Initial Environmental Examination

Document Stage: Draft
Project Number: 42486-018
June 2020

IND: Madhya Pradesh Urban Services Improvement Program – Additional Financing (Sewerage and Storm Water Improvement in Rajnagar Town) PART A

Package No: MPUSIP-6E

CURRENCY EQUIVALENTS
(as of 10 June 2020)

Currency unit  –  Indian rupee (₹)

₹1.00  =  $0.0132
$1.00  =  ₹75.495

ABBREVIATIONS

AC  –  Asbestos Cement
ADB  –  Asian Development Bank
ASI  –  Archeological Survey of India
ASO  –  Assistant Safeguards Officer
CFE  –  Consent for Establishment
CFO  –  Consent for Operation
CPCB  –  Central Pollution Control Board
EA  –  Executing Agency
EAC  –  Expert Appraisal Committee
EC  –  Environmental Clearance
EHS  –  Environmental Health & Safety
EIA  –  Environmental Impact Assessment
EMP  –  Environmental Management Plan;
ESR  –  Elevated Service Reservoir
GOI  –  Government of India
GOMP  –  Government of Madhya Pradesh
IA  –  Implementing Agency
IEE  –  Initial Environmental Examination
LPCD  –  Liters per Capita per Day
MLD  –  Million Liters per Day
MOEF  –  Ministry of Environment and Forest
MPPCB  –  Madhya Pradesh Pollution Control Board
MPUDC  –  Madhya Pradesh Urban Development Company
NOC  –  No Objection Certificate
PHED  –  Public Health Engineering Department
PIU  –  Project Implementation Unit;
PMC  –  Project Management Consultant
PMU  –  Project Management Unit
PPTA  –  Project Preparatory Technical Assistance
PWD  –  Public Works Department
REA  –  Rapid Environmental Assessment Checklist
RNP  –  Rajnagar Nagar Parishad
ROW  –  Right of Way
SEIAA  –  State Environmental Impact Assessment Authority
SPS  –  Safeguard Policy Statement, 2009
UDED  –  Urban Development & Environment Department
ULB  –  Urban Local Body
WHO  –  World Health Organization
STP  –  Water Treatment Plant
SBR – Sequence Batch Reactor

**WEIGHTS AND MEASURES**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>Degree Celsius</td>
</tr>
<tr>
<td>km</td>
<td>kilometer</td>
</tr>
<tr>
<td>lpcd</td>
<td>litres per capita per day</td>
</tr>
<tr>
<td>mm</td>
<td>millimeter</td>
</tr>
<tr>
<td>m</td>
<td>metre</td>
</tr>
<tr>
<td>MLD</td>
<td>million litres per day</td>
</tr>
<tr>
<td>nos.</td>
<td>numbers</td>
</tr>
<tr>
<td>km²</td>
<td>square kilometer</td>
</tr>
</tbody>
</table>

**NOTE**

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

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>INTRODUCTION</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A. Background</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>B. Purpose of this Initial Environmental Examination Report</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>C. Report Structure</td>
<td>2</td>
</tr>
<tr>
<td>II.</td>
<td>DESCRIPTION OF THE PROJECT</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>A. Project Area</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>B. Existing Sewerage and Storm Water Drainage System</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>C. Proposed Project</td>
<td>5</td>
</tr>
<tr>
<td>III.</td>
<td>POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>A. ADB Policy</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>B. National Environmental Laws</td>
<td>37</td>
</tr>
<tr>
<td>IV.</td>
<td>DESCRIPTION OF THE ENVIRONMENT</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>A. Methodology Used for Baseline Study</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>B. Physical Resources</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>C. Ecological Resources</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>D. Economic Development</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>E. Subproject Site Environmental Features</td>
<td>51</td>
</tr>
<tr>
<td>V.</td>
<td>ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>A. Pre-Construction Impacts – Design &amp; Location</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>B. Construction Impacts</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>C. Operation and Maintenance Impacts</td>
<td>81</td>
</tr>
<tr>
<td>VI.</td>
<td>PUBLIC CONSULTATION AND INFORMATION DISCLOSURE</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>A. Overview</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>B. Public Consultation</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>C. Information Disclosure</td>
<td>86</td>
</tr>
<tr>
<td>VII.</td>
<td>GRIEVANCE REDRESS MECHANISM</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>A. Project Specific Grievance Redress Mechanism</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>B. Purpose of the GRM Manual:</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>C. Principles:</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>D. Nature and scope of Grievance Redress Mechanism under MPUSIP</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>E. Structure of GRM and its Functions</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>F. Process of Grievance Redress Mechanism</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>G. Monitoring and Evaluation systems of GRM</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>H. Action Plan for the formation of the GRM</td>
<td>96</td>
</tr>
<tr>
<td>VIII.</td>
<td>ENVIRONMENTAL MANAGEMENT PLAN</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>A. Environmental Management Plan</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>B. Implementation Arrangements</td>
<td>128</td>
</tr>
<tr>
<td></td>
<td>C. Training Needs</td>
<td>131</td>
</tr>
<tr>
<td></td>
<td>D. Monitoring and Reporting</td>
<td>132</td>
</tr>
<tr>
<td></td>
<td>E. EMP Implementation Cost</td>
<td>132</td>
</tr>
<tr>
<td>IX.</td>
<td>CONCLUSION AND RECOMMENDATIONS</td>
<td>136</td>
</tr>
</tbody>
</table>
## APPENDICES

1. REA Checklist Sewerage and Sanitation
2. STP Discharge Standards
3. National Ambient Air Quality Standards
4. Vehicle Exhaust Emission Norms
5. National Ambient Air Quality Standards in Respect of Noise
6. Standards for Sludge Reuse as Manure
8. Salient Features of Major Labor Laws Applicable to Establishments Engaged in Construction of Civil Works
9. IBAT Proxity Screening Report
10. Details of Stakeholder Consultation conducted in Rajnagar Town
11. Press Report in leading Hindi newspaper (Rajasthan Patrika) about Rajnagar Sewerage Scheme and consultation Conducted in the town
12. Sample Grievance Registration Form
13. Sample Outline Spoils (construction waste) Management Plan
14. Sample Outline Traffic Management Plan
15. Sample Environmental Site Inspection Checklist
EXECUTIVE SUMMARY

Government of Madhya Pradesh with loan funding from Asian Development Bank (ADB) has proposed to implement Madhya Pradesh Urban Services Improvement Project (MPUSIP), herein after referred as the “Project”. Madhya Pradesh Urban Development Company Limited (MPUDC) shall be the Implementing Agency and the State Urban Development and Environment Department (UDED) shall be the executing agency for the Project.

The Program envisages to deliver:

(i) Continuous, pressurized, safe and sustainable drinking water through private household metered connections in 59 tier II towns in the State;
(ii) Sewage and storm water collection and treatment system in eight (08) identified towns, Khajuraho, Rajnagar, Maihar, Sanchi, Dhamnod, Nagda, Mandsaur and Jabalpur (Part II); and
(iii) Non-physical investments comprising of establishing GIS system, capacity building of participating urban local bodies in contract management, Improving local operators' capability through global partnership and building capacity of the implementing agency, urban local bodies and services utilities for ensuring long term sustainability of services.

Rajnagar town is located in Chatarpur District in the northern part of the Madhya Pradesh state in central India. This is a small town, recently upgraded to Nagar Parishad status, and population as per 2011 census was 14,253. Provision of sewerage and storm water drainage system in Rajnagar is one of the subprojects proposed under MPUSIP. At present, there is no sewerage system Rajnagar; about 65-70% of residents use septic tanks or soak pit for sewage disposal, and rest of the houses dispose the wastewater directly into roadside open drains. Most of the houses do not have in-built toilets, discharging into storm water drains or nala (Natural stream)/ flows into the natural depressions/ponds/lakes in the town - Jal Sena Talab (talab means pond/lake), Thanera Talab and Dhandhar Talab in Rajnagar town. This leads to deterioration of environment and health hazards. The size of existing drains is inadequate and due to poor maintenance. When it rains, the area gets flooded leading to much higher deterioration of sanitation aggravating the risk of disease.

The Subproject. The objective of this subprojects is to develop sewerage and storm water management services to the residents in Rajnagar Nagar Parishad conforming to National Service Level Benchmarks in sewerage and storm water services. The subproject envisages providing 100% coverage of population with sewage collection network and treatment services, and includes civil works, project implementation and management, and non-physical investments. The physical investment includes the following:

(i) Sewerage System - (a) sewer network of 18.16 km length and 150 to 450 mm diameter; (b) Manholes-1031 Nos; (c) terminal sewage pumping station (SPS) of capacity 2.82 MLD, and (d) sewage treatment plant (STP) of capacity 2.82 MLD; (e) Pumping main length of 50 m and diameter 250 mm pipe; (f) No. of House Sewer Connections – 3000 nos.
(ii) Drainage System – (a) New reinforced cement concrete (RCC) and Brick Masonry storm water drains – 15.84 km length (b) repair and rehabilitation of existing storm water drains – 2.60 km length (c) RCC pipe Culverts – 6 Nos; and (d) RCC slab (box) culvers – 26 Nos, (e) provision of coarse screen at inlet of lake for prevention of entry of solid waste / floating material into the lake and provision
of chain link fencing around the lakes. This subprojects package is proposed for implementation under a single Design-Build-Operate (DBO) contract package.

Implementation Arrangements: Urban Development and Housing Department (UDHD) of Government of Madhya Pradesh is the executing agency. Implementing agency is the Madhya Pradesh Urban Development Company (MPUDC). A central project management unit (PMU) attached to MPUDC is responsible for implementing the MPUSIP. The PMU will be supported by program implementation units (PIUs). A program management consultant (PMC) centrally located in PMU and with field teams in PIUs, will support PMU and PIUs in implementation. Infrastructure will be designed, built, and operated (DBO) by contractor for 10 years after which it will be transferred to the ULB. Project officer (Environment) at PMU and Assistant Safeguard Officer (ASO) at each of the PIU will be responsible for environment safeguards tasks and will be supported by Environment Specialist and Environmental Engineers of PMC Team. Contractor personnel will include an Environment, Health and Safety (EHS) supervisor.

Screening and assessment of potential impacts: 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 Checklist for Sewerage. Then potential negative impacts were identified in relation to pre-construction, construction and operation of the improved infrastructure.

Categorization: Based on results of the assessment and ADB SPS, the subprojects is classified as environmental Category B, i.e., the subproject is judged to be unlikely to have significant adverse environmental impacts. An initial environmental examination (IEE) is required to determine whether significant environmental impacts warranting an environmental impact assessment are likely.

This IEE aims to: (i) provide critical facts, significant finding, and recommended actions; (ii) present the national and local legal and institutional framework within which the environmental assessment has been carried out; (iii) provide information on existing geographic, ecological, social and temporal context including associated facilities within the subproject’s area of influence; (iv) assess the subproject’s likely positive and negative direct and indirect impacts to physical, biological, socioeconomic, and physical cultural resources in the subproject’s area of influence; (v) identify mitigation measures and any residual negative impacts that cannot be mitigated; (vi) describe the process undertaken during project design to engage stakeholders and the planned information disclosure measures and the process for carrying out consultation with affected people and facilitating their participation during project implementation; (vii) describe the subproject’s grievance redress mechanism for resolving complaints about environmental performance; (viii) present the set of mitigation measures to be undertaken to avoid, reduce, mitigate, or compensate for adverse environmental impacts; (ix) describe the monitoring measures and reporting procedures to ensure early detection of conditions that necessitate particular mitigation measures; and (x) identify indicative costs and who is responsible for carrying out the mitigation and monitoring measures.

Description of the Environment: The subproject components locations are in Rajnagar towns. Town is spread over 28 sq. km and population of 14,253 as per 2011 census. The immediate surroundings were converted into urban use for many years ago, and there is no natural habitat left at the subproject sites. The proposed SPS and STP in Rajnagar is located on Chandala Road near Dhandhar Talab, in the eastern outskirts of the town. Site is surrounded by agricultural lands, and there are no notable developments within 400 m of the site boundary. Couple of isolated
houses are located at about 250 m and habitation with cluster of houses located at about 400 m from the site. There are 25-30 trees of local species in the STP site; some of which may be required to cut off, as these are located within the site. Tree cutting will be minimize as far as possible with due consideration to trees in layout planning. Rajnagar Forest, an open forest, with low tree cover, and no notable wildlife is situated at about 1 km east of the STP site. Sewers and drains will be constructed along the roads and within the right of way. In wider roads pipes/sewers will be laid in the road shoulder, and in narrow roads, where there is no space, pipes/sewers will be laid in the road carriage. Roads in the old part of the town are quite narrow (~3m), and in the rest of the town roads are wider. There are no trees along the roads, except in some new colonies in the outer areas. Laying of pipeline in centre of the road or sides etc. will be decided after utility survey during detailed design phase by DBO contractor. The soil in the region is mainly alluvial type occurring in the north-eastern part of the district. Red and Yellow soil is prevalent in the north-eastern part and red and black soil is prevalent in the central part. The town is under Granite Belt of Madhya Pradesh. Depth of soils is shallow. The region has various minerals of sedimentary origin: Sandstone, Shale and Limestone. Project area is characterized by semi-arid extreme climate with very hot summers, cold winters and low rainfall. The region is drought prone. There are no major rivers, Kutni river flowing in west and north of the town, about 10 km from the town, is the only notable river. There are ponds in the town - Jal Sena Talab, Thanera Talab and Dhandhar Talab, which mostly cater to wastewater from the town due to low rainfall. There are no places of archeological, historical or tourism importance in Rajanagar. Khajuraho town, located 4 km south of Rajanagar is a historical, culture and tourism centre in central India, and a World Heritage Site. Nearest monument is about 3 km from the boundary of Rajanagar (Chitragupta Temple). Therefore, no interference with archeological areas or protected monuments envisaged.

**Potential Environmental Impacts.** The subproject is unlikely to cause significant adverse impacts because: (i) the components will involve straightforward construction and operation, so impacts will be mainly localized; (ii) there are no significant sensitive environmental features in the project sites; and (iii) predicted impacts are site-specific and likely to be associated with the construction process and are produced because the process is invasive, involving excavation and earth movements. Sewerage system performs a crucial function of safely collecting, transporting, treating and disposing domestic wastewater, including, human excreta. Subproject is likely to have numerous positive impacts on the environment and public health. 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. Locations and siting of the proposed infrastructures were considered to further reduce impacts. These include: (i) locating sewage pumping station and STP away from the inhabited areas; (ii) locating facilities on government-owned land to avoid the need for land acquisition and relocation of people; and (iii) laying of sewer pipes and drain in RoW alongside main/access roads, to reduce acquisition of land and impacts on livelihoods specifically in densely populated areas of the town.

It is proposed to design treatment facility to meet the stringent discharge standards. This will produce a finely treated wastewater with less than 10 mg/l of BOD. Treated wastewater will be discharged into Dhandhar Talab (pond). At present, wastewater from the town via open drains partially accumulates in Dhandhera Talab and used for agricultural purposes. It is proposed to provide treated wastewater for irrigation purpose. Various measures suggested as per WHO standards for safe use of treated wastewater for agricultural use. Given the existing condition of Dhandhera Talab, no negative impacts envisaged. Baseline water quality of dhandhera talab will be established during detailed design phase. Monitoring will be continued during the operation. Utmost care is taken to locate sewage pumping station away from the houses, and also included
various design and operation measures to minimize the odour generation. Another impact is that of STP operation: from malfunction or decrease in treatment efficiency and sludge handling and disposal. This will result in release of untreated or partially treated wastewater that will pollute environment and cause public health issues. Accumulation of silt in sewers in areas of low over time, overflows, blockages, power outages, harmful working conditions for the workers cleaning sewers etc. may create nuisance, unhealthy and hazardous conditions. Cleaning and desilting activity of existing drains is estimated to produce 4,734 m$^3$ of sediment/solid waste, which requires to be handled and disposed safely. Various measures are suggested to minimize these impacts.

Sewer line and drain works will be conducted along public roads in the town with narrow and congested roads, subproject is likely to cause 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. There is risk due to the need for deep excavations in some area for sewers (4.6 m deep) and drains (3 m deep). Various measures suggested to avoid collapse of trench, and damage to nearby houses and buildings. These are all general impacts of construction in urban areas, and there are well developed methods of mitigation that are suggested in the EMP.

**Environmental Management Plan (EMP).** An EMP has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels. The EMP includes design measures such as: (i) design of treatment process to meet discharge parameters more stringent than discharge standards of MOEFCC; (ii) sludge and drain sediment management; (iii) planning and design measures to control odour from SPS; (iv) green buffer zones around SPS and STP; and (v) alternative power supply (back-up) arrangements for uninterrupted working of SPS and STPs. During construction, the EMP includes mitigation measures such as: (i) safety measures for deep excavations; (ii) implementation of traffic management plan in coordination with local traffic police to minimize traffic impacts; (iii) awareness campaigns and consultations to inform residents and businesses of potential disturbances; (iv) provision of walkways and planks over trenches to ensure access will not be impeded; (v) appropriate scheduling of works to avoid peak tourist season in important places; (vi) use of noise-dampening measures in areas with sensitive receptors such as hospitals, schools, places of worships and other silence-zones; (vii) use of dust-suppression methods such as watering and/or covering of stockpiles; and (viii) finding beneficial use of excavated materials to extent possible to reduce the quantity that will be disposed off. As for the operations and maintenance (O&M) phase, 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. The EMP includes mitigation measures and monitoring plan to ensure compliance to environmental standards during O&M phase.

The EMP will guide the environmentally-sound construction of the subproject and ensure efficient lines of communication between MPUDC, PMU, PIU, consultants and contractors. The EMP will: (i) ensure that the activities are undertaken in a responsible non-detrimental manner; (ii) provide a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site; (iii) guide and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iv) detail specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (v) ensure that safety recommendations are complied with. The EMP includes a monitoring program to measure the environmental condition and effectiveness of implementation of the mitigation measures. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries.
The contractor will be required to submit to PMU, for review and approval, a site environmental plan (SEP) 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; (iii) monitoring program as per SEP; and (iv) budget for SEP implementation. No works are allowed to commence prior to approval of SEP.

A copy of the EMP/approved SEP will be kept on site during the construction period at all times. The EMP included in the bid and contract documents. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

Consultation, Disclosure and Grievance Redress Mechanism: Consultations have been conducted with different types of stakeholders at town level with municipa officials, elected representatives, business community and general public were consulted at several places in the town including at STP and pumping stations site. The stakeholders were involved in developing the IEE through discussions on-site and public consultation at several places in the town, after which views expressed were incorporated into the IEE and in the planning and development of the project. The IEE will be made available at public locations and will be disclosed to a wider audience via the ADB, MPUDC and PMU websites. The consultation process will be continued and expanded during project implementation to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation. A grievance redress mechanism is described within the IEE to ensure any public grievances are addressed quickly.

Monitoring and Reporting: Mitigation will be assured by a program of environmental monitoring to be conducted during construction and operation stages. The environmental monitoring program will ensure that all measures are implemented and will determine whether the environment is protected as intended. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries. Any requirements for remedial action will be reported to the PMU. The PIU, PMDC and PMU will be responsible for monitoring. The PMDC will submit quarterly and semi-annual monitoring reports to PMU, and the PMU will review and send the semi-annual monitoring reports to ADB. ADB will post the environmental monitoring reports on its website.

The citizens of Rajnagar Nagar Parishad will be the main beneficiaries of the sewerage and drainage scheme, as they will be provided with sewerage system to collect, convey, treat and dispose the sewage safely. Improvement and expansion of drainage system will prevent water logging and insanitary conditions. This will improve the over-all health condition of the town as water borne diseases will be reduced, 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. This should also improve the environment of these areas, should deliver major improvements in individual and community health and well-being.

