site and workers informed	
Drinking water provided at the site	
Monitoring Items	Compliance
Toilet facility provided at the site	
Separate toilet facility is provided for women workers	
Workers camps are maintained cleanly	
Adequate toilet & bath facilities provided	
Contractor employed local workers as far as possible	
Workers camp set up with the permission of PIU	
Adequate housing provided	
Sufficient water provided for drinking/washing/bath	
No noisy work is conducted in the nights	
Local people informed of noisy work	
No blasting activity conducted	
Pneumatic drills or other equipment creating vibration is not used near old/risky buildings	

Signature

Sign off

Name
Position

Name
Position

^a If on-going construction, include %physical progress and expected date of completion.

II. COMPLIANCE STATUS WITH NATIONAL/STATE/LOCAL STATUTORY ENVIRONMENTAL REQUIREMENTS^a

Package No.	Subproject Name	Statutory Environmental Requirements ^b	Status of Compliance ^c	Validity if obtained	Action Required	Specific Conditions that will require environmental monitoring as per Environment Clearance, Consent/Permit to Establish ^d

^a All statutory clearance/s, no-objection certificates, permit/s, etc. should be obtained prior to award of contract/s. Attach as appendix all clearance obtained during the reporting period. If already reported, specify in the "remarks" column.

^b Specify (environmental clearance? Permit/consent to establish? Forest clearance? Etc.)

^c Specify if obtained, submitted and awaiting approval, application not yet submitted.

^d Example: *Environmental Clearance requires ambient air quality monitoring, Forest Clearance/Tree-cutting Permit requires 2 trees for every tree, etc.*

III. COMPLIANCE STATUS WITH ENVIRONMENTAL LOAN COVENANTS

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

IV. COMPLIANCE STATUS WITH THE ENVIRONMENTAL MANAGEMENT PLAN (REFER TO EMP TABLES IN APPROVED IEE/S)

- Confirm if IEE/s require contractors to submit site-specific EMP/construction EMPs. If not, describe the methodology of monitoring each package under implementation.

Package-wise Implementation Status

Package Number	Components	Design Status (Preliminary Design)	Final IEE based on Detailed Design				Site-specific EMP (or Construction EMP)	Remarks
			Not yet due	Submitted to ADB	Disclosed on	Final IEE provided to		

		Stage/Detailed Design Completed)	(detailed design not yet completed)	(Provide Date of Submission)	project website (Provide Link)	Contractor/s (Yes/No)	approved by Project Director? (Yes/No)	

- Identify the role/s of Safeguards Team including schedule of on-site verification of reports submitted by consultants and contractors.
- For each package, provide name/s and contact details of contractor/s' nodal person/s for environmental safeguards.
- Include as appendix all supporting documents including **signed** monthly environmental site inspection reports prepared by consultants and/or contractors.
- With reference to approved EMP/site-specific EMP/construction EMP, complete the table below
- Provide the monitoring results as per the parameters outlined in the approved EMP (or site-specific EMP/construction EMP when applicable).
- In addition to the table on EMP implementation, the main text of the report should discuss in details the following items:

(i) **Grievance Redress Mechanism.** Provide information on establishment of grievance redress mechanism and capacity of grievance redress committee to address project-related issues/complaints. Include as appendix Notification of the GRM (town-wise if applicable).

(ii) **Complaints Received during the Reporting Period.** Provide information on number, nature, and resolution of complaints received during reporting period. Attach records as per GRM in the approved IEE. Identify safeguards team member/s involved in the GRM process. Attach minutes of meetings (ensure English translation is provided).

- Confirm if any dust was noted to escape the site boundaries and identify dust suppression techniques followed for site/s.
- Identify muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads.

- Identify type of erosion and sediment control measures installed on site/s, condition of erosion and sediment control measures including if these were intact following heavy rain;
- Identify designated areas for concrete works, chemical storage, construction materials, and refueling. Attach photographs of each area.
- Confirm spill kits on site and site procedure for handling emergencies.
- Identify any chemical stored on site and provide information on storage condition. Attach photograph.
- Describe management of stockpiles (construction materials, excavated soils, spoils, etc.). Provide photographs.
- Describe management of solid and liquid wastes on-site (quantity generated, transport, storage and disposal). Provide photographs.
- Provide information on barricades, signages, and on-site boards. Provide photographs.
- Checking if there are any activities being under taken out of working hours and how that is being managed.

Summary of Environmental Monitoring Activities (for the Reporting Period)^a

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

^a Attach Laboratory Results and Sampling Map/Locations

Overall Compliance with CEMP/EMP

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

V. APPROACH AND METHODOLOGY FOR ENVIRONMENTAL MONITORING OF THE PROJECT

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

VI. MONITORING OF ENVIRONMENTAL IMPACTS ON PROJECT SURROUNDINGS (ambient air, water quality and noise levels)

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

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

Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)			
			PM10 µg/m ³	PM2.5 µg/m ³	SO2 µg/m ³	NO2 µg/m ³

Surface Water Quality Results

S.No.	Parameters	Results		
		Location-1 (Name)	Location-2 (Name)	Location-3 (Name)
1.	pH			
2.	Turbidity			
3.	Total Hardness			
4.	DO			
5.	BOD			
6.	COD			
7.	Chloride			
8.	Iron			
9.	TSS			
10.	Arsenic			

11.	Cadmium			
12.	Fluoride			
13.	Potassium			
14.	Sodium			
15.	Calcium			
16.	Zn			
17.	Cr ⁺⁶			
18.	Magnesium			
19.	Copper			
20.	Manganese			
21.	Sulphate			
22.	Cyanide			
23.	Nitrate			
24.	Lead			
25.	Boron			
26.	Selenium			
27.	Aluminium			
28.	Total residual Chlorine			

Ground water Quality Results

S. No.	Parameters	Results		
		Location-1 (Name)	Location-2 (Name)	Location-3 (Name)
1.	pH			
2.	Total Alkalinity			
3.	Total Hardness			
4.	Chloride			
5.	Iron			
6.	TDS			
7.	Arsenic			
8.	Fluoride			
9.	Zn			
10.	Cr+6			
11.	Copper			
12.	Manganese			
13.	Sulphate			
14.	Phosphate			
15.	Nitrate			
16.	Lead			
17.	Phenolic Compound			

Noise Quality Results

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

VII. SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

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

APPENDIXES

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

Appendix 24: Environmental Monitoring Plan - Ambient Air, Noise, Water and Soil

1. Under RUDSICO (EAP) works Environmental Monitoring will done for ambient air, noise, surface water, ground water and soils with following parameters-
 - A. **Ambient Air Quality-** Particulate Matters PM₁₀, Particulate Matter PM_{2.5}, SO_x, NO_x, Carbon Monoxide (CO) as per methods and norms approved by CPCB
 - B. **Ambient Noise Quality-** L_{day} and L_{night} (in Leq dBA) 24 hrs basis as per methods and norms approved by CPCB
 - C. **Surface Water Quality-** pH, Turbidity, Total Hardness, DO, BOD, COD, Chloride, Hg, Iron, TDS, TSS, Calcium, Zn, Cr⁺⁶, Magnesium, Copper, Manganese, Sulphate, Cyanide, Nitrate, Sodium, Potassium, Fluoride, Cadmium, Arsenic, Lead, Boron, Selenium, Aluminium, Total residual Chlorine
 - D. **Ground Water Quality-** pH, TDS, Total Hardness, Zn, Chloride, Iron, Copper, DO, Manganese, Suplhate, Nitrate, Fluidride, Hg, Cadmium, Cr⁺⁶, Arsenic, Lead, Total Alkalinity, Phosphate, Phenolic compound
 - E. **Soil quality-** pH, Elect. Conductivity (at 25°C), Moisture (at 105°C), Texture (silt, clay, sand), Calcium (as CaO), Magnesium (as Mg), Permeability, Nitrogen (as N), Sodium (as Na), Phosphate (as PO₄), Potassium (as K), Organic Matter, oil and grease
2. During pre-construction stage monitoring is required to establish baseline at following sites-

Environmental Monitoring in Pre-Construction Period

S.N.	Type of monitoring	Location of monitoring and no. of samples	Total No. of samples
1	Ambient Air Monitoring	STP site -1 SPS/MWP sites -2 Construction camp-1	4
2.	Ambient Noise monitoring	STP site -1 SPS/MWP sites -2 Construction camp-1 Additional site (if any)-1	5
3.	Surface Water quality	River behind STP site-1	1
4.	Ground Water quality	STP site-1 SPS/MWP sites-2 Construction camp-1	4
5.	Soil Quality	STP site -1 SPS/MWP sites -2 Construction camp-1	4

3. During construction stage below monitoring should be done on minimum quarterly basis at the following sites-

Environmental Monitoring in Construction Period

Proposed sites	Ambient Air quality	Ambient Noise quality	Surface water quality	Ground Water Quality	Soil Quality
Pipe laying site within the town preferably near sensitive	One	One	Nil	Nil	One

receptor*					
Construction camp/storage yard	One	One	Nil	One	One
Labour camp	One	One	Nil	Nil	Nil
MWP site	One	One	Nil	One	One
SPS site	One	One	One- Deepeshwar Talab	One	One
STP site	One	One	One- river behind STP	One	One
Total number of samples in each quarter (A)	6	6	2	4	5
Total number of samples in construction period (B)	48	48	16	32	40

Calculation of total Number of samples-

Project duration= 3 years=12 quarters

Pre-construction phase= 3 months=1quarter

Monsoon period in each year=3 months=1 quarter (July-Sept)

Monsoon period in project duration=3 quarter

Effective period of environmental monitoring (C) = 12-1-3=8 quarters

Total number of samples in construction period (B)= AxC

Note –

- All the tests should be done by labs approved by CPCB and/or RPCB and should be accredited by NABL
 - All the tests should be done as per the norms and methods approved by CPCB/RPCB
 - All the meteorological data like weather, wind, location, nearby features etc. should be recorded during sampling and indicated in the report for ambient air quality
 - If surface water is not available within 500 meters of the site, ground water quality monitoring should be done from the vicinity within 500 meters and if both surface and ground water is available at any site both should be taken
 - For air quality monitoring, if any two sites are within the distance of 2 kms from each other, only one sampling can be done at any site
- * Sensitive receptors are hospitals, schools, any major religious place etc

Appendix 25: Details of land availability, ownership and NOCs for sites

Sr. No.	Project Component	Location	Ownership	Area of government land available at the location (sq mtr)	Area required (m ²)	Khasra No.	Khata No.	Remarks
1	Construction of STP of 7 MLD and TEER, TESR, and EPS	Near Mukti Dham	Nagar Parishad	72700	10000	173	793	Land available, NOC obtained
2	One sewage pumping station (SPS) of 7 mld	Near Deepeshwar Talab	Nagar Parishad	2100	1500	1041	793	Land available, NOC obtained
3	One MWP – 0.10 MLD	near Govt Secondary School, Gautam Nagar, Ward no. 19	Nagar Parishad	----	----	---	---	Land available, NOC obtained

Appendix 266: NOCs for Proposed Works

NOC of Nagar Parishad for STP and SPS

कार्यालय नगर परिषद प्रतापगढ़, जिला-प्रतापगढ़ (राज.)

Fax No. 01478-222043

E-Mail- municipal.board.pratapgarh@gmail.com

क्रमांक: / नपप्र / 2019 / ८०५१

दिनांक: 10.07.19

श्रीमान मुख्य अभियन्ता महोदय,
RUIDP, जयपुर, (राज.)