Conclusions and Recommendations: 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. No further special study or detailed environmental impact assessment (EIA) needs to be undertaken to comply with ADB SPS (2009) or GOI EIA Notification (2006). Project will require following government permission/approvals: consent to establish and consent
to operate for STP from Madhya Pradesh Pollution Control Board. These permissions/approvals
shall be obtained during detailed design phase. This IEE will be updated during the detailed
design stage by the DBO contractor to reflect any changes, amendments and will be reviewed
and approved by PMU. Contractor will also conduct any environmental monitoring of baseline
conditions of air, noise, water and soil as applicable and the same will be reflected in the updated
IEE. The updated IEE shall be submitted to ADB for approval and no works can commence prior
to securing ADB approval and clearance.
I. INTRODUCTION

A. Background

1. Government of Madhya Pradesh with loan funding from Asian Development Bank (ADB) has proposed to implement Madhya Pradesh Urban Services Improvement Project (MPUSIP), herein after referred as „the Project‟. Madhya Pradesh Urban Development Company Limited (MPUDC) shall be the Implementing Agency and the State Urban Development and Housing Department (UDHD) shall be the executing agency for the Project. A project management unit (PMU) created under MPUDC is implementing MPUSIP.

2. MPUSIP’s physical components include (a) improvements to water in 60 subproject towns, and (b) sewage and storm water collection and treatment services proposed in seven (8) identified towns namely Sanchi, Maihar, Nagada, Dhamnod, Mandsaur, Khajuraho and Rajnagar under tranche I I. The project also includes an institutional strengthening component and a project management and administrative support component.

3. At present there is no sewerage system for collection, conveyance, treatment and safe disposal of sewage in Rajnagar Town. The households are having septic tanks and overflow of septic tank and household wastewater is being directly discharged into storm water drains without treatment. This leads to deterioration of environment and health hazards. It causes lot of unhealthy conditions to the people in general and hence it is essential to provide underground drainage scheme for the towns.

4. The water supply improvement project is under implementation in Rajnagar town under MPUSIP Phase I funded by ADB and water supply rate per capita is 135 liters per capita per day (lpcd) in the water supply project and therefore there is immediate need for sewerage system for collection, conveyance and treatment of sewage.

5. Hence there is need of the project to improve service levels in the sewerage system in Rajnagar Nagar Parishad conforming to national service level benchmarks.

6. ADB has deployed Project Preparatory Technical Assistance (PPTA) and as part of the Program development. The PPTA team conducted series of investigations and developed this conceptual plan for improving the sewerage and storm water management in the twin towns of Khajuraho as well as Rajnagar (also included under MPUSIP). Khajuraho and Rajnagar are located about 4km apart. Project management consultants (PMCs), appointed by MPUDC for MPUSIP Phase I, had reviewed the detailed project report (DPR) prepared by PPTA team and made observations on DPR. During discussions with MPUDC and ADB team in month of February 2017, it was decided that PMCs will incorporate the observations made and finalise the DPR for Khajuraho and Rajanagrar Towns. Based on this, PMCs have finalized this report. As per the DPR, separate sewerage systems are proposed for Khajuraho and Rajnagar towns. The initial environmental examination (IEE) is focused only on proposed sewerage and drainage system in Rajnagar.

7. The subproject town of Rajnagar is located in the district of Chatarpur in the north-eastern part Madhya Pradesh state. Providing sewerage & drainage system in Rajnagar is one of the subprojects proposed under MPUSIP. The objective of this subproject is to develop sewerage and drainage management services to the residents in Rajnagar Nagar Parishad (RNP) conforming to national service level benchmarks in sewerage & drainage services. The subproject envisages providing 100% coverage of population with sewage collection network and
treatment services. A detailed description of the components is provided in Section III. This subproject package is proposed for implementation under a single Design-Build-Operate (DBO) contract package.

B. Purpose of this Initial Environmental Examination Report

8. 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 Checklist for Sewage and Sanitation (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 IEE has been prepared in accordance with ADB SPS requirements for environment category B projects.

9. This IEE is based on the detailed engineering report prepared by the PMC team and will be finalized during implementation stage by DBO contractor to reflect any changes and latest subproject designs. The IEE was based mainly on field reconnaissance surveys and secondary sources of information. No field monitoring (environmental) survey was conducted. This IEE will be updated during the detailed design stage by the DBO contractor to reflect any changes, amendments and will be reviewed and approved by PMU. Contractor will also conduct any environmental monitoring of baseline conditions of air, noise, water and soil as applicable and the same will be reflected in the final IEE. The final IEE shall be submitted to ADB for approval and no works can commence prior to securing ADB approval and clearance.

C. Report Structure

10. This Report contains the following nine (9) sections:
   (i) Executive summary;
   (ii) Introduction;
   (iii) Description of the project;
   (iv) Policy, legal and administrative framework;
   (v) Description of the environment;
   (vi) Anticipated environmental impacts and mitigation measures;
   (vii) Public consultation and information disclosure;
   (viii) Grievance redress mechanism;
   (ix) Environmental management plan; and
   (x) Conclusion and recommendation.
II. DESCRIPTION OF THE PROJECT

A. Project Area

11. Project area comprises the urban area and surroundings of Rajnagar Nagar Parishad in Chhatarpur District, in Bundelkhand Region of Madhya Pradesh State (Figure 1). Rajnagar shares geographical boundary with Khajuraho town, a UNESCO world heritage site and a renowned tourist destination, with its rich heritage and culture, attracts the tourists from the world over. Population of Rajnagar is 14,253 (2011 census) and spread over area of 28 sq. km. Project area is situated at about 360 km north of state capital Bhopal and is connected with highways. Khajuraho has a railway station and an airport.

12. The subproject components locations are in Rajnagar town. The proposed sewage treatment plant (STP) and sewage pumping station will be located within the municipal boundary of the town. The immediate surroundings were converted into urban use for many years ago, and there is no natural habitat left at the subproject sites. No components are located near any of the world heritage or protected monuments in Khajuraho town. All the locations of the STP and SPS are government-owned barren land with no notable tree cover.

B. Existing Sewerage and Storm Water Drainage System

13. Existing Sewerage System: There is no conventional sewerage system in the town for collection, transport, treatment and safe disposal of the sewage generated in the town. There are 1206 individual toilets were constructed in the town. 65% of the households have toilets with septic tank, 10% of the households have soak pits and 25% have toilets directly discharging into storm water drains or nala (Natural stream). There are no community toilets constructed for poor communities. 33% of the population are said to be resorting to open defecation. There are no locally available suction machines for septage de-sludging and the private machine available in Khajuraho and Chattarpur are called when in need and some of the residents also hire services of scavengers who empty the septic tank by manual means and dispose the sludge in the nearby ditches.

14. Existing Storm Drainage: About 49 km of storm water drains exists in the town which are constructed in RCC, random rubble stone masonry. The drain size is inadequate, and the slope is not sufficient to meet the local rainwater discharge intensities. As per the natural topography storm water is discharged at three locations. Rainwater is mixed with effluents from septic tanks and the combined wastewater flows in natural depressions of the town, (i) Jal Sena Talab in ward no.6, (ii) Dhanora Talab in ward no.13, and (iii) Ghanghar Talab in ward no.7. The area near the Jal Sena talab the outfall drain size is inadequate and therefore water logging occurs frequently. During rains this problem aggravates.
15. Due to discharge of untreated wastewater, and septic tank discharge, open drains mostly carry wastewater. Indiscriminate throwing of solid waste/garbage into open drains is common. Choking and blocking of drains is common, and often leads to overflow and water logging. In
some of the areas there are no drains, and water is directly discharged onto roads/streets. It causes lot of unhealthy conditions to the people in general and hence it is essential to provide underground sewerage and drainage scheme for the town. Also, at present water supply improvement project is under implementation under Phase 1 of MPUSIP. This will lead to generation of more wastewater, which needs to be safely managed and disposed. The Government has therefore appointed the consultant for preparation of sewerage scheme of the Town and implement under the ADB funded MPUSIP in Phase 2. The objective of the sewerage system is to ensure that sewage discharged from communities is properly collected, transported and treated to the required degree and disposed off / reused without causing any health or environmental problems.

C. Proposed Project

16. Coverage of Sewerage System: It is proposed to lay down scheme consisting of two separate sewage Zones in Rajnagar town (Figure 3), considering the topography and location of STP site. Details of the classified area covered by each zone and the projected dry weather flow (DWF) to be served by the respective pumping stations are given in Table 1.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Catchment 1</td>
<td>1.43 MLD</td>
<td>1.78 MLD</td>
<td>STP - 2.82 MLD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(SBR)</td>
</tr>
<tr>
<td>Catchment 2</td>
<td>0.83 MLD</td>
<td>1.04 MLD</td>
<td></td>
</tr>
</tbody>
</table>

17. Rajnagar town is devided into two sewerage Zones. Both the zones contribute to a single sewage treatment plant (STP) of capacity 2.82 MLD based on (SBR Technology). Only Gravity network has been considered, and to minimize the sewer depths, 2 manhole based lifting stations and a terminal sewage pumping station are proposed. These will lift the sewage from low level to higher level sewers for further gravity flow. The Sewerage zone boundaries are defined based on the topography (Considering depth of cut). Sewer collection network is planned for the project area keeping in consideration of minimise the crossings of major barriers like National highway, Railways, Rivers, Canals. Main Sewers are laid along the natural drainage line to minimize the depth of excavation. The design of sewer network is as per the design criteria of CPHEEO Manual. The treated effluent from STP is proposed to be disposed off to a nearby natural water body (Dhandhera Talab) by a gravity pipeline.

18. All the wards mentioned in the city Development plan has been taken in the proposal. The proposed sewage collection system will include house service connections with aim to collect sewage at location of its generation. This will also avoid intermixing of sewage and storm water run off.

19. Proposed Sewerage System: The conventional sewage system of laterals, branch and main sewers are proposed. The network is planned in such a way that sewage will be collected from households from all streets and roads within ULB area by gravity and will be conveyed to STP location. The manholes are proposed at 30m interval, at change of direction and diameters of sewers for inspection and cleaning of sewers. The sewer manholes are brick masonry manholes up to 3.0m depth and above 3.0m, RCC manholes are proposed. The street manholes will be circular in shape with concentric cone depending on the depth and diameter of sewers. The minimum size of sewer considered as 150 mm and minimum soil cover of 1m. Till the house sewers connections are made by individuals, the existing septic tanks will be in operation.
22. The sewage flow is considered 80% of rate of water supply that is 135 lpcd. The sewage flows are calculated for present, intermediate and ultimate years. The efforts are made to maintain minimum self-cleaning velocity in sewers. In initial stretches of sewers, the minimum self-cleaning velocities are not achieved so flushing will be required. The sewer cleaning equipment are proposed in the project for cleaning of sewers. House connection chambers are proposed for connection of household sewer pipe to this chamber. The hydraulic designing of sewers is done using Sewer CAD software. The proposed sewage treatment facility is for Rajnagar is of capacity 2.82 MLD based on SBR technology.

23. Sewage treatment plant of 2.82 MLD capacity based on sequential batch reactor (SBR) technology. This option is cost-effective, land required is less and treatment efficiency is very good. STP is to be designed for ultimate design year capacity, but the phase wise operation will be followed (i.e. first phase will be comprising of the construction of STP for first 15 years capacity) year 2033. The proposed SBR technology will achieve effluent discharge standards of Central Pollution Control Board (CPCB).

24. Proposed Storm Drainage System Improvement planning in Rajnagar Town: The new drains are proposed in outer area of the town and drains are proposed for the connectivity of the drains wherever not exists. The repairs of existing drains including desilting of drains proposed which will improve conditions of the drains. This way the drains flow carrying capacity will be improved and incidences of overflows and water logging will be resolved. Trash screen in inlet of lake and fencing is proposed at the lakes/ponds. The existing lakes will act as balancing and holding tanks during rain and prevent flooding. The proposed storm water drainage system consists of:

(i) Repair of existing drains
(ii) Cleaning of existing drains and channels
(iii) Construction of new drains on roadsides
(iv) Trash screen in entry of lake and chain link fencing
(v) Construction of cross-drainage (CD) works – RCC culverts and RCC bridge

25. The proposed works will resolve water logging problem and proper conveyance of storm water runoff as per topography to natural stream/nala/river. As the the sewerage system is proposed in the town and the wastewater from houses will be conveyed into piped sewers and drains will not have dry weather flows. Therefore, the local water logging problem will be eliminated. By proposed sewerage scheme, lake water quality will improve and improve human dignity, quality of life and hygienic conditions in the town.
Figure 3: Rajnagar Catchment / Zone Area
Table 2 shows the nature and size of the various components of the subproject. The descriptions shown in Table 2 are based on the present proposals, which are expected to be substantially correct, although certain details may change as development of the subproject progresses. Location of subproject components and conceptual layout plans are shown in Figure 5 to Figure 25.

### Table 2: Proposed Sewerage and Storm Water Subproject Components in Rajnagar Town

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Infrastructure</th>
<th>Function</th>
<th>Description</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sewer network</td>
<td>Collect wastewater from houses and convey by gravity to nearest sewage pumping station for further conveyance to STP for treatment and disposal</td>
<td>18,160 m, diameter 150 - 450 mm</td>
<td>Sewers will be laid underground along all the roads and streets in Rajnagar town area comprising two sewerage zones. Sewers will be laid in the earthen shoulder along the roads, and where there is no place, sewers will be located within the carriage way.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>S. No.</strong></td>
<td><strong>Diameter (mm)</strong></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
<td>150</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>2</td>
<td>175</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>3</td>
<td>215</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>4</td>
<td>260</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>5</td>
<td>400</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td>6</td>
<td>450</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>18,160</strong></td>
</tr>
<tr>
<td>2</td>
<td>Manholes</td>
<td>For maintenance and cleaning of sewers</td>
<td>1,031 Nos.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Materials</strong></td>
<td><strong>Nos.</strong></td>
</tr>
<tr>
<td></td>
<td>Brick</td>
<td></td>
<td></td>
<td>609</td>
</tr>
<tr>
<td></td>
<td>Brick</td>
<td></td>
<td></td>
<td>230</td>
</tr>
<tr>
<td></td>
<td>Brick</td>
<td></td>
<td></td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>RCC</td>
<td></td>
<td></td>
<td>97</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Average spacing - 30 m</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Brick masonry manholes up to 3.0m depth and above 3.0m, RCC manholes; drop arrangement for sewer juctions of &gt;0.6 m level difference; circular in shape with concentric cone depending on depth and sewer diameter</strong></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Sewer Mains</td>
<td>Transfer sewage from lifting/pumping station to STP</td>
<td>3,117 m length – 200-450 mm diameter DI pipes</td>
<td>Sewer mains will be laid underground along the</td>
</tr>
<tr>
<td>Sewage pumping stations (SPS)</td>
<td>Collect sewage and pump to higher level for further transfer by gravity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Capacity (2.82 MLD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Components: (wet well of diameter 4.5m and depth 2.0 m and pumping station</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 02 Nos. of lifting pumping stations (LPS) are proposed in Rajnagar town to reduce depth of sewers and connect sewers to STP by gravity.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(i) Lifting pumping station (LPS-1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Capacity (1.00 MLD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Components: (wet well of diameter 2.5m and depth 2.0 m and pumping station)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(ii) Lifting pumping station (LPS-2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Capacity (0.85 MLD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Components: (wet well of diameter 2.7m and depth 2.0 m and pumping station)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The lifting pumping station will carry sewage from downstream sewer network and pump it to upstream sewer network.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The lifting pumping stations will be underground structure below road and pumps will be placed in manhole based wet well and will have valve chamber. Manually cleaned bar screen will be placed in upstream sewer manhole for removal of floating particles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• For lifting sewage within network, manhole based lifting station is proposed and <strong>no separate land will be required.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SPS is located on Chandala Road. Land area required is 0.15 acre, available 3.97 acre.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LS-1 is located near Jalsena Talab, along the road within ROW.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LS-2 is located near Lakhudi Purvaalong the road within ROW.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sewage Treatment Plant (STP)</th>
<th>For treatment of raw sewage for final discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.82 MLD capacity</td>
</tr>
<tr>
<td></td>
<td>Treatment technology: SBR</td>
</tr>
<tr>
<td></td>
<td>STP Components: Following are indicative, and actual design will be firmed up by DBO Contractor</td>
</tr>
<tr>
<td></td>
<td>- Raw Sewage Pumping Station</td>
</tr>
<tr>
<td></td>
<td>- Pre-treatment works (inlet chamber, fine Screen channels, de-gritting Tanks, flow)</td>
</tr>
<tr>
<td><strong>STP site is located on Chandala Road or near BSNL Exchange / Pashu Chikitsalaya.</strong></td>
<td></td>
</tr>
</tbody>
</table>
|   |   | measuring channel and flow distribution box)  
|   |   | List main treatment components: (Anoxic Basin Selector zone, SBR Basin, Chlorin Contact Tank, Gravity Sludge Thickener, Sludge Dewatering Centrifuge, Sludge Drying Beds and Filtrate pump house etc.).  
|   |   | Treated wastewater sump  
|   |   | Total land area required is 1.00 acre. available is 2.52 acre  
| 6. | Outfall sewer | Dispose treated wastewater from STP to final disposal location  
|   |   | 180 m length 450 mm dia DI-K7 pipe for STP  
|   |   | Pipeline will be laid from STP outlet to Dhandhera Talab along road  
| 7. | House sewer connections | Collect sewage from individual houses and convey into network  
|   |   | 3,000 Nos.  
|   |   | Sewage delivery pipe will be connected to sewer lines at each house with a chamber  
| 8. | Storm Drains | Improving the storm water drainage infrastructure to minimise or avoid flooding and water logging.  
|   |   | Repair, rehabilitation and desilting of existing roadside drains:  
|   |   | Length of existing drains: 26.30 km  
|   |   | Repair and rehabilitation existing drains: 2.6 km  
|   |   | Disilting of existing drains: 26.30 km  
|   |   | Size of existing drains: 0.4 – 1 m wide, and 0.5-1 m deep  
|   |   | Construction of new drains, and cross drainage works on roads:  
|   |   | Length of proposed new storm water drains: 16 km  
|   |   | Type of drains: RCC and brick  
|   |   | Size of drains:  
|   |   | 7 km length: 0.45 m wide, 0.9 m deep  
|   |   | 5 km length: 1 m wide, 1.5 m deep  
|   |   | 4 km length: 2 m wide, 3.0 m deep  
|   |   | RCC pipe culverts: 6 nos – 6.17 m length, 1.6 m wide, and 1 m deep  
|   |   | RCC slab culverts: 26 nos 6-8 m length, 0.6 m wide, 0.8-0.9 m deep  
|   |   | Chain Link Fencing around lake  
|   |   | Trash screen at inlet of lake with structure for prevention of floating and solid waste into lake  
|   |   | All around the town (Catchment 1 to 2)
27. **Details of Manholes:** Manholes are proposed at every 30m interval in the straight line, at intersections and turns on the roads, at changes in grade and size of sewers. The drop arrangement has been proposed where one sewer pipe meets another sewer pipe at different level (where level difference is more than 0.6m). The sewer manholes are brick masonry manholes up to 3.0m depth and above 3.0m, RCC manholes are proposed. The street manholes will be circular in shape with concentric cone depending on the depth and diameter of sewers.