विषय :- अनापत्ति प्रमाण पत्र (एन.ओ.सी.) जारी करने के सम्बन्ध में।

प्रसंग :- श्रीमान का पत्र क्रमांक / 1686 दिनांक 13.05.2019 के क्रम में।

महोदय,

उपरोक्त विषयान्तर्गत निवेदन है कि प्रासंगिक पत्र अनुसार RUIDP Phase VI के अन्तर्गत नगर परिषद के स्वायत्त की भूमि राजस्वग्राम प्रतापगढ़ के खसरा संख्या 1041 रकबा 0.21 किस्म नाला एवं खसरा संख्या 173 रकबा 7.27 हेक्टर किस्म बीड मेंसे आप द्वारा चाही गई STP हेतु रकबा 0.65 एवं SPS-2 हेतु 20mX15m कुल 60 वर्गमीटर भूमि आवंटन की एन.ओ.सी. चाही गई है।

जिस क्रम में निवेदन है उपरोक्त खसरा संख्या की भूमि मेंसे आप द्वारा चाही गई भूमि आवंटित की जाती है तो नगर परिषद प्रतापगढ़ को कोई आपत्ति प्रतित नहीं होती है।

आयुक्त
नगर परिषद प्रतापगढ़

क्रमांक: / नपप्र / 2019 /

प्रतिलिपि सूचनार्थ :-

1- श्रीमान जिला कलेक्टर महोदय, प्रतापगढ़ (राज.)

दिनांक:

आयुक्त
नगर परिषद प्रतापगढ़

Transcript in English

To,
The Chief Engineer,
RUIDP

Sub: Regarding NoC for proposed STP and SPS of Pratapgarh town.

Ref: Your letter no-1686 on dated 13.05.2019

Sir,

With reference to the above cited subject, this is to inform that 60 sq mtr land is required under khasra no-1041(0.21 hec) and 173(7.27 hec) for proposed STP and SPS.

Nagar Parishad, Pratapgarh giving no objection certificate if these lands are allotted for STP and SPS.

Signed by

Commissioner,
Nagar Parishad,
Pratapgarh

Appendix 277: Guidelines for Safety during Monsoon/Heavy rainfall

Excavation and refilling of earth are common activities, which, if not carefully executed may pose problems to the safety of works as well as passersby and road users during the impending Monsoon.

Normal and heavy rainfall event affect our ongoing works, It should be our conscientious effort to ensure that such events do not prove to be problematic to people and structures in town. During monsoon PIU/PMCBC should ensure that any further excavation work is taken up only after ensuring that the earlier work is in safe stage. It is desired that DCM/ACM & Ex En PIU should inspect all sites during rains and take proactive actions.

Some of the precautions and mitigation measures to be taken are discussed below-

1. The execution of works having deep excavation in smaller lanes and congested areas should be completed well before monsoon. The works of deep excavation during monsoon should not be preferably taken up or extensive care should be taken for execution of such works.
2. The settlement in refilled trenches of sewerage and water supply lines may occur during monsoon. CAPC and PIU team should inspect all sites after a storm to identify such reaches and take immediate corrective action by proper refilling and compacting. It is responsibility of all engineers to look after this activity during monsoon and ensure corrective actions from Contractor's side.
3. The contractor's crew should be equipped with vehicle, gum boots, raincoats, torch etc. to tackle such situation during and after rains. Adequate quantities of earth, debris and gravel should be stacked at strategic places so that no time is lost in procuring such material.
4. In trenches where pipe laying has been done and duly tested and approved, refilling should be done and all surplus material relocated to safe disposal sites such that it does not obstruct traffic or waterways.
5. All open ends of WS and WW pipelines should be firmly plugged to prevent debris from entering the pipeline. Manhole covers of sewer lines should be fixed in place to avoid any harm to road users.
6. Drains are primary or secondary carriers of storm water. Any unutilized construction material should be relocated to allow free passage of storm water. Surplus earth should be suitably and immediately be relocated to avoid earth from falling into the drain so that choking does not occur.
7. Overhead works should not be carried on in-weather conditions that threaten the safety of workers. More frequent checks on scaffold and bracings should be done during monsoon season.
8. Additional precautions should be taken of the power lines, ignorance and carelessness can cause major accidents and casualty.
9. Take preventive measures for water logging in working areas by providing dewatering pumps. Place bright and reflective warning signs.
10. Inspection should also be carried out before resumption of work after a shower/rain.
11. Storage of Construction Material: Steel & Cement are vital ingredients for quality construction work but in absence of proper storage, especially during monsoon, cement and steel may rapidly decline in quality and strength. Care should be taken to protect these materials and use of any exposed material should be allowed only after conducting fresh tests. Improper storage of such material should be reported to SE PIU/ACM, CAPC and use of any apparently affected material should be done after permission of SE PIU/DCM/ACM.

Additional Precautions

1. Adequate set up and resources such as dewatering pumps, electrical routings etc should be planned ahead. Water logging on main roads to be avoided, where construction works are going on.
2. Ensuring the monsoon specific PPE's issued in adequate and are used during monsoon.
3. Use of electric extension box should be avoided; extension cables (if used) should not be wet and damaged. Cables connections should be only weatherproof/waterproof. Electrical and HSE personnel of contractor should visit permanent and running sites regularly. Transparent protective sheets/rain sheds should be placed for the power distribution boards.
4. Welding machines, bar cutting machines etc. should be kept in dry conditions; should not stand in water logged area. Brakers and Drill machines should not be used when raining; dirt/mud should be scrubbed with cloth.
5. Special Trainings to all drivers and operators on safe practices and all vehicles/ equipment's maintenance checks to be more frequent.
6. High boom equipment to be stopped during blowing of high speed wind and rain storm. Arresting of parked vehicles, equipment during monsoon should be done.
7. All chemicals should be stored as per MSDS, chemicals to be protected from water ingress. Chemical waste should be disposed for preventing overflow of chemicals.
8. At labor camps following precautions should be taken:-
 - Maintaining hygiene & proper housekeeping.
 - Additional health checkup camp to identify seasonal diseases
 - Preventive measures on mosquito/parasite breeding mainly in work locations and camps
 - Frequent cleaning of toilets
 - To avoid water borne diseases, high level of cleanliness to be maintained, drinking water containers need to be cleaned and kept covered. Walk areas and pathways to be covered with Murom and soft rock particles (to avoid soft soil conditions).
 - Obstacle free approach to rest sheds, camp and toilets.
 - Proper illumination, provision of battery operated emergency lights
 - No bonfires inside resting sheds. No use of wood.