Table 3: Details of Manhole, Numbers, Sizes Types & Materials – Rajnagar Town

<table>
<thead>
<tr>
<th>Type of Manholes</th>
<th>Quantity</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-Type Manhole (Brick masonry) 900 mm Dia. depth 1.2m to 1.65m</td>
<td>609</td>
<td>No's</td>
</tr>
<tr>
<td>B1-Type Manhole (Brick masonry) 1200 mm Dia. depth 1.66 m to 2 m</td>
<td>145</td>
<td>No's</td>
</tr>
<tr>
<td>B2-Type Manhole (Brick masonry) 1200 mm Dia. depth 2.01 m to 2.3 m</td>
<td>85</td>
<td>No's</td>
</tr>
<tr>
<td>C1-Type Manhole (Brick masonry) 1500 mm Dia. depth 2.31 to 3m</td>
<td>95</td>
<td>No's</td>
</tr>
<tr>
<td>C2-Type Manhole (RCC) 1500 mm Dia. depth 3.01 to 4.5 m</td>
<td>94</td>
<td>No's</td>
</tr>
<tr>
<td>C3-Type Manhole (RCC) 1500 mm Dia. depth 4.5 to 6.0 m</td>
<td>3</td>
<td>No's</td>
</tr>
<tr>
<td><strong>Total manholes</strong></td>
<td><strong>1031</strong></td>
<td></td>
</tr>
</tbody>
</table>

28. **Road Width:** Width of road varies section to section wise. Details are provided in the following table with respect sewer main alignment.

Table 4: Width of Road with respect to Manhole No. for Sewer Main Trunk Line- Rajnagar

<table>
<thead>
<tr>
<th>Zone-2</th>
<th>Manhole to Manhole</th>
<th>Width of Road in Meter</th>
<th>Manhole to Manhole</th>
<th>Width of Road in Meter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catchment-1</td>
<td>32-31</td>
<td>5.1</td>
<td>171-172</td>
<td>7.1</td>
</tr>
<tr>
<td>Catchment-1</td>
<td>31-30</td>
<td>6</td>
<td>172-173</td>
<td>6.9</td>
</tr>
<tr>
<td>Catchment-1</td>
<td>30-29</td>
<td>6.2</td>
<td>173-174</td>
<td>6</td>
</tr>
<tr>
<td>Catchment-1</td>
<td>29-28</td>
<td>6.1</td>
<td>174-175</td>
<td>4.5</td>
</tr>
<tr>
<td>Catchment-1</td>
<td>28-27</td>
<td>6.4</td>
<td>175-176</td>
<td>5.5</td>
</tr>
<tr>
<td>Catchment-1</td>
<td>27-26</td>
<td>6.3</td>
<td>176-177</td>
<td>6</td>
</tr>
<tr>
<td>Catchment-1</td>
<td>26-25</td>
<td>5.9</td>
<td>177-178</td>
<td>6.3</td>
</tr>
<tr>
<td>Catchment-1</td>
<td>25-24</td>
<td>8</td>
<td>178-179</td>
<td>6.9</td>
</tr>
<tr>
<td>Catchment-1</td>
<td>24-23</td>
<td>6.1</td>
<td>179-180</td>
<td>6.5</td>
</tr>
<tr>
<td>Catchment-1</td>
<td>23-22</td>
<td>6.9</td>
<td>180-181</td>
<td>6.5</td>
</tr>
<tr>
<td>Catchment-1</td>
<td>22-21</td>
<td>8</td>
<td>181-182</td>
<td>6.3</td>
</tr>
<tr>
<td>Catchment-1</td>
<td>21-20</td>
<td>5.9</td>
<td>182-183</td>
<td>5.9</td>
</tr>
</tbody>
</table>
29. **Sewer & Drains Construction works:** Civil works in the project include linear excavation for drain and laying sewer pipes along the roads, placing sewer pipes in the trench and refilling with the excavated soil. Subsequent to completion of works, road reinstatement will be undertaken by the contractor as part of the civil works. The roads in the core city area are very narrow and congested with pedestrians and vehicles, while the roads in outer areas are wide. Details of proposed sewer construction are given below. Minimum depth will be 1.20 m and maximum will be 4.63 m. Trench width will range from 1.20 m to 2.30 m. 42% of sewers will be laid within depth of 1.5 m below ground, and only about 8.24% of sewers will be laid more than 3.5 m deep. Trenches for sewer-work will be dug by backhoe or manually in narrow, and sewers will be brought to site on trucks, offloaded and placed into each trench manually, after which soil will be replaced to cover the trench. Manholes will be either constructed in-situ or precast manholes will be fixed depending on site conditions.

**Table 5: Details of Depth Wise Length of sewer- Rajnagar Town**

<table>
<thead>
<tr>
<th>Length of Sewer (m)</th>
<th>Depth</th>
<th>% of total sewer length</th>
</tr>
</thead>
<tbody>
<tr>
<td>7627</td>
<td>1 - 1.5 m</td>
<td>42.0%</td>
</tr>
<tr>
<td>4358</td>
<td>1.5 – 2 m</td>
<td>24.0%</td>
</tr>
<tr>
<td>2588</td>
<td>2 – 2.5</td>
<td>14.3%</td>
</tr>
<tr>
<td>2090</td>
<td>2.5 - 3.5 m</td>
<td>11.5%</td>
</tr>
</tbody>
</table>
Length of Sewer (m) | Depth | % of total sewer length
--- | --- | ---
1260 | 3.5 – 4.5 m | 6.9%
236 | 4.5 – 5.5 | 1.3%
18,160 | Total | 100.0%

30. **Trench Excavation Width:** With reference to the width of trench for pipe laying in Rajnagar, depending on the soil condition at site and depth of the sewer, method of pipe laying will be decided and accordingly trench width also (Figure 4).

Table 6: Details of Diameter Wise Depth & Trench Excavation Width of Sewer- Rajnagar

<table>
<thead>
<tr>
<th>Pipe Diameter</th>
<th>Min. Depth (m)</th>
<th>Max. Depth (m)</th>
<th>Average Trench Width (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>1.2</td>
<td>2.5</td>
<td>1.20</td>
</tr>
<tr>
<td>175</td>
<td>1.2</td>
<td>3.0</td>
<td>1.2</td>
</tr>
<tr>
<td>215</td>
<td>1.5</td>
<td>2.0</td>
<td>1.30</td>
</tr>
<tr>
<td>260</td>
<td>2.0</td>
<td>4.03</td>
<td>1.80</td>
</tr>
<tr>
<td>400</td>
<td>2.0</td>
<td>4.63</td>
<td>2.30</td>
</tr>
<tr>
<td>450</td>
<td>2.0</td>
<td>4.45</td>
<td>2.30</td>
</tr>
</tbody>
</table>

Figure 4: Type & Width of Trench

Type 1: single slot
Type-2: one-side stepped
Type-3: two-side stepped
Type-4: multi stepped
Type-5: one-side sloped
Type-6: two-side sloped

31. **Other construction works:** Other civil works in the subproject include construction of sewage pumping stations, and STP (pre-treatment works like inlet chamber, fine Screen
Channels De Gritting Tanks Flow measuring Channel and Flow distribution box, main treatment units, treated effluent disposal works, at the identified sites. These works will be confined to sites, and construction will include general activities like excavation for foundation, construction of foundations, columns, walls and roof in cement concrete and masonry, and fixing of mechanical and electrical fixtures, etc. Although the site is fairly small the construction will be straightforward, involving mainly simple excavation. The ground will be dug by backhoe diggers and bulldozers, and soil will be transferred into trucks for offsite disposal. Most of the construction works will be of concrete mortar, which will be prepared mechanically at site in concrete mixtures. Foundations for the small pump houses will be dug by backhoe or manually, and concrete and aggregate will be tipped in to create the foundations and floor. The brick sides will then be built manually by masons and pumps will be brought in on trucks and placed inside the pump house by crane. The roof material will then be attached by hand. Once the work is over, the temporary structure will be removed.

32. **Project Benefits:** The subproject aims to achieve sustainable wastewater management in Rajnagar town and where the sewage generated is collected at the household level, transported, treated and safely disposed and at the same time improving the storm water drainage infrastructure to minimise or avoid flooding and water logging. Subproject will improve the overall environmental quality of the town and will lead to better public health particularly reduction in waterborne and infectious diseases.

33. **The benefits of the project after implementation are:**

   (i) Prevention of ground water and soil pollution due to infiltration of untreated liquid waste;
   (ii) Prevention of discharge of untreated sewage into lakes / river;
   (iii) Improvement in water quality of lakes;
   (iv) Improvement in environmental sanitation health and reduction in associated health hazards;
   (v) Improvement in quality of life, human dignity and increased productivity;
   (vi) Prevention of storm drains carrying sanitary sullage or dry weather flow; and
   (vii) Treated sewage shall be available for irrigating agricultural fields leading to more production of agricultural products.

**D. Implementation Schedule**

34. After the approval of the detailed project report, bids will be invited in June 2020, and the contract will be awarded by January 2021. Construction is likely to start in March 2021 and will take about 28 months (including monsoon period).
Figure 5: Proposed Sewer Network Catchment-1 - Rajnagar

Figure 6: Proposed Sewer Network Catchment-2 - Rajnagar
Figure 7: Proposed Complete Sewerage Scheme in Rajnagar
Figure 8: Final Outfall of STP, Road Width of Main Sewer Line - Rajnagar Town
Figure 9: General Arrangement of for 2.82 MLD Terminal Sewage Pumping Station Near BSNL Exchange- Rajnagar Town
Figure 10: General Arrangement of for 1.00 MLD Lifting Pumping Station in Catchment-1 in Rajnagar Town
Figure 11: General Arrangement of 0.85 MLD Lifting Pumping Station in Catchment-2 in Rajnagar Town
Figure 12: GA Drawing of 2.82 MLD STP- Rajnagar (SBR Technology)
Figure 13: Sludge Sump of 2.82 MLD in Rajnagar
Figure 14: Gravity Sludge Thickener of 2.82 MLD in Rajnagar
Figure 15: Thickened Sludge Sump of 2.82 MLD STP- Rajnagar (SBR Technology)
Figure 16: Rajnagar – Storm Water Drainage Network
Figure 17: Typical Details of RCC Manhole

<table>
<thead>
<tr>
<th>TABLE</th>
<th>B100 (mm)</th>
<th>T100</th>
<th>T10</th>
<th>T200</th>
<th>T250</th>
<th>T300</th>
<th>T350</th>
<th>T400</th>
</tr>
</thead>
<tbody>
<tr>
<td>MANHOLE OUTER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diam (mm)</td>
<td>1300</td>
<td>1300</td>
<td>1300</td>
<td>1700</td>
<td>1700</td>
<td>1700</td>
<td>2200</td>
<td>2200</td>
</tr>
<tr>
<td>MANHOLE INNER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diam (mm)</td>
<td>1100</td>
<td>1100</td>
<td>1100</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
<td>2000</td>
<td>2000</td>
</tr>
<tr>
<td>INTERNAL DEPTH</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>WALL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diam (mm)</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
<td>2000</td>
<td>2000</td>
<td>2000</td>
<td>2500</td>
<td>2500</td>
</tr>
<tr>
<td>VERTICAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HEIGHT (mm)</td>
<td>550</td>
<td>550</td>
<td>550</td>
<td>550</td>
<td>550</td>
<td>550</td>
<td>550</td>
<td>550</td>
</tr>
</tbody>
</table>

SECTION 'EB'

FOR SEwers > 700mm B100

SECTION 'PP'

TYPICAL DETAILS OF RCC MANHOLE (PRO-5E)
Figure 18: Typical Details of 900mm dia sewer Manhole
Figure 19: Typical Details of 1200mm dia sewer Manhole
Figure 20: Typical Details of 1500mm dia sewer Manhole
Figure 21: Typical Details of House Connection for Sewerage scheme
Figure 22: Tentative Green Buffer Area Around Proposed STP in Rajnagar
Figure 23: Tentative Green Buffer Area Around Proposed SPS in Rajnagar
Figure 24: Proposed Location of STP & SPS & Proposed Alignment of Pumping Main/Rising main in Rajnagar Town
Figure 25: Final disposal of Treated Sewage From TP into Dhandhar Talab Shown in Google Map - Rajnagar Town
III. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. ADB Policy

35. ADB SPS 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.

36. 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. 

37. The environmental impacts of Rajanagar 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 (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.

38. **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.

39. **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.

40. **Consultation and Participation.** ADB SPS require borrower to conduct meaningful consultation 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.

41. **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.

42. **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.

43. **Occupational Health and Safety.** ADB SPS requires the borrower to ensure that workers 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, diseases, and incidents; and (vi) having emergency prevention, preparedness, and response arrangements in place.

44. **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

---

1 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.

2 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.

3 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.
measures and plans to address them in a manner commensurate with the identified risks and impacts.

45. **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.

B. **National Environmental Laws**

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

47. Categories A projects require EC from the central Ministry of Environment and Forests (MOEF). 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 MoEF prepares comprehensive Terms of Reference (TOR) for the EIA study. On completion of the study and review of the report by the EAC, MOEF considers the recommendation of the EAC and provides the EC if appropriate.

48. 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.

49. None of the components of this sewage improvement subproject in Rajnagar fall under the ambit of the EIA Notification 2006, and, therefore EC is thus not required for the subproject.

50. **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 7.
### Table 7: Applicable Environmental Regulations

<table>
<thead>
<tr>
<th>Law</th>
<th>Description</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>The EIA notification, 2006 (and its subsequent amendments in 2009) provides for categorization of projects into category A and B, based on extent of impact</td>
<td>This states that Environmental Clearance (EC) is required for specified activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorized as A or B depending on the scale of the project and the nature of its impacts. Categories A projects require Environmental Clearance from the National Ministry of Environment and Forests (MoEF). Category B projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA).</td>
<td>Not applicable. The sub-project is not included in schedule of environmental impact assessment notification 2006 and its subsequent amendments till date, so it is not categories as either Category A or Category B. As a result, environmental clearance is not required, either from the state or the central Government.</td>
</tr>
<tr>
<td>Water (Prevention And Control of Pollution) Act of 1974, Rules of 1975, and amendments</td>
<td>Act was enacted to provide for the Prevention and control of water pollution and the maintaining or restoring of wholesomeness of water, by Central and State Pollution Control Boards and for conferring on and assigning to CPCB/SPCBs powers and functions relating to water pollution control. Control of water pollution is achieved through administering conditions imposed in consent issued under to this Act. These conditions regulate the quantity and quality of effluent, the location of discharge and the frequency of monitoring of effluents. Any component of the subproject having the potential to generate sewage or trade effluent will come under its purview. Such projects have to obtain Consent For Establish (CFE) under Section 25 of the Act from Madhya Pradesh Pollution Control Board (MPPCB) before starting implementation and Consent For Operate (CFO) before commissioning.</td>
<td>STP requires CFE and CFO from MPPCB. Application has to be submitted online at <a href="http://www.mppcb.nic.in/xgn.html">http://www.mppcb.nic.in/xgn.html</a></td>
</tr>
<tr>
<td>Environment (Protection) Act, 1986 and CPCB Environmental Standards.</td>
<td>Emissions and discharges from the Facilities to be created or refurbished or augmented shall comply with the notified standards</td>
<td>Appendix 2 Provides STP discharge standards Appendix 3 provides applicable standards for ambient air quality. Appendix 4 provides vehicular emission norms</td>
</tr>
<tr>
<td>Noise Pollution (Regulation and Control) Rules, 2000 amended up to 2010.</td>
<td>Rule 3 of the Act specifies ambient air quality standards in respect of noise for different areas/zones.</td>
<td>Appendix 5 provides applicable noise standards.</td>
</tr>
<tr>
<td>Rules to manage municipal solid waste generated; provides rules for segregation, storage, collection, processing and disposal.</td>
<td>Solid waste generated at proposed facilities shall be managed and disposed in accordance with the MSWM Rules. Rules provides standards for reuse of solid waste / compost / manure. Appendix 6 provides standards for compost / manure.</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Rules to manage construction &amp; to waste resulting from construction, remodeling, repair and demolition of any civil structure. Rules define C&amp;D waste as waste comprising of building materials, debris resulting from construction, remodeling, repair and demolition of any civil structure.</td>
<td>Construction &amp; demolition waste generated from the project construction shall be managed and disposed as per the rules (Appendix 7)</td>
<td></td>
</tr>
<tr>
<td>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 any construction activity in the “regulated area” requires prior permission of the National Monuments Authority (NMA).</td>
<td>Not applicable - there are no protected monuments / places of archeological / historical places in or near Rajnagar Khajuraho, located 4 km south of Rajnagar, Khajuraho is a famous historical and archaeological place and there are several monuments of national and international importance. It is a world heritage site. As these are far from Rajnagar, this act is not applicable to Rajnagar subproject. In case of chance finds, the contractor/ PIU will be required to follow a protocol as defined in the Environmental Management Plan (EMP)</td>
<td></td>
</tr>
<tr>
<td>The contractor shall not make employment decisions based upon personal characteristics unrelated to job requirements. The contractor shall base the employment relationship upon equal opportunity and fair treatment, and shall not discriminate with respect to aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment or retirement, and discipline.</td>
<td>Appendix 8 provides applicable Labor laws including amendments issued from time to time applicable to establishments engaged in construction of civil works.</td>
<td></td>
</tr>
</tbody>
</table>
contractor shall provide equal wages and benefits to men and women for work of equal value or type.

Table 8: Effluent Disposal Standards of STPs Applicable to All Modes of Disposal

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Parameter</th>
<th>Location</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>pH.</td>
<td>Anywhere in the country</td>
<td>Concentration not to exceed 6.5 - 9.0</td>
</tr>
<tr>
<td>2</td>
<td>Bio-Chemical Oxygen Demand (BOD)</td>
<td>Metro Cities*, all State Capitals except in the State of Assam, Manipur, Meghalaya Mizoram, Nagaland, Tripura Sikkim, Himachal Pradesh, Uttarakhand, and Union territory of Andaman and Nicobar Islands, Dadar and Nagar Haveli Daman and Diu and Lakshadweep</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Areas/regions other than mentioned above</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>Total Suspended Solids (TSS)</td>
<td>Metro Cities*, all State Capitals except in the State of Assam, Manipur, Meghalaya Mizoram, Nagaland, Tripura Sikkim, Himachal Pradesh, Uttarakhand, and Union territory of Andaman and Nicobar Islands, Dadar and Nagar Haveli Daman and Diu and Lakshadweep</td>
<td>&lt;50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Areas/regions other than mentioned above</td>
<td>&lt;100</td>
</tr>
<tr>
<td>4</td>
<td>Fecal Coliform (FC) (Most Probable Number per 100 milliliter, MPN/100ml)</td>
<td>Any where in the country</td>
<td>&lt;1000</td>
</tr>
</tbody>
</table>

*Metro Cities are Mumbai, Delhi, Kolkata, Chennai, Bengaluru, Hyderabad, Ahmedabad and Pune.

**Note:**

(i) All values in mg/l except for pH and Fecal Coliform.

(ii) These standards shall be applicable for discharge into water bodies as well as for land disposal/applications.

(iii) The standards for Fecal Coliform shall not apply in respect of use of treated effluent for industrial purposes.

(iv) These Standards shall apply to all STPs to be commissioned on or after the 1st June, 2019 and the old/existing STPs shall achieve these standards within a period of five years from date of publication of this notification in the Official Gazette.

(v) In case of discharge of treated effluent into sea, it shall be through proper marine outfall and the existing shore discharge shall be converted to marine outfalls, and in cases where the marine outfall provides a minimum initial dilution of 150 times at the point of discharge and a minimum dilution of 1500
times at a point 100 meters away from discharge point, then, the existing norms shall apply as specified in the general discharge standards.

(vi) Reuse/Recycling of treated effluent shall be encouraged and in cases where part of the treated effluent is reused and recycled involving possibility of human contact, standards as specified above shall apply.

(vii) Central Pollution Control Board/State Pollution Control Boards/Pollution Control Committees may issue more stringent norms taking account to local condition under section 5 of the Environment (Protection) Act, 1986”.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>mg/kg</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Cadmium</td>
<td>mg/kg</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Chromium</td>
<td></td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Copper</td>
<td></td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>Lead</td>
<td></td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Mercury</td>
<td></td>
<td>0.15</td>
<td>0.15</td>
</tr>
<tr>
<td>Nickel</td>
<td></td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Zinc</td>
<td></td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>C/N ratio</td>
<td></td>
<td>&lt;20</td>
<td>&lt;20:1</td>
</tr>
<tr>
<td>PH</td>
<td></td>
<td>6.5 – 7.5</td>
<td>(1:5 solution) maximum 6.7</td>
</tr>
<tr>
<td>Moisture, percent by weight, maximum</td>
<td></td>
<td>15.0 – 25.0</td>
<td>25.0</td>
</tr>
<tr>
<td>Bulk density (g/cm3)</td>
<td></td>
<td>&lt;1</td>
<td>Less than 1.6</td>
</tr>
<tr>
<td>Total Organic Carbon, per cent by weight, minimum</td>
<td></td>
<td>12</td>
<td>7.9</td>
</tr>
<tr>
<td>Total Nitrogen (as N), per cent by weight, minimum</td>
<td>percent by weight</td>
<td>0.8</td>
<td>0.4</td>
</tr>
<tr>
<td>Total Phosphate (as P205) percent by weight, minimum</td>
<td>percent by weight</td>
<td>0.4</td>
<td>10.4</td>
</tr>
</tbody>
</table>
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: -

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Potassium (as K2O), percent by weight, minimum</td>
<td>percent by weight</td>
<td>0.4</td>
<td>-</td>
</tr>
<tr>
<td>Colour</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Odour</td>
<td></td>
<td>Absence of foul Odor</td>
<td></td>
</tr>
<tr>
<td>Particle size</td>
<td>minimum 90% material should pass through 4.0 mm is sieve</td>
<td>minimum 90% material should pass through 4.0 mm is sieve</td>
<td></td>
</tr>
<tr>
<td>Conductivity, not more than</td>
<td>dsm-1</td>
<td>4</td>
<td>8.2</td>
</tr>
</tbody>
</table>

* 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.

51. **ADB SPS Requirements**: During the design, construction, and operation of the project the PMU and PIUs 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 (IFC’s General EHS Guidelines4 and Sector Specific (Water and Sanitation) Guidelines5). 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.

4https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES
5https://www.ifc.org/wps/wcm/connect/e22c0500484855ae0875cd76a6515bb18/Final%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES
Table 10: WHO Ambient Air Quality Guidelines

<table>
<thead>
<tr>
<th></th>
<th>Averaging Period</th>
<th>Guideline value in μg/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfur dioxide (SO₂)</td>
<td>24-hour</td>
<td>125 (Interim target 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 (Interim target 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20 ( guideline)</td>
</tr>
<tr>
<td></td>
<td>10 minute</td>
<td>500 (guideline)</td>
</tr>
<tr>
<td>Nitrogen dioxide (NO₂)</td>
<td>1-year</td>
<td>40 (guideline)</td>
</tr>
<tr>
<td></td>
<td>1-hour</td>
<td>200 (guideline)</td>
</tr>
<tr>
<td>Particulate Matter PM₁₀</td>
<td>1-year</td>
<td>70 (Interim target 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 (Interim target 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 (Interim target 3)</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>20 (guideline)</td>
</tr>
<tr>
<td>Particulate Matter PM₂.₅</td>
<td>1-year</td>
<td>70 (Interim target 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 (Interim target 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 (Interim target 3)</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>20 (guideline)</td>
</tr>
<tr>
<td>Ozone</td>
<td>8-hour daily maximum</td>
<td>160 (Interim target 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100 (guideline)</td>
</tr>
</tbody>
</table>

Table 11: World Bank Group’s EHS Noise Level Guidelines

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Daytime (07:00 - 22:00)</th>
<th>Nighttime (22:00 - 07:00)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential; institutional; educational</td>
<td>55</td>
<td>45</td>
</tr>
<tr>
<td>Industrial; commercial</td>
<td>70</td>
<td>70</td>
</tr>
</tbody>
</table>
IV. DESCRIPTION OF THE ENVIRONMENT

A. Methodology Used for Baseline Study

52. Data collection and stakeholder consultations. Data for this study has been primarily collected through comprehensive literature survey, discussion with stakeholder agencies, and field visits to the proposed subproject sites.

53. The literature survey broadly covered the following:

   (i) Project details, reports, maps, and other documents provided by PPTA team and prepared by technical experts of the PMC Team;
   (ii) Discussions with Technical experts of the PMC team, municipal authorities, relevant government agencies etc;
   (iii) Secondary data from previous project reports and published articles; and
   (iv) Literature on land use, soil, geology, hydrology, climate, socioeconomic profiles, and other planning documents collected from Government agencies and websites.

54. **Ocular inspection**: During IEE preparation to assess the existing environment (physical, biological, and socioeconomic) and gather information with regard to the proposed sites and scale of the proposed project. A separate socioeconomic study was conducted to determine the demographic information, existing service levels, stakeholder needs and priorities.

B. Physical Resources

1. Location, Area & Connectivity

51. Geographically, the project area is located at 24°50' N latitude and 79°55' E longitude in the Bundelkhand Region of Madhya Pradesh state. The project area comprises municipal area of Rajnagar Town, administratively in Chhatarpur District of the state. It is located at about 300 km north of the state capital Bhopal, and 42 km east of the district headquarter, Chhatarpur. Chhatarpur district shares borders with Uttar Pradesh state in the north.

52. Geographically, Rajnagar is a Nagar Parishad located at 24°53′N 79°55′E / 24.88°N 79.92°E, about 5km north of Khajuraho, famous archeological and historical town. Rajnagar is one of the 7 tehsils (revenue sub-division) of Chhatarpur District. Rajnagar town is in central part of Chhatarpur District.

53. State highway 75 that passes near Khajuraho connects Rajnagar town with Chhatarpur and from there to other major cities, and state capital Bhopal. Khajuraho, 4 km from Rajanagar, has a railway station, providing a better rail connectivity to national capital Delhi. There are daily trains connecting New Delhi and Udaipur in the State of Rajasthan. Khajuraho also has an airport, connecting it with Mumbai, Delhi and Varanasi, a famous religious place and tourist destination in Uttar Pradesh.

54. The total geographical area under Rajnagar Nagar Parishad (Rajnagar Municipal Council) is 28 sq. km and divided into 15 municipal wards.

2. Topography, Soils and Geology
55. Topography of the project area is mostly plan, except for few isolated small range hills in and around the town, in east and south. Average elevation is 220 m, and area predominantly slopes towards east/northeast. In the east there is a large lake/pond, into which most the town drains. There is a small stream, which is a mostly dry and flows only during rains, in the eastern side of the town, and flows towards north and joins Gadaraya Nadi (a small river), which in turn flows northeast/east, and joins Kutni River. Rajnagar overall is in the drainage catchment of River Kutni.

56. About 65% of the district is occupied by Bundelkhand granite in northern & north central part (which included the project area) with a thin soil cover. The granite is pink in colour, medium to coarse grained porphyriatic in texture. It is very hard & compact with well-developed joints. The soil in the region is mainly alluvial type occurring in the north-eastern part of the district. Red and Yellow soil is prevalent in the north-eastern part and red and black soil is prevalent in the central part. The town is under Granite Belt of Madhya Pradesh. Depth of soils is shallow. The region has various minerals of sedimentary origin: Sandstone, Shale and Limestone.

3. Seismology

58. As per the seismic zoning map of India, project area falls under Zone II, which is the lowest earthquake risk zone in India. This zone is termed as “low damage risk zone”.

4. Rainfall and Climatic Conditions

59. Entire Bundelkhand region is characterized by semi-arid extreme climate, with very hot summers, very cold winters and low rain monsoons. The region is prone to drought. The long-term average annual rainfall of Chhatarpur district is 1068.3 mm. The district receives maximum rainfall during south west monsoon period i.e. June to September. Rainfall is mostly erratic and below average. 2014 was the lowest rainfall year in the 2 to 3 decades. Rainfall is mostly concentrated in the monsoon season of June/July to September/October – about 80-95% of annual rainfall is received during these months. Only 9.8% of the annual rainfall takes place between October to May period.

60. There are significant seasonal and day-night temperature variations almost throughout the year. There are three predominant seasons: June to September is monsoon (southwest monsoon), October to March is winter, and April to till onset of monsoon in late June is summer. Summers are very hot. May is normally the hottest month with an average maximum temperature of 42.3°C. Minimum temperatures are recorded during the month of January. The average minimum temperature of January is 7.1°C. Annual means maximum & minimum temperature of Chhatarpur district is 32.7°C and 18.1°C respectively. The region experiences a typical sub-tropical weather condition. Summer are not the ideal time to visit due to the oppressive heat and humidity. Rajnagar experiences hot humid summers, a monsoon season and cool pleasant winters.

61. During the south west monsoon season the relative humidity generally exceeds 85% (August month). In the rest of the year is drier. The driest part of the year is the summer season, when relative humidity’s are less 34% April is the driest month of the year. The wind velocity is higher during the pre-monsoon period as compared to post monsoon period. The maximum wind velocity 9.0 kh/hr. observed during the month of June and minimum 2.5 km/hr. during the month of December. The average normal annual wind velocity of Khargone district is 4.9 km./hr.
62. During the south west monsoon season the relative humidity generally exceeds 85% (August month). In the rest of the year is drier. The driest part of the year is the summer season, when relative humidity’s are less 34% April is the driest month of the year. The wind velocity is higher during the pre-monsoon period as compared to post monsoon period. The maximum wind velocity 9.0 km/hr. observed during the month of June and minimum 2.5 km/hr. during the month of December. The average normal annual wind velocity of Khargone district is 4.9 km/hr.

5. Surface Water

63. There are no major rivers or streams flowing through or near Rajnagar town. Area is mostly dry and receives low rainfall. Kutni River flowing 5 km west of the town is main river in the region. It is mostly dry except during monsoon. A reservoir constructed across Kutni River, on the upstream side of Rajnagar town is the source of water for irrigation, and the new water supply scheme under development combinedly for Rajnagar and Khanjauro is based on this source. This scheme is under implementation under MPUSIP Phase 1. A small natural drain flows in the eastern outskirts of the town, and towards north and joins Gadaraya River, a small river, and tributary of River Kutni. This small river flows eastwards and joins River Kutni.

64. Water Bodies in Rajnagar Town: Water bodies in terms of ponds/talab constitute a major portion in the urbanized area. Nearly 6.70 Ha land area is under this category. Jal Sena Talab, Thanera Talab and Dhandhar Talab are the major water bodies in the town. As per the natural topography storm water is discharged at three locations. Rain water is mixed with effluents from septic tanks and the combined wastewater flows in natural depressions of the town, (i) Jal Sena Talab in ward no.6, (ii) Dhanora Talab in ward no.13 and (iii) Dhandhar Talab in ward no.7, causes water pollution. Most of the drains has final disposal point in Jal Sena Talab, which results in water pollution of the pond. Due to absence of solid waste management system in the town open drains often suffer from choking due to garbage thrown by the residents. The area near the Jal Sena talab the outfall drain size is inadequate and therefore water logging occurs frequently. During rains this problem aggravates. Presently Dhandhar talab is used as sewage and storm water disposal point without any treatment, which deteriorates Talab water quality and creates unhygienic condition in surrounding area. Presently Dhandhar Talab is used for irrigation of surrounding agricultural land. Water quality of talab is raw sewage characteristics. It acts as balancing and holding tanks during rain and prevent flooding. Due to disposal of treated water, there will be no overflow as the most of the treated effluent will be utilized for irrigation for surrounding agricultural lands, gardening & flushing of sewers. The excess effluents and during monsoon when it will not have used for agriculture it will be utilized recreational reuse for Dhandhar Talab. Proposed sewerage scheme in Rajnagar will improve the physical appearance and condition of the lake and surrounding area. lake water quality/quality of surface water drainage and groundwater will improve and improve human dignity,
quality of life and hygienic conditions in the town. Clearly there will be significant improvements once the whole town is connected to sewer.

**Figure 27: Jalsena Talab**

**Figure 28: Dhanora Talab**

68. **Surface Water Quality:** Surface water quality data is not available at this stage. Drains, and streams are mostly dry. Water quality of lakes is likely to be poor as the accumulated water is mostly wastewater from the houses. Detailed water quality assessment will be conducted during detailed design phase and surface water quality monitoring has been included in monitoring plan.

6. **Ground Water**

69. Rajnagar comes under Bhundelkhand region. This region is covered by Bhundelkhand granite in northern part with thin soil cover. This region is very hard and compact with well-developed joints. These joints were open at the surface and persist to about 20m below the surface. Ground water in this region also occurs in weathered mantle in joints and fracture under water table condition and can sustain well having up to 2lps discharge. Ground water in the alluvium also occurs under water table conditions.
70. Ground water level in this region ranges from 4.5 to 14.57 mbgl during pre-monsoon. Shallow water level in the district is less than 6m in north eastern and south-eastern part of the district. Whereas in northern and southern parts the deepest water level recorded was 14.5mbgl whereas in the post monsoon period the water level ranges from 2.5mbgl to 12.5mbgl with a shallow water level of less than 5m. The water level fluctuations in the pre-and post monsoon in the district ranges from 0.10m to 9.45m.

71. **Groundwater Quality**: Following table shows the groundwater quality in the study area. Some of the water quality parameters although exceed desirable level, are however within the permissible levels of drinking water standards. Bacteriological contamination is evident from the water quality results.

Table 12: Groundwater Quality (2015)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Ranipur, Rajnagar</th>
<th>Drinking water standards*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature, o C</td>
<td>28</td>
<td>-</td>
</tr>
<tr>
<td>Turbidity, NTU</td>
<td>1.16</td>
<td>5-10</td>
</tr>
<tr>
<td>Color, Hazen units</td>
<td>Nil</td>
<td>5-25</td>
</tr>
<tr>
<td>pH</td>
<td>7.5</td>
<td>6.5-8.5</td>
</tr>
<tr>
<td>Electrical conductivity (µS/cm)</td>
<td>647</td>
<td>750 – 2000</td>
</tr>
<tr>
<td>Total dissolved solids (mg/l)</td>
<td>360</td>
<td>500-2000</td>
</tr>
<tr>
<td>Total alkalinity (mg/l)</td>
<td>228</td>
<td>-</td>
</tr>
<tr>
<td>Chlorides (mg/l)</td>
<td>31</td>
<td>250-1000</td>
</tr>
<tr>
<td>Total hardness (mg/l)</td>
<td>370</td>
<td>300-600</td>
</tr>
<tr>
<td>Calcium (mg/l)</td>
<td>74</td>
<td>75-200</td>
</tr>
<tr>
<td>Magnesium (mg/l)</td>
<td>44.4</td>
<td>30-100</td>
</tr>
<tr>
<td>Iron (mg/l)</td>
<td>0.05</td>
<td>0.3 – 1</td>
</tr>
<tr>
<td>Manganese (mg/l)</td>
<td>0.01</td>
<td>-</td>
</tr>
<tr>
<td>Fluoride (mg/l)</td>
<td>1.02</td>
<td>1-1.5</td>
</tr>
<tr>
<td>Nitrate (mg/l)</td>
<td>32.4</td>
<td>45-100</td>
</tr>
<tr>
<td>Sulphates (mg/l)</td>
<td>13.65</td>
<td>200-400</td>
</tr>
<tr>
<td>Total Coliform / 100ml</td>
<td>Nil</td>
<td>10</td>
</tr>
<tr>
<td>Thermo tolerant coliform / 100 ml</td>
<td>Nil</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Sampling survey 2015 by PPTA Team; samples collected from tube well

* standards prescribe lower and higher values for parameters, except pH; lower value is the ‘desirable limit’ while higher value is the ‘permissible limit in the absence of alternate source’; there is only lower value for parameters which have no relaxation.

72. Air Quality

72. No air quality data available, however, there are no air pollution sources, except the dust, which is mainly due to dry weather, activities like traffic movement. There is no data on ambient air quality in Rajnagar town, which is not subject to monitoring by the Madhya Pradesh Pollution Control Board (MPPCB) as there are no major industries. Located in the semi-arid drought prone Bundelkhand region, particulate matter is likely to be high, particularly during summer months. Traffic is the only significant pollutant, so levels of oxides of sulphur and nitrogen are likely to be well within the National Ambient Air Quality Standards (NAAQS).

73. 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.

C. Ecological Resources

73. Project area mostly comprises urban areas, and surrounding agricultural areas of Rajnagar, which are converted to human use many years back. Extent of forest areas in the project area is very limited, and none of the project components are located in the forest areas. Rajnagar protected forest (PF, have limited protection\(^6\)) is located at about 1 km from the STP site. This forest area is characterized by low range hills, rugged lands, rocky outcrops, open forests (10-40% tree canopy cover) and scrub lands (less than 10% tree canopy cover). Following type of tree species are found in these areas: babul (Acacia Nilotica), neem, khair (Acacia catechu), palas (Butea monosperma), ber (Zizyphus varieties), tendu (Diospyros melanoxylon), mahua (Mahuca Indica), semal (Salmalia malabarica) and kardhai (Anogeissus pendula). None of the components are located in Forest area.

74. Project area is screened and proximity analysis carried out using Integrated Biodiversity Assessment Tool (IBAT) to identify the location of protected areas with respect to the project location. IBAT screening proximity report is attached at Appendix 9. As per the proximity report, there are no protected areas or key biodiversity areas within 10 km radius of the project area.

75. Common wild animals like wild boar, monkey, jackal, etc are found in these forests. Aquatic life in the project areas is not notable, given low rainfall semi-arid zone. Lakes are mostly filled with wastewater and therefore there is no notable aquatic life.

D. Economic Development

1. Landuse

76. Spread over an area of 28 sq. km area Rajnagar is comparatively a smaller town and is traditionally an agriculture-based economy. It is a local center for agricultural marketing dealing in agriculture produce, inland fisheries and forest produce. Large part of the municipal area is still under agriculture.

2. Industry & Agriculture

77. There are no notable industries in Rajnagar. The economy is mostly dependent on agriculture and agricultural based activities. There are few agro-based industries like rice and oil mills.

78. Kharif and rabi are the main crop seasons in the project area. Main crops are wheat, pulses, sesame, vegetables, etc.,

3. Infrastructure

---

\(^6\) Protected Forest - An area notified under the provisions of the Indian Forest Act or other State Forest Acts, having limited degree of protection. In all protected forest all activities are permitted unless prohibited. Reserved Forest - An area so constituted under the provisions of the Indian Forest Act or other State Forest Acts, having full degree of protection. In reserved forest all activities are prohibited unless permitted.
79. The Rajnagar water supply system is completely groundwater based. There are 7 tube wells and 3 open dug wells in the city for water supply. In addition, 129 hand pumps are provided by Rajnagar Nagar Parishad (RNP) across the town to cater the needs of people. Water from tube wells is directly pumped to a ground level sump, and from sump to an elevated reservoir for supply. Water is supplied on alternate days for about an hour. With about 25km of distribution network (of AC and uPVC material), about 50% the households are covered with piped water supply. The rest of the population is primarily dependent on private tube wells or hand pumps provided by Nagar Parishad of Rajnagar (NPR) in the town.

80. Overall, the current water supply systems in the town suffers from unreliable sources, low coverage, inadequate storage, poor network efficiency and low management capability. Water supply improvement project is under implementation in Khajuraho and Rajnagar towns under MPUSIP funded by ADB under Phase I. This will improve water supply service levels and water will be supplied at the per capita rate of 135 lpcd.

86. **Sewerage:** There is no sewerage collection and treatment system in the town. Households mainly depend on individual sanitation systems like pit latrines, septic tanks etc. Open defecation is also prevalent in the project area. Septage from septic tanks is collected by mobile tankers with suction arrangement. A sewerage and drainage system need to be improved in the town to meet the increased wastewater generation due to improvement in water supply.

87. **Solid Waste Management:** There is no proper solid waste management system in the towns. Respective municipal councils are responsible for SWM services their areas. Waste generated in the towns are collected and disposed by crude open dumping method in the outskirts of the towns.