SE-PIU and DCM/ACM-PMCBC should oversee the arrangements to effectively deal with the eventuality.

EHS Engineer of contractor should visit each site and camps more frequently. Contractor/EHS officer will also impart training on safe working methods during Monsoon and will keep a daily watch on weather conditions to share with site team to act accordingly.

Contractor should organize Monsoon Health Camps and Monitor Workmen Habitat and Hygiene.

Appendix 28: NOC for disposal of treated effluent**कार्यालय नगर परिषद, प्रतापगढ़, जिला-प्रतापगढ़ (राज.)**

Fax No. 01478-222043

E-Mail-municipal.board.pratapgarh@gmail.com

क्रमांक / नपप्र / 2020-21 / SPL-1

दिनांक:- 13/04/2020

अनापत्ति प्रमाण-पत्र

यह प्रमाणित किया जाता है कि फ़ैज-4 के अन्तर्गत किये जाने वाले सीवरेज कार्य प्रतापगढ़ का सीवरेज डिस्चार्ज, एस.टी.पी. के समीप से गुजरने वाले सरकारी नाले में किया जावेगा जिससे भविष्य में किसी प्रकार के भराव की संभावना नहीं होगी ।



नगर परिषद प्रतापगढ़ राज.

Transcript in English**Office of Municipal Council, Banswara**

No: NPP/2020-21/SPL-01.

Dtd. 13.04.2020

No Objection Certificate

It is certified that treated effluent from sewage treatment under Phase-4 shall be discharge in the government drain passing nearby the STP, there will be no any problem of impoundment or flooding due to this in future.

Signed by

Commissioner
Nagar Parishad, Pratapgarh

Appendix 29: WHO Interim Guidance on Water, Sanitation, Hygiene and Waste Management for the COVID-19 virus



Water, sanitation, hygiene, and waste management for the COVID-19 virus

Interim guidance
19 March 2020

Background

This interim guidance supplements the infection prevention and control (IPC) documents by summarizing WHO guidance on water, sanitation and health care waste relevant to viruses, including coronaviruses. It is intended for water and sanitation practitioners and providers and health care providers who want to know more about water, sanitation and hygiene (WASH) risks and practices.

The provision of safe water, sanitation, and hygienic conditions is essential to protecting human health during all infectious disease outbreaks, including the COVID-19 outbreak. Ensuring good and consistently applied WASH and waste management practices in communities, homes, schools, marketplaces, and health care facilities will help prevent human-to-human transmission of the COVID-19 virus.

The most important information concerning WASH and the COVID-19 virus is summarized here.

- Frequent and proper hand hygiene is one of the most important measures that can be used to prevent infection with the COVID-19 virus. WASH practitioners should work to enable more frequent and regular hand hygiene by improving facilities and using proven behavior-change techniques.
- WHO guidance on the safe management of drinking-water and sanitation services applies to the COVID-19 outbreak. Extra measures are not needed. Disinfection will facilitate more rapid die-off of the COVID-19 virus.
- Many co-benefits will be realized by safely managing water and sanitation services and applying good hygiene practices.

Currently, there is no evidence about the survival of the COVID-19 virus in drinking-water or sewage. The morphology and chemical structure of the COVID-19 virus are similar to those of other human coronaviruses for which there are data about both survival in the environment and effective inactivation measures. This document draws upon the evidence base and WHO guidance on how to protect against viruses in sewage and drinking-water. This document will be updated as new information becomes available.

1. COVID-19 transmission

There are two main routes of transmission of the COVID-19 virus: respiratory and contact. Respiratory droplets are generated when an infected person coughs or sneezes. Any person who is in close contact with someone who has respiratory symptoms (sneezing, coughing) is at risk of being exposed to potentially infective respiratory droplets.¹ Droplets may also land on surfaces where the virus could remain viable; thus, the immediate environment of an infected individual can serve as a source of transmission (contact transmission).

Approximately 2–10% of cases of confirmed COVID-19 disease present with diarrhoea,^{2,4} and two studies detected COVID-19 viral RNA fragments in the faecal matter of COVID-19 patients.^{5,6} However, only one study has cultured the COVID-19 virus from a single stool specimen.⁷ There have been no reports of faecal–oral transmission of the COVID-19 virus.

2. Persistence of the COVID-19 virus in drinking-water, faeces and sewage and on surfaces.

Although persistence in drinking-water is possible, there is no evidence from surrogate human coronaviruses that they are present in surface or groundwater sources or transmitted through contaminated drinking water. The COVID-19 virus is an enveloped virus, with a fragile outer membrane. Generally, enveloped viruses are less stable in the environment and are more susceptible to oxidants, such as chlorine. While there is no evidence to date about survival of the COVID-19 virus in water or sewage, the virus is likely to become inactivated significantly faster than non-enveloped human enteric viruses with known waterborne transmission (such as adenoviruses, norovirus, rotavirus and hepatitis A). For example, one study found that a surrogate human coronavirus survived only 2 days in dechlorinated tap water and in hospital wastewater at 20°C.⁸ Other studies concur, noting that the human coronaviruses transmissible gastroenteritis coronavirus and mouse hepatitis virus demonstrated a 99.9% die-off in from 2 days⁹ at 23°C to 2 weeks¹⁰ at 25°C. Heat, high or low pH, sunlight, and common disinfectants (such as chlorine) all facilitate die off.