88. **Storm Water Drainage:** Open drainage system is provided in towns for collection and conveyance of rain water from the town. Due to lack of sewerage system, the drains are presently carrying wastewater including sewage. Since rains are confined only to a short duration in monsoon, the drains mostly carry wastewater. Indiscriminate disposal of solid waste into drains is common, due to which drains are often choked, creating unhygienic conditions.

89. **Power Supply:** Thermal power is the main source of energy in Madhya Pradesh, contributing nearly 90% of the electricity, compared to hydropower, which produces the remainder.

90. **Transport:** The old town areas of Rajnagar are characterized by very 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. Roads are surface either with bitumen or concrete, and roads in the outer areas are mostly unpaved. Most of the roads are maintained by respective municipal councils except the main roads connecting other towns and villages, which are maintained by the Public Works Department (PWD). Road condition is generally poor, with many roads in need of repairs and resurfacing.
E. Socio Cultural Resources

1. Demography

91. According to the census, the population of Rajnagar was 14,253 in 2011, increased from 12,449 in 2001, which shows an increase of 15% over the decade. The previous decade of 1991-2001 experienced comparatively higher growth of 21%. Overall literacy is 73.71%, reported at 79.93% for males and 66.60% for females, which is better than literacy in the state as a whole, which is 69.3% overall, and 78.7% for males and 59.3% for females. The sex ratio is however significantly below the natural 1:1 ratio, being 882 females per 1000 males, lower than the state average.

2. History, Culture and Tourism

92. There are no places of archeological, historical or tourism importance in Rajanagar. Khajuraho town, located 5 km south of Rajanagar is a historical, culture and tourism centre in central India, which is world famous for its beautifully carved temples. This is notified as World Heritage Site by UNESCO in the year 1986. The monuments and sites are far away from the proposed project locations in Rajnagar. Nearest monument is about 3 km from the boundary of Rajnagar (Chitrangupta Temple). STP and SPS site is still away from Khajuraho, as the proposed site is located in the east of Rajnagar, while Khajuraho is located in the south. Therefore, no interference with archeological areas or protected monuments envisaged.

E. Subproject Site Environmental Features

93. Features of the selected subproject sites are presented in the following table below.

<table>
<thead>
<tr>
<th>Infrastructure</th>
<th>Location &amp; Environment Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sewage Treatment Plant at Rajnagar</td>
<td>The proposed STP is located on Chandala Road near Dhandhar Talab. Site is away from human settlement. Some isolated houses are located at a distance of 250 m, and nearest habitation with cluster of houses is nearly 400 m from the site. Some part of proposed STP site is Rocky terrain, so rock cutting activity may be required during</td>
</tr>
</tbody>
</table>
As far as possible elevation will be utilized for suitable components.

There are 25-30 trees (locally known as Dhak, Butea monosperma). This is a native small sized dry-season deciduous tree, growing up to 15 m tall. Some of the trees may be required to be removed for construction of STP. Trees will be integrated into the layout plan as far as possible to minimize the removal.

Site is mostly surrounded by agricultural lands. Rajnagar protected forest is located at about 1 km from the site on the east. This is open forest with low tree cover, and no notable or protected flora or fauna. Site is not a low lying/flood prone area. Site is vacant and owned by Revenue Department. Total land area required is 1 acre. Land available is (1.020 ha or 2.52) acres under Khasra No. 2100/2

Site is located adjacent to Dhandhara lake, which is normally dry or partially filled with wastewater from Rajanagar. This water is used for irrigation by surrounding farmers. Farmers use pumps to lift water to their fields.

In the proposed STP, treated wastewater will be discharged into a sump within the STP facility, and from sump a outfall sewer will be laid to adjoining Dhandhara Lake for discharge. Sump will facilitate surrounding farmers to lift the water for their fields. Surplus water will flow into the lake. Water from the lake can be further utilized by farmers for agriculture, and if there is still surplus, overflow from Dhandhara lake will be discharged into a natural drain that joins Gadaraya Nadi (a small river), which in turn flows northeast / east, and joins Kutni River.

The proposed SPS is located next to STP site on Chandala Road. Site is away from human settlement. Some isolated houses are located at a distance of 250 m, and nearest habitation with cluster of houses is nearly 400 m from the site.

Site is vacant and devoid of any notable tree cover. There are some trees of local species in the periphery of the site. These will not be removed for construction of SPS. Site is not a low lying/flood prone area. Site is vacant and owned by Revenue Department. Total land area required is 0.15 acre, while land available is 1.607 ha or 3.97 acres under Khasra No. 2108.

Two nos. of lifting pumping stations (LPS) are
<p>| <strong>Pumping Stations (LPS) in Rajnagar</strong> | proposed in Rajnagar town to reduce depth of sewers and connect sewers to STP by gravity. The lifting pumping station will carry sewage from downstream sewer network and pump it to upstream sewer network. For lifting sewage within network, manhole based lifting station is proposed and no separate land will be required. The lifting pumping stations will be underground structure below road and pumps will be placed in manhole based wet well and will have valve chamber. Manually cleaned bar screen will be placed in upstream sewer manhole for removal of floating particles. Site is away from human settlement and proposed on govt. land. No sensitive environmental features have been reported. No environmental impact has been envisaged. LS-1 is proposed near Jalsena Talab along road within ROW and LS-2 is proposed at lokudi Purva in ward no. 8 along main road within ROW. |
| <strong>Sewer mains</strong> | Pumping will be laid along the main roads and. Pipes will be laid underground. There are no trees along the roads and no tree cutting will be required for laying sewer pumping main. Pumping/gravity sewers mains will be laid from lifting stations to higher manholes/SPS and ultimately to STP. Of the 3.1 km length sewers, about 600-700 will be laid outside the developed area of the town, along unsurfaced roads (see photo), and rest will be laid along the main roads in the town, within the rights of way. |
| <strong>Sewer Network</strong> | Sewers will be laid along the roads/streets in the towns within the road right of way (ROW). In wider roads pipes/sewers will be laid in the road shoulder, and in narrow roads, where there is no space, pipes/sewers will be laid in the road carriage. Roads in the old part of the town are quite narrow (~3m), and in the rest of the town roads are wider. Roads are lines both sides with open drains. There are no trees along the roads, except in some new colonies in the outer areas. In old town areas pipes will be laid in the middle of the road, which may affect the traffic. However, exact alignment of sewers, laying of pipeline in centre of the road or sides etc. will be decided after utility survey during detailed design phase by DBO contractor. |</p>
<table>
<thead>
<tr>
<th>Storm Drains</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing storm water drains are mostly available along the roads and streets in the developed area, and there are no drains in peripheral and newly developed areas.</td>
</tr>
<tr>
<td>In the town, roads are narrow, and in the periphery roads are comparatively wider. Existing drains will be repaired and rehabilitated within the existing footprint. New drains will be constructed along the building lines within the road right of way.</td>
</tr>
<tr>
<td>Existing drains will be disilted, and waste will be disposed at identified sites.</td>
</tr>
<tr>
<td>These works will be spread over entire town, and along almost all roads and streets.</td>
</tr>
</tbody>
</table>
Figure 30: Location of Proposed Components in Rajnagar

Figure 31: Proposed STP, SPS and Disposal Location (Dhandhar Talab)
Figure 32: Proposed STP Site at Rajnagar with Area around 50m, 100m, 200m, 250m & 500m Circle Shown in Google Map

Figure 33: Proposed SPS Site at Rajnagar with Area around 50m, 100m & 200m Circle Shown in Google Map
V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

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

95. 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 bio physical 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/throughout, waste production, discharge specifications, pollution sources and ancillary services.

(iii) 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.

(iv) 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.

96. 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).

97. 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.

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

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

A. Pre-Construction Impacts – Design & Location

100. ADB Environmental Assessment Guidelines require that an IEE should evaluate impacts due to the location, design, construction and operation of the project. Construction and operation are the two activities in which the project interacts physically with the environment, so they are the two activities during which the environmental impacts occur. In assessing the effects of these processes therefore, all potential impacts of the project are identified, and mitigation is devised for any negative impacts.

101. In many environmental assessments there are certain effects that, although they will occur during either the construction or operation stage, should be considered as impacts primarily of the location or design of the project, as they would not occur if an alternative location or design was chosen.

102. Design of the Proposed Components: Technical design of the (i) sewage treatment plants; (iii) Pumping mains, (iv) Pumping stations, (v), Sewer Network; connections and other items, follows the relevant national planning and design guidelines, focusing on providing a robust system which is easy to operate, sustainable, efficient and economically viable.

103. Design of Sewage Treatment Plant. STP of capacity 2.82 MLD is proposed in Rajnagar Town and will be constructed at the identified site to treat the sewage generated to discharge standards. It is proposed that the treated wastewater will be disposed into Dhandhera Talab. 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
(see column (4) in table below) are applicable. However, under MPUSIP, PMU has decided to base the STP design on discharge standards for STPs suggested by CPCB in 2015, which are more stringent. It is also to be noted that, in April 2019, the National Green Tribunal (NGT) in one of its orders directed MOEFCC to reconsider stringent standards for STPs. Sequential batch reactor (SBR) technology is already finalized during feasibility stage, and contractor will adopt this technology and design the facility.

Table 14: Proposed STP Discharge Standards

<table>
<thead>
<tr>
<th>No</th>
<th>Parameter</th>
<th>Proposed Discharge Standards for Rajnagar STP</th>
<th>MOEF andCC STP Discharge Standards, 2017</th>
<th>CPCB discharge standards, 2015#</th>
<th>IFC Guideline value for sewage discharge</th>
<th>WHO Guideline Value for safe use in agriculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>pH</td>
<td>6.5 – 9.0</td>
<td>6 – 9</td>
<td>6.5-9.0</td>
<td>6 – 9</td>
<td>6 – 9</td>
</tr>
<tr>
<td>2</td>
<td>Biochemical Oxygen Demand (BOD) (mg/l)</td>
<td>≤10</td>
<td>&lt;30</td>
<td>&lt;20 (metro cities)</td>
<td>&lt;10</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>Chemical Oxygen Demand (COD) (mg/l)</td>
<td>≤50</td>
<td>-</td>
<td>50</td>
<td>125</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Total Suspended Solids (TSS) (mg/l)</td>
<td>≤20</td>
<td>&lt;100 and &lt;50 (metro cities)</td>
<td>&lt;20</td>
<td>50</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Total Nitrogen (mg/l)</td>
<td>&lt;10</td>
<td>-</td>
<td>&lt;10</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Ammonical Nitrogen (mg/l)</td>
<td>&lt;5</td>
<td>-</td>
<td>&lt;5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>Total Phosphorus (mg/l)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>8</td>
<td>Fecal Coliform MPN/100 ml</td>
<td>&lt;100</td>
<td>&lt;1000</td>
<td>&lt;100</td>
<td>-</td>
<td>&lt;1000</td>
</tr>
<tr>
<td>9</td>
<td>Oil and grease, mg/l</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>Nematodes, number of eggs per litre</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
</tbody>
</table>

MOEF andCC = Ministry of Environment, Forest and Climate Change; CPCB = Central Pollution Control Board; IFC = International Finance Corporation, the World Bank Group
# in April 2019, the National Green Tribunal (NGT) in one of its orders directed MOEFCC to reconsider the standards issued in 2015 for STPs.

104. SBR treatment process consists of following components:
   (i) Inlet works with mechanical screens, grit removal, flow measurement and flow splitter box
   (ii) Batch reactors with individual inlet flow control and a fully automated process
   (iii) Mechanical sludge dewatering
   (iv) Sludge holding area

105. Treated wastewater disposal. Normally STPs are located at a site where there is
suitable means of disposal for treated wastewater effluent (e.g. into a natural water course or for irrigation of surrounded agricultural lands). At present, wastewater from the town via open drains partially accumulates in Dhandhera Talab and used for agricultural purposes. The proposed STP site is located close to Dhandhera Talab, and the treated wastewater will be discharged into it, and will be utilized for agricultural purposes. There is a small stream, that carries the overflow. This is mostly dry and runs towards north and joins Gadaraya Nadi (a small river), which in turn flows northeast / east, and joins Kutni River. Water quality assessment of Dhandhera Talab will be conducted during the detailed design phase. However, given the nature of water accumulated in the lake, the quality is ought to be poor, and discharge of treated wastewater meeting the stringent discharge standards will be improve the water quality. Moreover, once the sewerage system operation starts, wastewater including both sullage and sewage from the houses will no more be discharged into open and that it will not flow in lakes like Dhandhera. This will improve the quality of environment significantly.

106. **Use of treated wastewater for irrigation.** STP site is surrounded by agricultural lands. As there is general lack of water availability in the region, treated wastewater from STP will be mostly used for agricultural purposes. 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 should have and less than one viable nematode egg per liter and less than 1000 fecal coliforms per 100 milliliters. These shall be considered during the detailed design and complied accordingly. Following measures are suggested:

(i) Obtain of consent of MPCB for discharge of treated wastewater into Dhandhera Talab
(ii) Conduct baseline water quality assessment of Dhandhera Talab during detailed design
(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

107. **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 there are no industries and also industrial wastewater is not 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.

108. 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. Dewatered sludge cake will be
further air dried for 15 days. This is indicative sludge management system, and DBO contractor
will design the system meeting these requirements.

109. 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 protective equipment (PPE) should be provided to the workers. 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 15: Standards for Sludge Reuse as Manure**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>mg/kg</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Cadmium</td>
<td>mg/</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Chromium</td>
<td>mg/kg</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Copper</td>
<td>mg/kg</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>Lead</td>
<td>mg/kg</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Mercury</td>
<td>mg/kg</td>
<td>0.15</td>
<td>0.15</td>
</tr>
<tr>
<td>Nickel</td>
<td>mg/kg</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Zinc</td>
<td>mg/kg</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>C/N ratio</td>
<td>-</td>
<td>&lt;20</td>
<td>&lt;20:1</td>
</tr>
<tr>
<td>pH</td>
<td>-</td>
<td>6.5 – 7.5</td>
<td>(1:5 solution) maximum 6.7</td>
</tr>
<tr>
<td>Moisture, percent by weight, maximum</td>
<td></td>
<td>15.0 – 25.0</td>
<td>25.0</td>
</tr>
<tr>
<td>Bulk density</td>
<td>g/cm3</td>
<td>&lt;1</td>
<td>Less than 1.6</td>
</tr>
<tr>
<td>Total Organic Carbon, percent by weight, minimum</td>
<td>percent by weight</td>
<td>12</td>
<td>7.9</td>
</tr>
<tr>
<td>Total Nitrogen (as N), percent by weight, minimum</td>
<td>percent by weight</td>
<td>0.8</td>
<td>0.4</td>
</tr>
<tr>
<td>Total Phosphate (as P205) percent by weight, minimum</td>
<td>percent by weight</td>
<td>0.4</td>
<td>10.4</td>
</tr>
<tr>
<td>Total Potassium (as K20), percent by weight, minimum</td>
<td>percent by weight</td>
<td>0.4</td>
<td>-</td>
</tr>
<tr>
<td>Odour</td>
<td></td>
<td>Absence of foul Odor</td>
<td></td>
</tr>
<tr>
<td>Particle size</td>
<td></td>
<td>minimum 90% material should pass through 4.0 mm is</td>
<td>minimum 90% material should pass through 4.0 mm is sieve</td>
</tr>
</tbody>
</table>
110. In order to ensure the safe use of dried sludge, following should be followed:

(i) Prepare a dried Sludge utilization plan for Rajnagar with the help of Agriculture Department; plan should also include if any additional processing is required for sludge to use as soil conditioner;
(ii) 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;
(iii) Identify a landfill/suitable site for disposal of surplus dried sludge;
(iv) Monitor sludge quality during operation phase as per the Environmental Monitoring Plan, ensure that it meets the quality parameters established by FCO; and
(v) 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).

111. Process disruption due to power brakedown. The SBR based STP will require uninterrupted power supply for operation of all the activities from inlet to treatment, and for sludge dewatering. Disruption in power supply will lead to process upset, may affect the efficiency of treatment, and result in treated effluent quality not meeting the disposal standards. Following measures are integrated into design and contracts to ensure efficient operation:

(i) Ensuring continuous uninterrupted power supply, including a back-up facility (such as generator)
(ii) Providing operating manual with all standard operating procedures (SOPs) for operation and maintenance of the facility
(iii) Necessary training to ULB staff dealing with STP
(iv) Extended contract period for O & M, proper transfer of facility to ULB after completion of contract period with adequate technical know-how on O&M and hands-on training to ULB staff

112. Nuisance due to Location and Operation of STP to surrounding areas. The objective of providing STP is to treat the sewage, collected from the various residential, commercial and institutional establishments, to achieve the pollution control standards with respect of the area under consideration. There are many parameters which require careful and judicious selection before setting off for the actual design of STP. The STP has been proposed after due consideration to the existing landuse of the site. Issues has been investigated before final selection include Government land availability, topography, drainage, surface/ground water, wind direction, power and water supply, accesibility, disposal of effluent, ecosystem and local landuse.

113. The proposed STP in Rajnagar is located on Chandala Road near Dhandhar Talab is
away from habitation. Site is surrounded by agricultural lands, and there are no notable developments within 400 m of the site boundary. STP sites is curently vacant, and is owned by Revenue Department, Government of Madhya Pradesh. Available land area is sufficient for setting up of proposed STP.

114. Proposed SBR process being an aerobic process and conducted in a compacted and a closed system with automated operation, odour nuisance will be very minimal. Limited bad odours will be generated from wet well, primary treatment units and sludge treatment. Although STP site is located away from residential areas, as a precautionary measure, considering the future expansion of the town, following measures are suggested:

(i) 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; and

(ii) Develop layout plan of SPS/STP such that odour generating units (such as sludge / solids handling facilities) are located away from the surrounding area with future development potential.

115. **Sewage Pumping station.** It is proposed to construct a sewage pumping station (SPS) and two manhole based lifting pumping stations, which will receive sewage from the catchment area and pump to STP. SPS is proposed near the STP, and lifting stations are proposed in the town, mainly to minimize the sewer depth. SPS and lift stations are located at lowest point where the sewage from catchment area can be collected by gravity, and then pumped to a higher level, and ultimately to the STP. SPS will consists of inlet chamber with screen; a sewage sump or wet well, to receive sewage; pump room.

116. SPS operation involves accumulation of incoming sewage wey well, and then pumping out as the sewage level reaches the designed pumping depth. Water level in the well rises before the pumping cycle starts, and as the pumping is performed the water level goes down, registering its lowest depth at the end of pumping cycle. This cycle of rising and lowering will continue throughout the day and night, however, the duration between successive pumping cycles will significantly vary depending on the sewage generation. During morning and evening peak hours, sewage will accumulate quickly, and pumping frequency will be high. The sewage retention time in the suction well therefore varies throughout the day, with very high retention periods during the nights and mid-days.

117. **Odour from pump stations.** In the suction wells, the sewage emits gases, which accumulated in the air above water surface. The gas may include odourous compounds like hydrogen sulphides (H$_2$S), amines, fatty acids, aldehydes, ketones and other volatile organic compounds (VOCs). As the water level rises before the pumping cycle, it physically displaces the air, along with the odourous gas compounds. H$_2$S is the most dominant odour causing compound, and therefore can cause nuisance to nearby households. When sewage becomes stagnant, H2S is generated in the anaerobic conditions. The quantum of H2S generation depend on quantity of accumulated sewage and sewage retention time that create anaerobic conditions. Both increase in quantity of sewage accumulation and retention time will increase the H2S generation. Design considerations will be included to minimize the both as much as possible. The retention time will be kept to its lowest possible so that there is no stagnation of sewage for long time which could create anaerobic conditions.

118. Tow manhole-based lift stations are proposed in Rajnagar. Lift stations handle small quantities, and are mostly underground within a manhole set up, and therefore nuisance due to
lift stations is very minimal.