It is not certain how long the virus that causes COVID-19 survives on surfaces, but it seems likely to behave like other coronaviruses. A recent review of the survival of human

coronaviruses on surfaces found large variability, ranging from 2 hours to 9 days.¹¹ The survival time depends on a number of factors, including the type of surface, temperature, relative humidity, and specific strain of the virus. The same review also found that effective inactivation could be achieved within 1 minute using common disinfectants, such as 70% ethanol or sodium hypochlorite (for details, see Cleaning practices).

3. Keeping water supplies safe

The COVID-19 virus has not been detected in drinking-water supplies, and based on current evidence, the risk to water supplies is low.¹² Laboratory studies of surrogate coronaviruses that took place in well-controlled environments indicated that the virus could remain infectious in water contaminated with faeces for days to weeks.¹⁰ A number of measures can be taken to improve water safety, starting with protecting the source water; treating water at the point of distribution, collection, or consumption; and ensuring that treated water is safely stored at home in regularly cleaned and covered containers.

Conventional, centralized water treatment methods that use filtration and disinfection should inactivate the COVID-19 virus. Other human coronaviruses have been shown to be sensitive to chlorination and disinfection with ultraviolet (UV) light.¹³ As enveloped viruses are surrounded by a lipid host cell membrane, which is not robust, the COVID-19 virus is likely to be more sensitive to chlorine and other oxidant disinfection processes than many other viruses, such as coxsackieviruses, which have a protein coat. For effective centralized disinfection, there should be a residual concentration of free chlorine of ≥ 0.5 mg/L after at least 30 minutes of contact time at pH < 8.0 .¹² A chlorine residual should be maintained throughout the distribution system.

In places where centralized water treatment and safe piped water supplies are not available, a number of household water treatment technologies are effective in removing or destroying viruses, including boiling or using high-performing ultrafiltration or nanomembrane filters, solar irradiation and, in non-turbid waters, UV irradiation and appropriately dosed free chlorine.

4. Safely managing wastewater and faecal waste

There is no evidence that the COVID-19 virus has been transmitted via sewerage systems with or without wastewater treatment. Further, there is no evidence that sewage or wastewater treatment workers contracted the severe acute respiratory syndrome (SARS), which is caused by another type of coronavirus that caused a large outbreak of acute respiratory illness in 2003. As part of an integrated public health policy, wastewater carried in sewerage systems should be treated in well-designed and well-managed centralized wastewater treatment works. Each stage of treatment (as well as retention time and dilution) results in a further reduction of the potential risk. A waste stabilization pond (an oxidation pond or lagoon) is generally considered a practical and simple wastewater treatment technology particularly well suited to destroying pathogens, as relatively long retention times (20 days or longer) combined with sunlight, elevated pH levels, biological activity, and other factors serve to accelerate pathogen destruction. A final disinfection step may be considered if existing wastewater treatment plants are not optimized to remove viruses. Best practices for protecting the health of workers at sanitation treatment facilities should

be followed. Workers should wear appropriate personal protective equipment (PPE), which includes protective outerwear, gloves, boots, goggles or a face shield, and a mask; they should perform hand hygiene frequently; and they should avoid touching eyes, nose, and mouth with unwashed hands.

WASH in health care settings

Existing recommendations for water, sanitation and hygiene measures in health care settings are important for providing adequate care for patients and protecting patients, staff, and caregivers from infection risks.¹⁴ The following actions are particularly important: (i) managing excreta (faeces and urine) safely, including ensuring that no one comes into contact with it and that it is treated and disposed of correctly; (ii) engaging in frequent hand hygiene using appropriate techniques; (iii) implementing regular cleaning and disinfection practices; and (iv) safely managing health care waste. Other important measures include providing sufficient safe drinking-water to staff, caregivers, and patients; ensuring that personal hygiene can be maintained, including hand hygiene, for patients, staff and caregivers; regularly laundering bedsheets and patients' clothing; providing adequate and accessible toilets (including separate facilities for confirmed and suspected cases of COVID-19 infection); and segregating and safely disposing of health care waste. For details on these recommendations, please refer to Essential environmental health standards in health care.¹⁴

1. Hand hygiene practices

Hand hygiene is extremely important. Cleaning hands with soap and water or an alcohol-based hand rub should be performed according to the instructions known as "My 5 moments for hand hygiene".¹⁵ If hands are not visibly dirty, the preferred method is to perform hand hygiene with an alcohol-based hand rub for 20–30 seconds using the appropriate technique.¹⁶ When hands are visibly dirty, they should be washed with soap and water for 40–60 seconds using the appropriate technique.¹⁷ Hand hygiene should be performed at all five moments, including before putting on PPE and after removing it, when changing gloves, after any contact with a patient with suspected or confirmed COVID-19 infection or their waste, after contact with any respiratory secretions, before eating, and after using the toilet.¹⁸ If an alcohol-based hand rub and soap are not available, then using chlorinated water (0.05%) for handwashing is an option, but it is not ideal because frequent use may lead to dermatitis, which could increase the risk of infection and asthma and because prepared dilutions might be inaccurate.¹⁹ However, if other options are not available or feasible, using chlorinated water for handwashing is an option.

Functional hand hygiene facilities should be present for all health care workers at all points of care and in areas where PPE is put on or taken off. In addition, functional hand hygiene facilities should be available for all patients, family members, and visitors, and should be available within 5 m of toilets, as well as in waiting and dining rooms and other public areas.

2. Sanitation and plumbing

People with suspected or confirmed COVID-19 disease should be provided with their own flush toilet or latrine that has a door that closes to separate it from the patient's room. Flush toilets should operate properly and have functioning drain traps. When possible, the toilet should be flushed with the lid down to prevent droplet splatter and aerosol clouds. If it is not possible to provide separate toilets, the toilet should be cleaned and disinfected at least twice daily by a trained cleaner wearing PPE (gown, gloves, boots, mask, and a face shield or goggles). Further, and consistent with existing guidance, staff and health care workers should have toilet facilities that are separate from those used by all patients.

WHO recommends the use of standard, well-maintained plumbing, such as sealed bathroom drains, and backflow valves on sprayers and faucets to prevent aerosolized faecal matter from entering the plumbing or ventilation system,²⁰ together with standard wastewater treatment.²¹ Faulty plumbing and a poorly designed air ventilation system were implicated as contributing factors to the spread of the aerosolized SARS coronavirus in a high-rise apartment building in Hong Kong in 2003.²² Similar concerns have been raised about the spread of the COVID-19 virus from faulty toilets in high-rise apartment buildings.²³ If health care facilities are connected to sewers, a risk assessment should be conducted to confirm that wastewater is contained within the system (that is, the system does not leak) before its arrival at a functioning treatment or disposal site, or both. Risks pertaining to the adequacy of the collection system or to treatment and disposal methods should be assessed following a safety planning approach,²⁴ with critical control points prioritized for mitigation.

For smaller health care facilities in low-resource settings, if space and local conditions allow, pit latrines may be the preferred option. Standard precautions should be taken to prevent contamination of the environment by excreta. These precautions include ensuring that at least 1.5 m exists between the bottom of the pit and the groundwater table (more space should be allowed in coarse sands, gravels, and fissured formations) and that the latrines are located at least 30 m horizontally from any groundwater source (including both shallow wells and boreholes).²¹ If there is a high groundwater table or a lack of space to dig pits, excreta should be retained in impermeable storage containers and left for as long as feasible to allow for a reduction in virus levels before moving it off-site for additional treatment or safe disposal, or both. A two-tank system with parallel tanks would help facilitate inactivation by maximizing retention times, as one tank could be used until full, then allowed to sit while the next tank is being filled. Particular care should be taken to avoid splashing and the release of droplets while cleaning or emptying tanks.

3. Toilets and the handling of faeces

It is critical to conduct hand hygiene when there is suspected or direct contact with faeces (if hands are dirty, then soap and water are preferred to the use of an alcohol-based hand rub). If the patient is unable to use a latrine, excreta should be collected in either a diaper or a clean bedpan and immediately and carefully disposed of into a separate toilet or latrine used only by suspected or confirmed cases of COVID-19. In all health care settings, including those with suspected or confirmed COVID-19 cases, faeces must be treated as a biohazard and handled as little as possible. Anyone handling

faeces should follow WHO contact and droplet precautions¹⁸ and use PPE to prevent exposure, including long-sleeved gowns, gloves, boots, masks, and goggles or a face shield. If diapers are used, they should be disposed of as infectious waste as they would be in all situations. Workers should be properly trained in how to put on, use, and remove PPE so that these protective barriers are not breached.²⁵ If PPE is not available or the supply is limited, hand hygiene should be regularly practiced, and workers should keep at least 1 m distance from any suspected or confirmed cases.

If a bedpan is used, after disposing of excreta from it, the bedpan should be cleaned with a neutral detergent and water, disinfected with a 0.5% chlorine solution, and then rinsed with clean water; the rinse water should be disposed of in a drain or a toilet or latrine. Other effective disinfectants include commercially available quaternary ammonium compounds, such as cetylpyridinium chloride, used according to manufacturer's instructions, and peracetic or peroxyacetic acid at concentrations of 500–2000 mg/L.²⁶

Chlorine is ineffective for disinfecting media containing large amounts of solid and dissolved organic matter. Therefore, there is limited benefit to adding chlorine solution to fresh excreta and it is possible that this may introduce risks associated with splashing.

4. Emptying latrines and holding tanks, and transporting excreta off-site.

There is no reason to empty latrines and holding tanks of excreta from suspected or confirmed COVID-19 cases unless they are at capacity. In general, the best practices for safely managing excreta should be followed. Latrines or holding tanks should be designed to meet patient demand, considering potential sudden increases in cases, and there should be a regular schedule for emptying them based on the wastewater volumes generated. PPE (long-sleeved gown, gloves, boots, masks, and goggles or a face shield) should be worn at all times when handling or transporting excreta offsite, and great care should be taken to avoid splashing. For crews, this includes pumping out tanks or unloading pumper trucks. After handling the waste and once there is no risk of further exposure, individuals should safely remove their PPE and perform hand hygiene before entering the transport vehicle. Soiled PPE should be put in a sealed bag for later safe laundering (see Cleaning practices). Where there is no off-site treatment, in-situ treatment can be done using lime. Such treatment involves using a 10% lime slurry added at 1-part lime slurry per 10 parts of waste.

5. Cleaning practices

Recommended cleaning and disinfection procedures for health care facilities should be followed consistently and correctly.¹⁹ Laundry should be done and surfaces in all environments in which COVID-19 patients receive care (treatment units, community care centres) should be cleaned at least once a day and when a patient is discharged.²⁷ Many disinfectants are active against enveloped viruses, such as the COVID-19 virus, including commonly used hospital disinfectants. Currently, WHO recommends using:

- 70% ethyl alcohol to disinfect small areas between uses, such as reusable dedicated equipment (for example, thermometers);
- sodium hypochlorite at 0.5% (equivalent to 5000 ppm) for disinfecting surfaces.