119. Site for pumping stations was identified based on the technical suitability and availability of government owned land parcels to avoid land acquisition. The site selected for SPS in Rajnagar is far away from habitation (~250 m), and therefore no notable impact envisaged. However, considering future development potential, and expansion of the town, the following measures needs to be included in the layout design of the SPS:

*Layout planning related measures*

(i) Locate wet wells within the identified site at an internal location as far as possible from nearest development;
(ii) Develop 5-10 m green buffer zone around the SPS with a combination of tall and densely growing trees in multi rows as per the land availability to control odour and also act as visual shield, and improve aesthetical appearance; and
(iii) Provide of high compound wall.

*Design related measures to prevent and control odour*

(i) Submersible sewage pumps of suitable rating, minimum submergence requirements;
(ii) Position of the submersible pumps and design of the wet well floor by providing necessary side benching / sloped flooring to allow for higher submergence during low flow shall be made to ensure regular pump operation and avoid sewage stagnation beyond the permissible limit;
(iii) Diesel Generators shall be provided as standby power supply;
(iv) Develop standard operating procedures / operational manual for operation and maintenance SPS; this shall include emergency measures; and
(v) Provide training to the staff in SOPs and emergency procedures.

120. **Noise from pumping operations.** Operation of pumps and motors and diesel generators is a major source of noise. Noise generated from lifting/pump stations can have continuous negative impacts on the surrounding population. Although STP and SPS sites are located outside the Town, noise control measures are necessary. High inside noise levels can affect the health of operators and staff at the facilities, and therefore, noise levels needs to be maintained within and outside the facilities at acceptable levels. Internal noise level in a room measured at a distance of 1 m from these pump sources typically will be in the range from 80 dB(A) to 100 dB(A).

(i) Procure good quality latest technology high pressure pumps that guarantee controlled noise at a level of around 80 dB(A) at a distance of 1 m;
(ii) Use appropriate building materials and construction techniques for pump houses which can absorb sound rather than reflect noise;
(iii) Use acoustic enclosures – manufacturer specified, for all pumps, motors;
(iv) Procure only CPCB approved generators with low emission and low noise fitted with acoustic enclosures;
(v) Provide sound mufflers for ventilators in the plant rooms; and soundproof doors; and
(vi) Provide ear plugs to workers.

121. **Energy Efficiency.** Project area is mostly plain and gently sloping ground, it is therefore not technically feasible or economical to design a completely gravity system to collect sewage
from individual houses and transfer the same to the STP on the outskirts of the town. It necessitated provision of pumping stations, which are optimized to the extent possible to minimize the overall pumping. In the current design, sewage will be collected from the houses via sewer network and conveyed by gravity to the lifting and pumping stations. To optimize the power consumption, the hydraulic design shall follow optimal approach, and the following also to be considered in design and selection of pumping systems. According to Manual for the Development of Municipal Energy Efficiency Projects in India (jointly developed by Bureau of Energy Efficiency (BEE) and International Finance Corporation in 2008), energy savings, at minimum, of 25% to 40% is possible with appropriate measures. The following measures shall be considered and incorporated into the subproject designs:

(i) Using low-noise and energy efficient pumping systems;
(ii) Efficient pumping system operation; and
(iii) Installation of variable frequency drives (VFDs).

122. Sewer network. Following design considerations are to be included in sewer network planning and design:

(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 atleast 300mm);
(iv) In unavoidable, where sewers are to be laid close to storm water drains or canals or natural streams, appropriate pipe material shall be selected (stoneware pipes shall be avoided);
(v) For shallower sewers, 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.

123. Social and Cultural Resources. There are no archeological places or protected monuments or areas in Rajnagar. However, Khajuraho, which is located at about 5 km south of Rajnagar is prominent historical place with number of protected monuments and places. Nearest monument, Chitragupta temple, is about 2.5 km from the boundary of Rajnagar municipality. As per the local information, there is also low risk of encountering any chance finds during the excavation, as the archeological places are limited to Khajuraho area. However, risk of uncovering archeological remains, given the long history of nearby town, during the excavations cannot be ruled out completely. Construction contractors therefore should follow the below measures in conducting any excavation work:

(i) Create awareness among the workers, supervisors and engineers about the chance finds during excavation work;
(ii) Stop work immediately to allow further investigation if any finds are suspected;
(iii) Inform Archeological Department if a find is suspected and take any action, they require to ensure its removal or protection in situ; and
(iv) Develop a chance find protocol and implement.

124. **Tree cutting at project sites.** At the proposed STP site, there are 25-30 medium sized trees of local species. These trees may be required to cut for construction. There are no notable tree cover or vegetation in other sites. Sewers will be laid along the road within road right of way, or at the middle of the road. There, are no notable trees in the alignment, therefore no tree cutting is envisaged. Following measures need to be implemented to minimize and/or compensate for the loss of tree cover.

(i) Minimize removal of trees by adopting to site condition and with appropriate layout design of STP;
(ii) Obtain prior permission for tree cutting at sites that may require tree cutting finalized during detailed design; and
(iii) Plant and maintain 10 trees for each tree that is removed.

125. None of the subproject components are located in the forest areas, nor any pipeline is aligned through the forests. There is a open forest – Rajanagar Forest, in the east of the town, about 1 km from the STP site. This is an open forest with very limited tree cover, mostly shrubs and bushes, and common wildlife. Although no components are located in forest and no direct interference, following measures are suggested to avoid any unauthorized entry into forest, and cutting of trees and hunting of wildlife by personnel related to construction.

(i) Provide proper compound wall/fencing around the STP and SPS site with proper security prior to start of site clearance / construction work;
(ii) No construction material storage/ancillary works shall be conducted outside the actual site; this shall be limited to actual construction area and the access roads;
(iii) Movement of construction vehicles, construction personnel, workers etc., shall be prohibited towards forest area; the road towards forest shall not be used for any purpose;
(iv) No workers/personnel shall enter forest areas; it is the DBOC responsibility to take necessary precautions & prevent workers removing/damaging trees/vegetation, hunting animals;
(v) Work site shall be properly and cleanly maintained, no solid waste, food waste shall be disposed haphazardly that may attract animals; and
(vi) Create awareness among workers on environment & safety.

126. **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.

127. **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, or in areas which will impact health and safety of communities.

128. Site selection of sources of materials: Significant quantities of coarse aggregate and fine aggregate will be required for construction works. Requirement of gravel is limited. Contractor should procure these materials only from the quarries permitted/licensed by Mines and Geology Department. Contractor should, to the maximum extent possible, procure material from existing quarries, and creation of new quarry areas should be avoided as far as possible. It will be the construction contractor's responsibility to verify the suitability of all material sources and to obtain the approval of Department of Mines & Geology and local revenue administration.

B. Construction Impacts

1. Construction Works

129. The works are spread over the entire town, and therefore the implementation of the project will affect a significant proportion of the town as branches of the new sewerage network will be built alongside almost all roads and streets. Areas outside the town will also be affected, by construction of the SPS and STP. However, it is not expected that the construction work will cause major negative impacts, mainly because:

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

130. STP Construction Works: STP will involve construction of:

(i) Pre-treatment works like inlet chamber, fine screen channels De gritting Tanks Flow measuring channel and flow distribution box;
(ii) Sewage Treatment Plant based on SBR & BRR Technology; and
(iii) Treated Effluent Disposal Works.

131. SPS Construction Works: SPS will involve construction of:

(i) Inlet and screen chamber;
(ii) Wet well; and
(iii) Pump room and diesel generator platform.

132. The STP and SPS works will be confined to identified site, and construction will include general activities like excavation for foundation, construction of foundations, columns, walls and roof in cement concrete and masonry, and fixing of mechanical and electrical fixtures, etc. SBR technology STP will involve several mechanical and electrical components which will be brought to site, assembled and installed.

133. Sewer laying works: This work involves construction of following components:
18,160 m secondary and tertiary network; pipes will be of small diameter (150 to 450 mm) and the materials for gravity sewer will be of DWC HDPE (SN 8 class) upto 315 mm dia. and 400mm dia. Onwards DI (K7 class); will be located in trenches along side roads (average width 1.20 to 2.10 m and depth 1.20 to 4.63 m); and

3,117 m Pumping mains (50m pumping main from SPS to STP in Zone 1, 520m pumping main from LS-1 to MH-169 in Zone 1, 230m gravity main from MH-169 to MH-174 in zone 1, 1700m pumping main from (zone 2) LS-2 to MH-174 in zone 1 & 564m gravity main from MH-174 to SPS in Zone 1); pipes will be 200 mm to 450 mm in diameter; and will be located in trenches along side roads (average width 1.30 to 1.50 m and depth 1.45 to 2.10 m).

134. **Storm water drains works**: This work involves construction of following compoents:

(i) Repair, rehabilitation and desilting of existing roadside drains:
   (a) Repair and rehabilitation existing drains: 2.6 km;
   (b) Disilting of existing drains: 26.30 km; and
   (c) Size of existing drains: 0.4 – 1 m wide, and 0.5-1 m deep.

(ii) Construction of new drains, and cross drainage works on roads:
   (a) Length of proposed new storm water drains: 16 km
   (b) Type of drains: RCC and brick
   (c) Size of drains:
       - 7 km length: 0.45 m wide, 0.9 m deep
       - 5 km length: 1 m wide 1.5 m deep
       - 4 km length: 2 m wide 3.0 m deep
   (d) RCC pipe culverts: 6 no,s – 6.17 m length, 1.6 m wide, and 1 m deep
   (e) RCC slab culverts: 26 no,s 6-8 m length, 0.6 m wide, 0.8-0.9 m deep

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

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

137. At intervals, manholes will be constructed to allow inspection and clearance of blockages and sediment during operation. These will be excavated by backhoe or manually. Manholes will be constructed in brick masonry or RCC.

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

139. Existing storm water drains are lined along the roads and streets in the town, some on eitherside of the roads and in narrow area, one side of the road. New drains will be construction in same way, in wider road both sides, and in narrow roads one side of the road. It is proposed to repair and rehabilitated 2.6 km length of existing drains, and this work will be done within the existing footprint. Damaged portions will be removed, and sections will be construction in RCC or brick as appropriate. It is also proposed to clean/desilt the entire 26 km length of storm water drains. This work will mostly be done manually as the drains are very narrow, and where possible, mechanical equipment will be used, especially for wider drains. Desilted material will be loaded onto trucks/tractors, and transported to disposal site.

140. Around 16 km of new drains will be constructed in areas where there are no existing drains, these are mostly in the outer areas. Drains will be located along the edge of the roads. Trenches will be created similar way as explained above for construction of sewers. Width of trench will range from 0.5 m – 2 m, and depth  1 m – 3 m.

141. 32 cross drainage structures – RCC pipe culvers, and RCC slab culverts will be constructed at road – drain crossings. Length of culvert will be equal to the width of the road/street (6-8 m), width 0.6 – 1.6 m and depth varies from 0.8-1m. Culvert will be constructed by stopping / diverting the drain temporarily (existing drains). If possible and necessary, culvert will be constructed in 2 parts, allowing the traffic in one lane, if the road carries considerable traffic and if there is no alternative road. the work involves site clearance, excavation, placing of pipes (pipe culverts, and forming of foundation, slab etc., using general RCC construction procedures.

142. Anticipated impacts during the construction phase are discussed below along with appropriate mitigation measures to avoid, minimize or mitigate those impacts to acceptable levels.

2. Construction Impacts

143. **Sources of Materials.** Significant amount of sand and coarse aggregate will be required for this project, which will be sourced from quarries. Quarries inevitably cause extensive physical changes; as construction materials are excavated from the ground, leaving large cavities, or levelling hillsides, etc. The physical damage caused by quarries is controlled by allowing them to operate within specific limited areas only, so the damage is restricted in extent and not allowed to spread indiscriminately. New quarries are subject to a rigorous process of environmental assessment to ensure appropriate siting and adequate environmental controls on the operation. It will therefore be important to ensure that construction materials for this project are obtained from government approved licensed quarries only, to ensure these controls are in place. In Rajnagar, construction sand is normally obtained from Khudar/Kutni river (about 3 km), and gravel and aggregate from Chhatarpur (about 40km). Contractor should avoid new borrow pits/quarries as far as possible, if necessary, all the permissions, including conduct of environmental assessment, and environmental clearance as necessary shall be obtained prior to start of quarrying activity. The contractor should also make a concerted effort to re-use as much excavated material from this project as possible. The construction contractor will be required to:
(i) Obtain construction materials only from government approved quarries with prior approval of PIU;
(ii) PIU to review, and ensure that proposed quarry sources have all necessary clearances/permissions in place prior to approval;
(iii) Contractor to submit to PIU on a monthly basis documentation on material obtained from each sources (quarry/ borrow pit); and
(iv) Avoid creation of new borrow areas, quarries etc., for the project; if unavoidable, contractor to obtain all clearances and permissions as required under law, including Environmental Clearance (EC) prior to approval by PIU.

144. **Handling and disposal of accumulated solid Waste in existing storm water drains.**

The subproject includes desilting of existing road-side storm water drains of 26 km length in Rajnagar. Due to entry of wastewater from houses, septic tanks, indiscrimante disposal of solid waste, street sweepings etc., these open drains are filled with solid waste, mostly inert material. This leads to blockage of flow and overflow, creating in sanitatary conditions in the town. Therefore, it is proposed to desilt the drains, and clear of the solid waste, and rehabilitate the drains as required ensuring smooth flow. As the sewerage system is being provided, there will be no discharge of wastewater into the drains. However, awareness is necessary to avoid throwing of solid waste into the drains. It is estimated that the desilting work of existing drains will generate about 4700 m$^3$ of solid waste. The handling of this accumulated waste/silt will involve occupational health and safety issues to the workers engaged for such work and also to the people residing close to the work site. This is because the waste handling and working conditions will be harmful. Proper health and safety precautions are necessary. Improper disposal of this accumulated waste will also lead to pollution of land, and water bodies. Following measures are to be implemented:

(i) Prepare a drain desilting management plan for the work, considering cleaning, handling, disposal and occupational and public health safety;
(ii) Assess the working conditions, develop appropriate working method, and work shall be only conducted under continuous supervision of EHS supervisor;
(iii) Waste shall not be handled manually; use appropriate equipment;
(iv) All workers shall be provided with necessary personal protection equipment, including gloves, boots; for deep drain work, and drains that are clogged for long time, PPEs like face/gas masks and oxygen cylinders in handy for emergency use shall be provided.; if gas emission is suspected at any point of time, workers shall use gas masks with oxygen cylinders;
(v) Inform surrounding public about the work;
(vi) Fire control and safety equipment shall be provided at the work site;
(vii) Waste shall be properly covered during transport;
(viii) Conduct quality test on accumulated silt/solid waste;
(ix) Manage the solid waste as per the Solid Waste Management Rules, 2016, identify a disposal site prior to start of the desilting work, and disposal shall be as appropriate for the quality of solid waste/silt;
(x) Provide proper bunding around disposal site, so that leachate/wastewater from the waste is not enters into other areas; contain the flow, and allow solar evaporation; and
(xi) It is likely that most of the waste contain inert material, and properly dried material may be become free of pathogens and harmless; conduct proper tests, and if found suitable and harmless, and utilize the material in construction purposes.
145. **Air Quality.** Construction work, especially from earthwork activities, coupled with dry and windy working conditions, material and debris transport, and works along the public roads carrying significant traffic, have high potential to generate dust. Significant quantities of earthwork will be conducted in the subproject, spread all over the project area. 95% of the excavated soil will be reused for filling the trenches. Also, emissions from construction vehicles, equipment, and machinery used for excavation and construction will induce impacts on the air quality. Anticipated impacts include dust and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons. Dust generation from construction work in individual and confined work sites like STP, pumping stations etc., will be mainly during the initial construction phase of earth work, as the site is confined, dust can be effectively controlled with common measures. STP and SPS and lifting stations are located mostly outside the town, away from habitation area. Dust generation will be significant during sewer laying and drainage works along the roads. Increase in dust/ particulate matter in ambient air is detrimental, and may have adverse impacts on people and environment. To mitigate the impacts, construction contractors will be required to:

**For all construction works**

(i) Provide a dust screen around STP and SPS worksites;
(ii) Damp down the soil and any stockpiled material on site by water sprinkling;
(iii) Stabilize surface soils where loaders, support equipment and vehicles will operate by using water and maintain surface soils in a stabilized condition;
(iv) Apply water prior to levelling or any other earth moving activity to keep the soil moist throughout the process;
(v) Cover the soil stocked at the sites with tarpaulins;
(vi) Control access to work area, prevent unnecessary movement of vehicle, public trespassing into work areas; limiting soil disturbance will minimize dust generation;
(vii) Use tarpaulins to cover the loose material (soil, sand, aggregate etc.,) when transported by open trucks;
(viii) Control dust generation while unloading the loose material (particularly aggregate, sand, soil) at the site by sprinkling water and unloading inside the barricaded area;
(ix) Clean wheels and undercarriage of haul trucks prior to leaving construction site; and
(x) Ensure that all the construction equipment, machinery are fitted with pollution control devises, which are operating correctly, and have a valid pollution under control (PUC) certificate.

**Additional measures for sewer and drainage works**

(i) Barricade the construction area using hard barricades;
(ii) Initiate site clearance and excavation work only after barricading of the site is done;
(iii) Confinе all the material, excavated soil, debris, equipment, machinery (excavators, cranes etc.,) to the barricaded area;
(iv) Limit the stocking of excavated material at the site; remove the excess soil from the site immediately to the designated disposal area;
(v) Undertake the work section wise; and conduct work sequentially - excavation, sewer laying, backfilling; testing section-wise, if required (for a minimum length as possible) so that backfilling, stabilization of soil can be done;
(vi) Remove the excavated soil of first section to the disposal site; and
(vii) Backfilled trench at any completed section after removal of barricading will be the main source of dust pollution. The traffic, pedestrian movement and wind will...
generate dust from backfilled section. Road restoration shall be undertaken immediately.

146. **Surface Water Quality.** Run-off from stockpiled materials and chemicals from fuels and lubricants during construction works can contaminate water quality of the receiving water bodies and streams/ribers. There are lakes in the project area, and which mostly drains into these lakes: Jal sena Lake, Dhanora and into Dhandhera lakes. It is important that runoff from the construction areas, which may contain silt and chemical traces do not enter the river and the water bodies. Impact will be temporary, and but needs to be mitigated. Construction contractor will be required to:

(i) All earthworks be conducted during the dry season to prevent the problem of soil/silt run-off during rains;
(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, only designated disposal areas shall be used;
(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) Store fuel, construction chemicals etc., on an impervious floor, also avoid spillage by careful handling; provide spill collection sets for effective spill management
(vii) Dispose any wastes generated by construction activities in designated sites; and
(viii) Conduct surface quality inspection according to the Environmental Management Plan (EMP).

147. It proposed repair and rehabilitate existing 2.6 km of drains. During this time, the flow in the drains will be stopped, and if an alternative arrangement or stoppage of flow from source is not initiated, this may lead to water logging, and create insanitary conditions, as these drains mostly carry wastewater from the houses. Following measures shall be implemented:

(i) Conduct the drain repair and rehabilitation work section-wise;
(ii) Isolate the section, and inform the upstream and adjoining houses that use the drain about the work, and the need to minimize the discharge to the extent possible;
(iii) Provide a bypass arrangement, in the form of a pipe or temporary drain, for isolated section so that flow is restored so that there is no accumulation or water logging; and
(iv) If necessary, use the pumps to lift the collected water into mobile tankers and discharge at an pre identified site; at no point, there shall be stagnation of water due to work.

148. **Surface and Groundwater Quality.** Another physical impact that is often associated with excavation is the effect on drainage and the local water table if groundwater and surface water collect in the voids. In the project area, groundwater table is much deeper than the anticipated excavation depth and therefore this impact is not envisaged. However, during the rains, water will be collected in open pits and trenches. The water collected in excavated pits will contain silt and disposal of this in drainage channels lead to silting. To avoid this the contractor needs to be implement the following measures:
(i) As far as possible control the entry of runoff from upper areas into the excavated pits, and work area by creation of temporary drains or bunds around the periphery of work area;

(ii) Pump out the water collected in the pits / excavations to a temporary sedimentation pond; dispose off only clarified water into drainage channels/streams after sedimentation in the temporary ponds; and

(iii) Consider safety aspects related to pit collapse due to accumulation of water.