All individuals dealing with soiled bedding, towels, and clothes from patients with COVID-19 infection should wear appropriate PPE before touching soiled items, including heavy duty gloves, a mask, eye protection (goggles or a face shield), a long-sleeved gown, an apron if the gown is not fluid resistant, and boots or closed shoes. They should perform hand hygiene after exposure to blood or body fluids and after removing PPE. Soiled linen should be placed in clearly labelled, leak-proof bags or containers, after carefully removing any solid excrement and putting it in a covered bucket to be disposed of in a toilet or latrine. Machine washing with warm water at 60–90°C (140–194°F) with laundry detergent is recommended. The laundry can then be dried according to routine procedures. If machine washing is not possible, linens can be soaked in hot water and soap in a large drum using a stick to stir and being careful to avoid splashing. The drum should then be emptied, and the linens soaked in 0.05% chlorine for approximately 30 minutes. Finally, the laundry should be rinsed with clean water and the linens allowed to dry fully in sunlight.

If excreta are on surfaces (such as linens or the floor), the excreta should be carefully removed with towels and immediately safely disposed of in a toilet or latrine. If the towels are single use, they should be treated as infectious waste; if they are reusable, they should be treated as soiled linens. The area should then be cleaned and disinfected (with, for example, 0.5% free chlorine solution), following published guidance on cleaning and disinfection procedures for spilled body fluids.²⁷

6. Safely disposing of greywater or water from washing PPE, surfaces and floors.

Current WHO recommendations are to clean utility gloves or heavy duty, reusable plastic aprons with soap and water and then decontaminate them with 0.5% sodium hypochlorite solution after each use. Single-use gloves (nitrile or latex) and gowns should be discarded after each use and not reused; hand hygiene should be performed after PPE is removed. If greywater includes disinfectant used in prior cleaning, it does not need to be chlorinated or treated again. However, it is important that such water is disposed of in drains connected to a septic system or sewer or in a soakaway pit. If greywater is disposed of in a soakaway pit, the pit should be fenced off within the health facility grounds to prevent tampering and to avoid possible exposure in the case of overflow.

7. Safe management of health care waste

Best practices for safely managing health care waste should be followed, including assigning responsibility and sufficient human and material resources to dispose of such waste safely. There is no evidence that direct, unprotected human contact during the handling of health care waste has resulted in the transmission of the COVID-19 virus. All health care waste produced during the care of COVID 19 patients should be collected safely in designated containers and bags, treated, and then safely disposed of or treated, or both, preferably on-site. If waste is moved off-site, it is critical to understand where and how it will be treated and destroyed. All who handle health care waste should wear appropriate PPE (boots, apron, long-sleeved gown, thick gloves, mask, and goggles or a face shield) and perform hand hygiene after removing it. For more information refer to the WHO guidance, Safe management of wastes from health-care activities.²⁸

Considerations for WASH practices in homes and communities.

Upholding best WASH practices in the home and community is also important for preventing the spread of COVID-19 and when caring for patients at home. Regular and correct hand hygiene is of particular importance.

1. Hand hygiene

Hand hygiene in non-health care settings is one of the most important measures that can prevent COVID 19 infection. In homes, schools and crowded public spaces – such as markets, places of worship, and train or bus stations – regular handwashing should occur before preparing food, before and after eating, after using the toilet or changing a child's diaper, and after touching animals. Functioning handwashing facilities with water and soap should be available within 5 m of toilets.

2. Treatment and handling requirements for excreta.

Best WASH practices, particularly handwashing with soap and clean water, should be strictly applied and maintained because these provide an important additional barrier to COVID-19 transmission and to the transmission of infectious diseases in general.¹⁷ Consideration should be given to safely managing human excreta throughout the entire sanitation chain, starting with ensuring access to regularly cleaned, accessible, and functioning toilets or latrines and to the safe containment, conveyance, treatment, and eventual disposal of sewage.

When there are suspected or confirmed cases of COVID-19 in the home setting, immediate action must be taken to protect caregivers and other family members from the risk of contact with respiratory secretions and excreta that may contain the COVID-19 virus. Frequently touched surfaces throughout the patient's care area should be cleaned regularly, such as beside tables, bed frames and other bedroom furniture. Bathrooms should be cleaned and disinfected at least once a day. Regular household soap or detergent should be used for cleaning first and then, after rinsing, regular household disinfectant containing 0.5% sodium hypochlorite (that is, equivalent to 5000 ppm or 1-part household bleach with 5% sodium hypochlorite to 9 parts water) should be applied. PPE should be worn while cleaning, including mask, goggles, a fluid-resistant apron, and gloves,²⁹ and hand hygiene with an alcohol-based hand rub or soap and water should be performed after removing PPE.

References

1. Coronavirus disease (COVID-19) advice for the public. Geneva: World Health Organization; 2020 (<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>, accessed 3 March 2020).
2. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*. 2020;395:497–506. doi:10.1016/S0140-6736(20)30183-5.

3. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet*. 2020;395:507–13. doi:10.1016/S0140-6736(20)30211-7.
4. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. *JAMA*. 2020. Feb 7. doi:10.1001/jama.2020.1585.
5. Xiao E, Tang M, Zheng Y, Li C, He J, Hong H, et al. Evidence for gastrointestinal infection of SARS-CoV. medRxiv. doi:10.1101/2020.02.17.20023721.
6. Holshue ML, DeBolt C, Lindquist S, Lofy KH, Wiesman J, Bruce H et al. for the Washington State 2019-nCoV Case Investigation Team. First case of 2019 novel coronavirus in the United States. *N Engl J Med*. 2020. Jan 31. doi:10.1056/NEJMoa2001191.
7. Zhang Y, Chen C, Zhu S et al. [Isolation of 2019-nCoV from a stool specimen of a laboratory-confirmed case of the coronavirus disease 2019 (COVID-19)]. *China CDC Weekly*. 2020;2(8):123-4. (In Chinese.)
8. Wang XW, Li JS, Zhen B, Kong QX, Song N, Xiao WJ et al. Study on the resistance of severe acute respiratory syndrome-associated coronavirus. *J Virol Methods*. 2005;126:171–7. doi:10.1016/j.jviromet.2005.02.005.
9. Gundy P, Gerba CP, Pepper IL. Survival of coronaviruses in water and wastewater. *Food Environ Virol*. 2009;1:10-14. doi:10.1007/s12560-008-9001-6.
10. Casanova L, Rutlal WA, Weber DJ, Sobsey MD. Survival of surrogate coronaviruses in water. *Water Res*. 2009;43(7):1893–8. doi:10.1016/j.watres.2009.02.002.
11. Kampf G, Todt D, Pfaender S, Steinmann E. Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. *J Hosp Infect*. 2020;104(3):246–51. doi:10.1016/j.jhin.2020.01.022.
12. Guidelines for drinking-water quality, fourth edition, incorporating the first addendum. Geneva: World Health Organization; 2017 (<http://apps.who.int/iris/bitstream/10665/254637/1/9789241549950-eng.pdf>, accessed 3 March 2020).
13. SARS-CoV-2 – water and sanitation. Adelaide: Water Research Australia; 2020 (http://www.waterra.com.au/r9544/media/system/attrib/file/2199/WaterRA_FS_Coronavirus_V10.pdf, accessed 3 March 2020).
14. Essential environmental health standards in health care. Geneva: World Health Organization; 2008 (https://apps.who.int/iris/bitstream/handle/10665/43767/9789241547239_eng.pdf?sequence=1&isAllowed=y, accessed 3 March 2020).
15. My 5 moments for hand hygiene. In: WHO/Infection prevention and control [website]. Geneva: World Health Organization; 2020 (<https://www.who.int/infection-prevention/campaigns/clean-hands/5moments/en/>, accessed 3 March 2020).
16. Siddharta A, Pfaender S, Vielle NJ, Dijkman R, Friesland M, Becker B, et al. Virucidal activity of World Health Organization-recommended formulations against enveloped viruses, including Zika, Ebola, and emerging coronaviruses. *J Infect Dis*. 2017;215(6):902–6. doi:10.1093/infdis/jix046.
17. WHO guidelines on hand hygiene in health care settings. Geneva: World Health Organization; 2009 (https://apps.who.int/iris/bitstream/handle/10665/44102/9789241597906_eng.pdf?sequence=1&isAllowed=y, accessed 3 March 2020).
18. Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected: interim guidance, 25 January 2020. Geneva: World Health Organization ([https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-coronavirus-\(ncov\)-infection-is-suspected-20200125](https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-coronavirus-(ncov)-infection-is-suspected-20200125), accessed 3 March 2020).
19. Q&A on infection prevention and control for health care workers caring for patients with suspected or confirmed 2019-nCoV. In: WHO/Newsroom [website]. Geneva: World Health Organization; 2020 (<https://www.who.int/news-room/q-a-detail/q-a-on-infection-prevention-and-control-for-health-care-workers-caring-for-patients-with-suspected-or-confirmed-2019-ncov>, accessed 3 March 2020).
20. Health aspects of plumbing. Geneva: World Health Organization; 2006. (<https://apps.who.int/iris/handle/10665/43423>, accessed 3 March 2020).
21. Guidelines on sanitation and health. Geneva: World Health Organization; 2018 (<https://apps.who.int/iris/bitstream/handle/10665/274939/9789241514705-eng.pdf?ua=1>, accessed 3 March 2020).
22. Yu ITS, Li Y, Wong TW, Tam W, Chan A, Lee JHW, et al. Evidence of airborne transmission of the severe acute respiratory syndrome virus. *N Engl J Med*. 2004;350(17):1731-9. doi:10.1056/NEJMoa032867.
23. Regan H. How can the coronavirus spread through bathroom pipes? Experts are investigating in Hong Kong. CNN. 12 February 2020 (<https://edition.cnn.com/2020/02/12/asia/hong-kong-coronavirus-pipes-intl-hnk/index.html>).
24. Sanitation safety planning: manual for safe use and disposal of wastewater, greywater and excreta. Geneva: World Health Organization; 2015. (<https://apps.who.int/iris/handle/10665/171753>, accessed 3 March 2020).
25. How to put on and take off personal protective equipment. Geneva: World Health Organization; 2008 (<https://apps.who.int/iris/handle/10665/70066>, accessed 3 March 2020).
26. Chemical disinfectants: guideline for disinfection and sterilization in healthcare facilities (2008). In: CDC/Infection Control [website]. Atlanta: US Centers for Disease Control and Prevention; 2019. (<https://www.cdc.gov/infectioncontrol/guidelines/disinfection/disinfection-methods/chemical.html>, accessed 3 March 2020).

27. Best practices for environmental cleaning in healthcare facilities in resource-limited settings. Atlanta: US Centers for Disease Control and Prevention; 2019
(<https://www.cdc.gov/hai/pdfs/resource-limited/environmental-cleaning-508.pdf>, accessed 3 March 2020).
28. Safe management of wastes from health-care activities: a summary. Geneva: World Health Organization; 2017
(<https://apps.who.int/iris/handle/10665/259491>, accessed 3 March 2020).
29. Home care for patients with suspected novel coronavirus (COVID-19) infection presenting with mild symptoms, and management of their contacts: interim guidance, 4 February 2020.
([https://www.who.int/publications-detail/home-care-for-patients-with-suspected-novel-coronavirus-\(ncov\)-infection-presenting-with-mild-symptoms-and-management-of-contacts](https://www.who.int/publications-detail/home-care-for-patients-with-suspected-novel-coronavirus-(ncov)-infection-presenting-with-mild-symptoms-and-management-of-contacts), accessed 3 March 2020).

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WHO continues to monitor the situation closely for any changes that may affect this interim guidance. Should any factors change, WHO will issue a further update. Otherwise, this interim guidance document will expire 2 years after the date of publication.

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This interim guidance was written by staff from WHO and UNICEF. In addition, a number of experts and WASH practitioners contributed. They include Matt Arduino,

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