149. **Generation of Construction Wastes.** Solid wastes generated from the construction activities are excess excavated earth (spoils), discarded construction materials, cement bags, wood, steel, oils, fuels and other similar items. Domestic solid wastes may also be generated from the workers’ camp. Improper waste management could cause odor and vermin problems, pollution and flow obstruction of nearby watercourses and could negatively impact the landscape. 95% of the excavated soil will be reused, and the remaining soil needs to be disposed safely. The following mitigation measures to minimize impacts from waste generation shall be implemented by the contractor:

(i) Prepare and implement a Construction Waste (Spoils) Management Plan;

(ii) As far as possible utilize the debris and excess soil in construction purpose, for example for raising the ground level or construction of access roads etc;

(iii) Avoid stockpiling any excess spoils at the site for long time. Excess excavated soils should be disposed off to approved designated areas immediately;

(iv) If disposal is required, the site shall be selected preferably from barren, infertile lands; sites should have located away from residential areas, forests, water bodies and any other sensitive land uses;

(v) Domestic solid wastes should be properly segregated in biodegradable and non-biodegradable for collection and disposal to designated solid waste disposal site; create a compost pit at worker’s camp sites for disposal of biodegradable waste; non-biodegradable / recyclable material shall be collected separately and sold in the local recycling material market;

(vi) Residual and hazardous wastes such as oils, fuels, and lubricants shall be disposed off in disposal sites approved by MPPCB;

(vii) Prohibit burning of construction and/or domestic waste;

(viii) Ensure that wastes are not haphazardly thrown in and around the project site; provide proper collection bins, and create awareness to use the dust bins; and

(ix) Conduct site clearance and restoration to original condition after the completion of construction work; PIU to ensure that site is properly restored prior to issuing of construction completion certificate.

150. **Noise and Vibration Levels.** Components are located within urban area, where there are houses, schools and hospitals, religious places and businesses in the surrounding area. 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 for laying of sewers, operation of construction equipment, 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. At the STP site, there are rock outcrops, which may required to be removed partially to maintain required levels for construction work. Rock cutting, blasting may be required. This will generate significant noise and vibration. Although there are no houses nearby, the noise and vibration needs to be properly controlled. This impact is negative short-term, and minimized 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) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and use portable street barriers to minimise sound impact to surrounding sensitive receptor; and 
(iii) Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s.
(iv) Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity;
(v) Horns should not be used unless it is necessary to warn other road users or animals of the vehicle’s approach;
(vi) Consult 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.
(vii) As far as possible avoid blasting to remove rocks at STP site, use chiselling instead
(viii) In unavoidable cases, obtain permission from the explosives department, and work shall be conducted as per the conditions and guidelines issued by the department
(ix) Blasting permission shall be submitted to the PIU, and work shall be initiated only after due permission from the PIU
(x) All workers shall be made aware of the guidelines 2 days prior to the work, and guidelines in local language shall be prominently displayed on the site
(xi) Timings of blasting work shall be as per the permission issued by Explosives Department; as far as possible, blasting work shall be conducted in the early morning hours (5 - 7 AM).
(xii) All necessary measures as suggested by Explosives department to contain noise and vibration shall be followed strictly
(xiii) PIU and PMC shall supervise and ensure that all measures are in place, and then issue go ahead for the blasting work
(xiv) Document the pre and post condition of area and surrounding, within its impact zone, in terms of photos and video
(xv) Surrounding population shall be made aware of the work at least 1 week before, and again day before the work; information shall be provided on the nature of work, expected noise, vibration, duration of work etc., and any precautions

151. **Accessibility and Traffic Disruptions.** Excavation along the roads for laying of sewers, hauling of construction materials and operation of equipment on-site will cause traffic problems. Main roads carrying traffic in the subproject area include the following:

(i) Khajuraho Rajnagar Road  
(ii) Main Market Road Rajnagar  
(iii) Bus Stand Road Raj Nagar  
(iv) Jalsena Talab road  
(v) Mohalla Road Rajnagar

152. Internal roads in Rajnagar are narrow, however, the major commercial spine of the town is comparatively widest in the hierarchy having width of approximately 5-8 m in Rajnagar. Most of the roads in Rajnagar are surfaced with cement concrete. Residential areas roads are narrow. At some places there are haphazard interwoven small lanes. Commercial activities in the town are concentrated on few main roads like market road, that carries considerable traffic,
activities, and pedestrians.

Details of Diameter Wise Proposed Trench Width & Depth- Rajnagar

<table>
<thead>
<tr>
<th>Pipe Diameter</th>
<th>Min. Depth (m)</th>
<th>Max. Depth (m)</th>
<th>Average Trench Width (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>1.2</td>
<td>2.5</td>
<td>1.20</td>
</tr>
<tr>
<td>175</td>
<td>1.2</td>
<td>3.0</td>
<td>1.2</td>
</tr>
<tr>
<td>215</td>
<td>1.5</td>
<td>2.0</td>
<td>1.30</td>
</tr>
<tr>
<td>260</td>
<td>2.0</td>
<td>4.03</td>
<td>1.80</td>
</tr>
<tr>
<td>400</td>
<td>2.0</td>
<td>4.63</td>
<td>2.30</td>
</tr>
<tr>
<td>450</td>
<td>2.0</td>
<td>4.45</td>
<td>2.30</td>
</tr>
</tbody>
</table>

153. Internal roads in the town are very narrow. Traffic movement will be mostly disrupted. Works related to all the remaining components (pumping stations and STP) will be confined to the selected sites, therefore there is no direct interference of these works with the traffic and accessibility. Hauling of construction material, equipment, construction waste, etc., to and from the work site may increase the road traffic on local roads. This will further inconvenience the local community and road users. Potential impact is negative but short term and reversible by mitigation measures. The construction contractor will be required to:

Sewer and drain works

(i) Prepare a sewer and drainage work implementation plan; ensure that for each road where the work is being undertaken there is an alternative road for the traffic movement; take up the work in sequential way so that public inconvenience is minimal;

(ii) Provide temporary diversions, where necessary and effectively communicate with general public;

(iii) Undertake the work section wise;

(iv) Confine work areas in the road carriageway to the minimum possible extent; all the activities, including material and waste/surplus soil stocking should be confined to this area;

(v) Proper barricading should be provided; avoid material/surplus soil stocking in congested areas – immediately removed from site/ or brought to the as and when required;

(vi) Limit the width of trench excavation as much as possible by adopting best construction practices; adopt vertical cutting approach with proper shoring and bracing; this is especially to be practiced in narrow roads and deeper sewers; if the deep trenches are excavated with slopes, the roads may render completely unusable during the construction period;

(vii) Leave spaces for access between mounds of soil to maintain access to the houses / properties; access to any house or property shall not be blocked completely; alternative arrangements, at least to maintain pedestrian access at all times to be provided;

(viii) Provide pedestrian access in all the locations; provide wooden/metal planks over the open trenches at each house to maintain the access;

(ix) Inform the affected local population 1-week in advance about the work schedule;
(x) Plan and execute the work in such a way that the period of disturbance/ loss of access is minimum;
(xi) Keep the site free from all unnecessary obstructions;
(xii) Notify affected public by public information notices, providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints. Provide information to the public through media – newspapers and local cable television (TV) services; and
(xiii) At work site, public information/caution boards shall be provided including contact for public complaints.

Additional measures for culvert works
(i) As the works are conducted on roads where the drains crosses, road will be required to be closed to conduct the work, which will restrict the movement of local people;
(ii) If blockage of road is necessary, minimize the blockage section as far as possible;
(iii) Identify alternative road, and provide proper information boards both the ends of blocked road;
(iv) Ensure that access to any house/property is not completely blocked; at least maintain pedestrian access;
(v) Provide prior public information to public on the work and blockage;
(vi) As far as possible avoid complete blocking of road, but taking up the work in two parts; the width of the culvert ranges from 6-8 m, therefore work in half portion can allow the traffic movement in other lane (atleast pedestrian, and 2 and 3-wheeler traffic); and
(vii) Provide proper barricading around the site; ensure that no pedestrian, or vehicles entry into the work area.

Hauling (material, waste/debris and equipment) activities
(i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
(ii) Schedule transport and hauling activities during non-peak hours;
(iii) Drive vehicles in a considerate manner; and
(iv) Notify affected public by public information notices, providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.

154. **Socio-Economic – Income.** Sites for all projects components are carefully selected in government owned vacant lands and therefore there is no requirement for land acquisition or any resettlement. Blocking of access to the business / livelihood activities, especially during sewer laying and drain works along the roads, may impact the income of households. Some shops and other premises along the roads may lose business income if the access will be impeded by excavation of trenches. Access disruption to socio cultural places will inconvenience public. Implementation of the following best construction measures will avoid the disturbance reduce the inconvenience and disturbance to the public. Resettlement and social issues are being studied in a parallel resettlement planning study of this subproject.

(i) Inform all businesses and residents about the nature and duration of any work well in advance so that they can make necessary preparations;
(ii) Do not block any access; leave spaces for access between barricades/mounds of excavated soil and other stored materials and machinery, and providing footbridges so that people can crossover open trenches

(iii) Barricade the construction area and regulate movement of people and vehicles in the vicinity, and maintain the surroundings safely with proper direction boards, lighting and security personnel – people should feel safe to move around

(iv) Control dust generation

(v) Immediately consolidate the backfilled soil and restore the road surface; this will also avoid any business loss due to dust and access inconvenience of construction work.

(vi) Employee best construction practices, speed up construction work with better equipment, increase workforce, etc., in the areas with predominantly commercial, and with sensitive features like hospitals, and schools;

(vii) Consult businesses regarding operating hours and factoring this in work schedules; and

(viii) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.

155. Socio-Economic – Employment. Manpower will be required during the 24-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 local labour force as far as possible.

156. Occupational Health and Safety. Workers need to be mindful of the occupational hazards which can arise from working in confined areas such as trenches, working at heights, near the heavy equipment operating areas etc., Maximum depth of sewer is 4.63 m, while this will be for a limited length, most of the sewers will be laid around 1-2 m deep. Maximum depth of storm water drain proposed is 3 m, for a length of 4 km. Proper measures are necessary to protect the workers from any accident due to collapse of trenches. As the works are conducted in an urban area and drains and sewers will be constructed along the roads, and adjacent to houses, there is a risk of damage to houses due to deep excavations along the structures. Potential impacts are negative and long-term but avoidable by mitigation measures.

157. The construction contractor will be required to:

(i) Follow all national, state and local labour laws;

(ii) Following best practice health and safety guidelines: IFC’s General EHS Guidelines and Sector Specific (Water and Sanitation) Guidelines;

(iii) Develop and implement site-specific Occupational Health and Safety (OHS) Plan which shall include measures such as: (a) safe and documented construction procedures to be followed for all site activities; (b) ensuring all workers are provided with and use personal protective equipment; (c) OHS Training for all site workers.

---

7 https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES

8 https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES

9 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;
personnel; (d) excluding public from the work sites; and (e) documentation of work-related accidents;

(iv) Develop site specific OHS plan for rock blasting works, deep sewer and drain works and deep drain works, STP and SPS works;

(v) Develop and implement detailed site specific health and safety plan with measures to manage COVID-19 impacts in accordance with national and local requirements and international guidelines of WHO, IFC, etc.

(vi) Conduct work in confined spaces, trenches, and at height with suitable precautions and using standards and safe construction methods; do not adopt adhoc methods; all trenches deeper than 1.5 m shall be provided with safety shoring/braces; verify the stability of adjacent houses, provide proper anchors, supports where necessary;

(vii) Ensure that qualified first aid is provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;

(viii) Provide medical insurance coverage for workers;

(ix) Secure all installations from unauthorized intrusion and accident risks;

(x) Provide health and safety 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;

(xi) The project area experiences very high temperature during summer months of April, May and June, which may affect the health of workers engaged in construction work. Contractor should take necessary measures during summers including the following: Work schedule should be adjusted to avoid peak temperature hours (12 – 3 PM); provide appropriate shade near the workplace; allow periodic resting and provide adequate water; Provide necessary medicine and facilities to take care of dehydration related health issues;

(xii) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;

(xiii) Ensure moving equipment is outfitted with audible back-up alarms;

(xiv) 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;

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

(xvi) Provide supplies of potable drinking water;

(xvii) Provide clean eating areas where workers are not exposed to hazardous or noxious substances;

(xviii) Provide H and S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers;

(xix) Conduct regular health check-ups for workers; and

(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.
Provide periodical awareness camps and special trainings for workers for health issues and risks in construction sites.

Impacts due to COVID19 Pandemic: In light of covid19 Pandemic, potential biological hazards in municipal waste, water and waste management practices may be anticipated. Municipal waste and sewage may contain disease-causing organisms that may be dispersed in water or air. Disinfection and containment will follow WHO’s guidance on water, sanitation, hygiene and waste management for the COVID-19 virus and to be considered in the detailed engineering design to avoid any risks of diseases or illnesses to the workers and the community such as the spread of viruses. Site specific EMP’s developed in such situations will follow international guidelines and any other WHO or national guidelines that may be applicable.

158. **Community Health and Safety.** Sewer and drainage works and deep excavations along the roads and narrow streets and hauling of equipment and vehicles have potential to create safety risks to the community. Deep excavations without any proper protection may endanger the close by buildings. Maximum depth of sewer is 4.63 m, while this will be for a limited length, most of the sewers will be laid around 1-2 m deep. Maximum depth of storm water drain proposed is 3 m, for a length of 4 km. Proper measures are necessary to protect the workers from any accident due to collapse of trenches. As the works are conducted in an urban area, and drains and sewers will be constructed along the roads, and adjacent to houses, there is a risk of damage to houses due to deep excavations along the structures. Hazards posed to the public, specifically in high-pedestrian areas may include traffic accidents and vehicle collision with pedestrians. Proper precautions need to be taken to ensure the workers operations to the site, so that there is no disturbance or safety risk to the residents.

159. Potential impact is negative but short-term and avoidable by mitigation measures. The construction contractor will be required to:

(i) Confining work areas; prevent public access to all areas where construction works are on-going through the use of barricading and security personnel;

(ii) Attach warning signs, blinkers to the barricading to caution the public about the hazards associated with the works, and presence of deep excavation;

(iii) Minimize the duration of time when the sewer/drain trench is left open through careful planning; plan the work properly from excavation to refilling and road relaying;

(iv) Control dust pollution – implement dust control measures as suggested under air quality section;

(v) Ensure appropriate and safe passage for pedestrians along the work sites;

(vi) Provide road signs and flag persons to warn of on-going trenching activities;

(vii) Restrict construction vehicle movements to defined access roads and demarcated working areas (unless in the event of an emergency);

(viii) Enforce strict speed limit (20 kmph) for plying on unpaved roads, construction tracks;

(ix) At sensitive locations particularly where there are schools and markets close to the road, awareness of safety issues will be raised through neighbourhood awareness meetings;

---

10 Useful guidance notes:


(iii) IFC Interim advice on supporting workers in the context of COVID-19
All drivers and equipment operators will undergo safety training; and
Maintain regularly the construction equipment and vehicles; use manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.

**Additional Safety during trench excavation**

(i) Trench excavation, especially for deep sewer and drain works shall be conducted in a safe manner; if 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; appropriate methods of open excavation for deep trenches like more than 2 m shall be planned to avoid any trench collapse;

(iii) Survey the surrounding buildings for likely issues in structural stability / differential settlement during the excavation works; take necessary precaution, structural safety measures to avoid any potential risk to adjacent buildings; the need for temporary evacuation of occupants in the nearby houses should be clearly evaluated prior to the start of work;

(iv) Provide prior information to the local people about the nature and duration of work;

(v) Conduct awareness program on safety during the construction work;

(vi) Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day; and

(vii) Provide hard 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 Camps.** Contractor may require to set up construction camps – for temporary storage of construction material (sewer, cement, steel, fixtures, fuel, lubricants etc.,), and stocking of surplus soil, and may also include separate living areas for migrant workers. The contractor will however be encouraged to engage local workers as much as possible. Operation of work camps can cause temporary air, noise and water pollution, and may become a source of conflicts, and unhealthy environment if not operated properly. 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) Select a camp site away from residential areas (at least 100 m buffer shall be maintained) or locate the camp site within the existing facilities of City Corporation

(iii) Avoid tree cutting for setting up camp facilities;

(iv) Provide a proper fencing/compound wall for camp sites;

(v) Camp site shall not be located near (100 m) water bodies, flood plains flood prone/low lying areas, or any ecologically, socially, archeologically sensitive areas;

(vi) Separate the workers living areas and material storage areas clearly with a fencing and separate entry and exit;

(vii) 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
(viii) Camps shall be provided with proper drainage, there shall not be any water accumulation;

(ix) Provide drinking water, water for other uses, and sanitation facilities for employees;

(x) Prohibit employees from cutting of trees for firewood; contractor should provide cooking fuel (cooking gas); firewood not allowed;

(xi) Train employees in the storage and handling of materials which can potentially cause soil contamination;

(xii) Wastewater from the camps shall be disposed properly either into sewer system; if sewer system is not available, provide on-site sanitation with septic tank and soak pit arrangements;

(xiii) Recover used oil and lubricants and reuse or remove from the site;

(xiv) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; provide a compost pit for biodegradable waste, and non-biodegradable / recyclable waste shall be collected and sold in local market;

(xv) Remove all wreckage, rubbish, or temporary structures which are no longer required; and

(xvi) At the completion of work, camp area shall be cleaned and restored to pre-project conditions, and submit report to PIU; PIU to review and approve camp clearance and closure of work site.

C. Operation and Maintenance Impacts

161. Operation and Maintenance of the sewerage system will be carried out by DBO operation for a duration of 10 years, and after which it will be transferred to Rajnagar Nagar Parishad. During the system design life (15/30 years for mechanical/civil components) it shall not require major repairs or refurbishments and should operate with little maintenance beyond routine actions required to keep the equipment in working order. The stability and integrity of the system will be monitored periodically to detect any problems and allow remedial action if required. Any repairs will be small-scale involving manual, temporary, and short-term works involving regular checking and recording of performance for signs of deterioration, servicing and replacement of parts.

162. 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. The treatment technology (SBR) is modern, compact, and currently widely used, and approved by the Central Public Health and Environmental Engineering Organization (CPHEEO). The proposed design discharge values of SBR based STP treated effluent is much stringent than the standards specified by the Ministry of Environment, Forest and Climate Change (MOEFCC) for discharge from STPs (Notification dated 13th October 2017 for the discharge of treated sewage from STPs).

163. The proposed STP site is located close to Dhandhera Talab, and the treated wastewater will be discharged into it, and will be utilized for agricultural purposes. There is a small stream, that carries the overflow. This is mostly dry and runs towards north and joins Gadaraya Nadi (a small river), which in turn flows northeast / east, and joins Kutni River. Water quality assessment of Dhandhera Talab will be conducted during the detailed design phase. However, given the nature of water accumulated in the lake, the quality is ought to be poor, and discharge of treated
wastewater meeting the stringent discharge standards will improve the water quality. Moreover, once the sewerage system operation starts, wastewater including both sullage and sewage from the houses will no more be discharged into open and that it will not flow in lakes like Dhandhera. This will improve the quality of environment significantly. Therefore, no negative impacts envisaged. 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. Proper systems should be put in place at the proposed STP to ensure that treated wastewater at all times meet the stipulated standards prior to its discharge.

164. STP operational procedures will be firmed up during the detailed design phase. 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.

165. 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. It also requires contractor to establish a platform/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. The norms for safe use of processed sludge as fertilizer and soil conditioner are discussed in this IEE in design impacts. 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.

166. 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 at 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) 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;

(iii) 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;

(iv) Ensure valid consent to operate (CTO) from MPCB for operation of STP;

(v) Ensure that all conditions/standards prescribed by MPCB are compiled duly;

(vi) 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;
(vii) Ensure proper knowledge transfer, hands-on training to municipal staff engaged in STP operation has been provided by contractor prior to handover of facility;

(viii) Operate and maintain the facility following standard operating procedures of operational manual;

(ix) Undertake preventive and periodic maintenance activities as required; and

(x) 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.

167. **Sewer network.** The sewer pipes will not function without maintenance, as silt inevitably collects in areas of low flow over time. The project contractor will therefore provide equipment for cleaning the sewers, including buckets and winches to remove silt via the inspection manholes, diesel-fuelled pumps to remove blockages, and tankers to transport the waste hygienically to the STP. Piped sewers are not 100% watertight and leaks can occur at joints. Any repairs will be conducted by sealing off the affected sewer and pumping the contents into tankers, after which the faulty section will be exposed and repaired following the same basic procedure as when the sewer was built. Trenches will be dug around the faulty section and the leaking joint will be resealed, or the pipe will be removed and replaced.

168. There are also certain environmental risks from the operation of the sewer system including sewage pumping stations. 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:
   (a) 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
   (b) 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
   (c) Monitoring of sewer flow to identify potential inflows and outflows
   (d) 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 mentales, or sewer line blockages);

(ii) Maintain records; 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) Provide necessary health and safety training to the staff in sewer cleaning and maintenance;

(vi) Provide all necessary personnel protection equipment;

(vii) Do not conduct manual cleaning of sewers; for personnel engaged sewer maintenance work, there is a risk due to oxygen deficiency and harmful gaseous emissions (hydrogen sulphide, methane, etc.); provide for adequate equipment (including oxygen masks) for emergency use;

(xi) Develop an Emergency Response System for the sewerage system leaks, burst and overflows, etc;

(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) Ensure that maintenance staff and supervisors understand the risks; provide proper instructions, training and supervision;

(xv) Use gas detector to detect any hazardous or inflammable gas in confined areas like sewers /manholes prior to maintenance process;

(xvi) 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;

(xvii) Provide adequate welfare facilities, including clean water, soap, nail brushes, disposable paper towels, and where heavy contamination is foreseeable, showers;

(xviii) For remote locations portable welfare facilities should be provided;

(xix) Areas for storage of clean and contaminated equipment should be segregated and separate from eating facilities;

(xx) Provide adequate first-aid equipment, including clean water or sterile wipes for cleansing wounds, and a supply of sterile, waterproof, adhesive dressings;

(xxii) Keep emergency preparedness plan ready before starting the work of sewage system cleaning.

169. The rehabilitated and expanded storm water drainage system should function smoothly but require regular cleaning and desilting will be required. Once the sewerage system is operational, the entry of wastewater, both sullage and sewage, into storm water drains will be prevented. Therefore, the drains will normally be dry except during the rains. At present indiscriminate disposal of solid waste is common. This should be prevented by creating proper awareness among the general public.

170. The citizens of Rajnagar Nagar Parishad will be the major beneficiaries of the improved sewerage and drainage system. The project will improve the over-all health condition of the town as water borne diseases will be reduced, 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. This should also improve the quality of environment, water quality of lakes and water bodies and, should deliver major improvements in individual and community health and well-being.
VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Overview

171. 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 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 are a must as per the ADB policy.

172. 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 near sites where facilities will be built (STP), and government and utility agencies responsible for provision of services in Rajnagar, Forest Department and Madhya Pradesh Pollution Control Board. Archeological survey of India, Secondary stakeholder are: NGOs and CBOs working in the area, community representatives, beneficiary community in general, government agencies, the executing and implementing agencies (MPUDC, PMU and PIUs), Government of India and the ADB.

B. Public Consultation

173. The public consultation and disclosure program is a continuous process throughout the project implementation, including project planning, design and construction.

1. Consultation during Project Preparation

174. Various consultations have been carried out with different type of stakeholders right from the planning of the subproject. The subproject proposal is formulated in consultation with office of the Nagar parishad Rajnagar. Consultations were conducted at municipal office and at various places in the town in June and October 2017. In All 93 stakeholders participated in these multiple meetings, which include 23 female and 70 male participants. Stakeholders include elected representatives of Rajangar Nagar Parishad, general public community representatives, officials of Nagar Parishads etc., Details of consultations are provided in Appendix 10.

175. It was observed that people are willing to extend their cooperation as the project activities are proposed to enhance the infrastructure service levels and the living standard of the public.

(i) Local people have appreciated the wastewater management proposal of the government and they have ensured that they will cooperate with the Executing Agency during project implementation

(ii) All the stakeholders were supportive of the project and indicated their willingness to participate in the project to make it successful.

(iii) Stakeholders were of the view that these subprojects provide benefits to all the people by improving sewerage.
(iv) Stakeholders are concerned about the pollution of water bodies due to entry of wastewater. It was explained that this subproject will mitigate this problem by effectively collecting, treating the sewage.

176. **Stakeholders suggested** that: (i) Local people should be employed by the contractor during construction work; (ii) Adequate safety measures should be taken during construction work; (iii) utility shifting should be properly planned before execution of the work; (iv) Road restoration should be carried out properly; and (v) Proposed waste water management project should ensure proper hygienic disposal of wastewater from all wards of the town.

### 2. Consultation during construction

177. Prior to start of construction, ULB and PIU with the assistance of PDMC will conduct information dissemination sessions at various places and solicit the help of the local community, leaders/prominent for the project work. 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.

178. A constant communication will be established with the affected communities to redress the environmental issues likely to surface during construction phases and also regarding the grievance redress mechanism ULB/PIU and PDMC 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. Contractor will provide prior public information (in Hindi) about the construction work in the area, once 7 days prior to the start of work and again a day before the start of work via pamphlets. At the work sites, public information boards will also be provided to disseminate project related information.

### C. Information Disclosure

179. During the consultation, information about the project is reported in the leading vernacular news papers *(Appendix 11)*. Executive summary of the IEE will be translated in Hindi and made available at the offices of PMU, PIU, Nagar Parishad offices, and also displayed on their notice boards 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 MPUDC, PMU after approval of the IEE by Government and ADB. Stakeholders will also be made aware of grievance register and redress mechanism.

180. Public information campaigns 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 PMU/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.

181. 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.
VII. GRIEVANCE REDRESS MECHANISM

A. Project Specific Grievance Redress Mechanism

182. Grievance Redress Mechanism (GRM) is a part of project management that is likely to increase accountability and responsiveness among service providers and provide a friendly environment to the beneficiaries of the project. GRM is considered a tool to measure efficiency and effectiveness of the project as it provides important feedback on the project management. Effectively addressing public grievances is a core component of managing risks under Asian Development Bank (ADB) projects according to the Safeguard Policy Statement (Safeguard Requirement 2: Involuntary Resettlement, Pages 49-50, June 2009) – “The borrower/client will establish a mechanism to receive and facilitate the resolution of affected persons’ concerns and grievances about physical and economic displacement and other project impacts, paying particular attention to the impacts on vulnerable groups. The grievance redress mechanism should be scaled to the risks and adverse impacts of the project. It should address affected persons’ concerns and complaints promptly, using an understandable and transparent process that is gender responsive, culturally appropriate, and readily accessible to the affected persons at no costs and without retribution. The mechanism should not impede access to the country’s judicial or administrative remedies. The borrower/client will inform affected persons about the mechanism”. The statement allows the formation of grievance redress committee in the project areas to facilitate the concerns of affected people under the project areas.

B. Purpose of the GRM Manual:

183. This document describes the procedure that shall be followed by the Madhya Pradesh Urban Development Company Limited (MPUDCL) under Madhya Pradesh Urban Services Improvement project (MPUSIP) to address complaints or concerns shared by people affected due to project related interventions.

184. The present document intends to provide clarity to project stakeholders on the grievance redress mechanism procedures to be followed under the project. The document provides clarity on how the complaint shall be received, registered, sorted, assessed, resolved and monitored under MPUSIP. This also includes action plans to be followed for effective implementation.

C. Principles:

185. The GRM is based on the following principles and the same shall be used to assess the GRM performance:

(i) Accessibility
   (a) The GRM shall be accessible to all people residing in the project area. It shall be available and provide assistance to all project affected people irrespective of language, literacy level, or cost. Project affected people shall access the GRM without fear of reprisal.
   (b) Information on the GRM will be disseminated using various means to ensure people know about GRC, its members and procedures.

(ii) Predictability
   (a) The GRM shall offer clear procedures with time frames for each stage and clarity on the type of results it can and cannot deliver.
(iii) **Transparency**  
(a) The GRM shall operate in such a way that it is easy for others to see what actions are being performed. This will be undertaken through disclosure of all information to the public and affected people.

(iv) **Credibility**  
(a) The performance of the GRM shall enable affected people to accept and believe that the mechanism works, delivers results and is trustworthy.

(v) **Fairness**  
(a) The GRM procedures shall be perceived as fair, especially in terms of access to information, and opportunities for meaningful participation in the final decision. Its outcome should be consistent with applicable national standards and should not restrict access to other redress mechanisms.

(vi) **Feedback**  
(a) The GRM shall serve as a means to channel citizen feedback to improve project outcomes for the people.  
(b) It is difficult to avoid Grievances totally but much can be done to minimize and manage complaints in order to reduce impacts.

D. **Nature and scope of Grievance Redress Mechanism under MPUSIP**

186. GRM aims to address complaints of local affected people because of project interventions in the selected towns (64 towns) of MPUSIP during the project period.

187. MPUSIP predicts public complaints because of the nature of the project during the design, implementation and operation & maintenance stage of the project. In the design phase, people are expected to raise inconveniences with regards to land acquisition, compensation amount, compensation procedure and environmental issues. During project implementation, grievances may come from individuals or a particular group of people in relation to construction related inconveniences such as dust, noise, blocking drainage, damage roads, walls/boundaries of property and its impact on their daily lives in addition to land acquisition, and compensation. Issues related to corruption shall not be considered by the Grievance Redress Committee (GRC). Corruption related issues shall be forwarded to the State GRC (PMU) directly by the Chairperson of town level GRC at the time of sorting of grievances. The structure, functions of GRC, monitoring & evaluation systems and action plan of its implementation is described below:

E. **Structure of GRM and its Functions**

188. The GRM will have a three-tier decision making process. The first tier which is at the town level aims to resolve all construction related grievances which require quick and efficient action. The second tier which is at the project implementation unit (PIU) will handle complaints that could not be resolved by the first tier level and/or grievances related to land acquisition and compensation. The third tier which is at the project management unit (PMU) or state level will handle complaints which are over and above the scope for the first and second tier and/or complaints which could not be resolved by the first and second tier levels.

189. Contact numbers of GRC Chair-person and members, CDO and contractor's focal person will be placed at appropriate locations like construction sites, ULB office etc.
190. The three-tier Grievance Redress Mechanism under MPUSIP is described below:

1. **1st tier (at town level):**
   
   (i) **Composition of the Grievance Redress Committee (GRC):**
   
   (a) A representative of Chief Municipal Officer associated with Urban Local Body, Chairperson;
   (b) CDO of ULB designated/nominated by ULB.
   (c) Field Engineer of Project Management Consultants;
   (d) Focal person (GRC Person) of DBO contractor of respective town;
   (e) Field Engineer of concerned ULB designated by the respective PIU, Secretary;

   (ii) **Major Functions: The major functions of town level GRC is as follows:**

   (a) Registration of Grievances by the Local person (GRC Person) of DBO contractor of respective town Sorting of Grievances by Focal person (GRC Person) of DBO contractor of respective town and Chairperson;
   (b) Forwarding grievances to concerned authorities i.e. Site Engineer for resolution;
   (c) Information to the complainant on the decision taken to address registered complaint and expected time to resolve issue;
   (d) Resolution of issues emerged due to construction;
   (e) Feedback to the complainant on action completed against registered complaint and seeking complainant feedback on level of satisfaction;
   (f) Closure of grievances by CDO-ULB or forwarding of complaint to PIU GRC if grievance remains unresolved.

2. **2nd Tier (at PIU level):**

   (i) **Composition of the PIU level GRC:**

   (a) Project Manager, associated with Project Implementation Unit (PIU) of Madhya Pradesh
   (b) Urban Development Company Limited - Chairperson
   (c) An elected member nominated by Mayor in Council/ President in Council of associated Urban Local Body (ULB).
   (d) A Social Worker nominated by Mayor in Council/ President in Council of associated Urban Local Body
   (e) Commissioner of associated Urban Local Body/Chief Municipal Officer or Community
   (f) Development Officer/Community Organizer of Urban Local Body.
   (g) Community Development Officer CDO-PIU - Secretary
(ii) **Major Functions: The following functions will be performed by the PIU level GRC:**

(a) Registration of complaints by CDO-PIU from the 1st tier GRC and/or affected people;
(b) Eligibility assessment of grievances by the GRC Chairperson;
(c) Information to the complainant about eligibility of the complaint;
(d) Grievance Redress Committee meetings to discuss grievances and action required;
(e) Ensuring collection of detailed information about the eligible complaint;
(f) Assessment of complaint, draw conclusion from discussions and make recommendations;
(g) Develop action plan outlining activities required to implement the recommendations;
(h) Ensuring implementation of recommendations by stakeholders or concerned authorities;
(i) Monitoring actions of the recommendations in view of timeline;
(j) Feedback to the complainant on action completed against registered complaint and seeking complainant feedback on level of satisfaction;
(k) Closure of grievances by CDO-PIU or forwarding of complaint to PMU GRC if grievance remains unresolved.

3. **3rd Tier (at PMU-State Level)**

(i) **Composition of State Level GRC:**

(a) Engineer in Chief, MPUDC – Chairperson
(b) Deputy Project Director (T)
(c) Deputy Project Director (A) (Secretary)
(d) Project Officer
(e) Community Development Officer CDO-PMU
(f) PMC TL or representative Advisor

(ii) **Major Functions: The state level GRC will be responsible to perform the following functions:**

(a) Registration of complaints received from GRC PIU and/or affected people;
(b) Information to the complainant about eligibility of the complaint;
(c) Eligibility assessment of grievances by the GRC PMU chairperson with support of the
(d) Secretary of state GRC- – whether grievance is eligible for consideration or not at the state level;
(e) Ensuring collection of required information about the eligible complaint;
(f) Assessment of complaint to draw conclusion from discussions and make recommendations;
(g) Develop action plan outlining activities required to implement the recommendations;
(h) Ensuring implementation of recommendations by stakeholders or concerned authorities;

(i) Monitoring actions of the recommendations in view of timeline;

(j) Closing complaint after all actions taken as per recommendations and feedback to the complainant.

(k) Advise to complainants about approach /appeal to the concerned department in case the complainant is not satisfied or complaint is beyond the scope of the GRC PMU.

**Figure 35: Work Flow Diagram on GRM**

---

**Step 1:** Receiving Grievances / Complaints and its Registration at town level (24 hours)

**Step 2:** Review of Grievances, Sorting, Information and Forwarding (1 Step)

**Step 3:** Eligibility and Preparation for GRC Meeting (3 Days)

**Step 4:** Assessment of the Grievance, Meeting and Plan of Action (7 Days)

**Step 5:** Implementation of Action

**Step 6:** Monitoring and Reporting (Monthly)

**Step 7:** Closure of the Complaint

**Step 8:** Appeal to the State Level GRC
F. Process of Grievance Redress Mechanism

191. The following process shall be adopted for receiving complaints and addressing received complaints:

1. **Step 1: Receiving Grievances/ Complaints and its Registration at town Level**

   (i) All grievances, complaints, concerns shall be submitted verbally or in writing to CDO contractor’s focal person or any GRC members – by filling the **Complaint Registration Slip** (Sample grievance from is at Appendix 12) and putting into the complaint box placed at construction sites or ULB office.

   (ii) Received complaints shall be recorded, compiled and **Registered** (Grievance Number) in a register (database) placed at the ULB by CDO with support of the contractor’s focal person on a daily basis (24 hours). Each grievance shall be given a number to track status.

2. **Step 2: Review of Grievances, Sorting, Information and Forwarding (24 hours)**

   (i) Registered grievances shall be reviewed by the CDO with support of the contractor’s focal person.

   (ii) Based on type of grievances, CDO shall sort out grievances with support of the contractor’s focal person.

   (iii) CDO (ULB) shall inform the GRC Chairperson about all grievances either by phone or in writing. At that time, CDO may suggest grievances can be managed by the site engineer to the GRC Chairperson;

   (iv) GRC Chairperson will determine eligibility of the complaints. Inconveniences caused by minor construction related issues shall be referred to the site engineer to resolve immediately or within 24 hours. For example - site engineer shall be instructed to resolve grievances associated with construction at the town such as restoration of road, obstruction in accessing house/shop or any place due to dumping of construction materials, dust etc. Site engineer will be responsible to respond to the complaints immediately. On the other hand, issues which cannot be resolved by the site engineer and if it is complex in nature shall be referred to GRC.

   (v) CDO shall receive acknowledgement from concerned authorities (site engineer) on receipt of the grievances shared with them. CDO shall inform complainants regarding eligibility of their complaint and action to be taken by the concerned authority (site engineer/ GRC) within (24 hours). If the grievance is ineligible, complainants should be informed of the reasons;

3. **Step 3: Eligibility and Preparation for GRC meeting (3 days)**

   (i) GRC Chairperson shall receive eligible complaints (copy of written complaint document or verbally recorded messages) from the CDO (ULB) and review details; GRC Chairperson may ask to collect baseline information about the grievances registered, if required.

   (ii) GRC Chairperson shall share list of documents with the GRC Secretary to collect baseline information on selected grievances to be addressed.
(iii) The GRC Secretary shall arrange all documents with the help of CDO-ULB, CDO-PIU or the contractor’s focal person in a proper way to present in front of GRC.
(iv) GRC Chairperson shall call a meeting as per convenient date and time of the committee members.

4. Step 4: Assessment of the Grievance, Meeting and Plan of Action (7 days)
   (i) If necessary the GRC shall consult and seek relevant information about complaint from the concerned parties.
   (ii) On basis of the collected evidences, GRC shall draw conclusions and make recommendations for a solution.
   (iii) GRC Secretary shall keep record of the proceedings and decisions taken by GRC members to further track the status as per decided time line.
   (iv) The GRC shall agree on the action plan required to be implemented according to the recommendations made. The action plan shall include detailed activities along with timeline.
   (v) GRC Secretary shall inform to the complainant about the decisions taken by the committee members and expected date of resolution of the grievance.
   (vi) If the complaint is complex, the GRC may request for additional time and resolution after proper assessment or refer the complaint to the GRC-PMU Level.

5. Step 5: Implementation of Action (30 days)
   (i) The concerned parties shall be responsible to implement action plan according to recommendations of the GRC.
   (ii) The GRC members may arrange field trip and interact with the concerned persons, if needed before reaching the conclusion.

6. Step 6: Monitoring and Reporting (Monthly)
   (i) CDO (ULB) shall be responsible to track and record status of all complaints -whether forwarded to site engineer or GRC in the database as follows – Grievance registered, Grievance in process to be resolved, Grievance addressed and closed, and Grievance forwarded to concerned authorities.
   (ii) CDO (ULB) shall be responsible to report/inform status of the complaints (received, addressed and forwarded) to the contractor for further reporting to respective PIU.
   (iii) Overall GRC chairperson shall be responsible for effective management of complaints at the town level.

7. Step 7: Closure of the Complaint
   (i) GRC Secretary shall prepare a summary of the findings and share with GRC members.
   (ii) On agreement of all GRC members, GRC Secretary shall provide information to the complainant about decisions taken in writing/verbal on the registered complaint and seek feedback of the complainant about the