

Initial Environmental Examination

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IND: Rajasthan Secondary Towns Development Sector Project – Banswara Water Supply and Sewerage Subproject, Banswara District, Rajasthan

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

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CURRENCY EQUIVALENTS

(as of 31 May 2020)

Currency unit	–	Indian rupee (₹)
₹1.00	=	\$0.01325
\$1.00	=	₹75.4850

ABBREVIATIONS

AC	–	Asbestos Cement
ACM	–	Asbestos Containing Material
ADB	–	Asian Development Bank
ADB	–	Asian Development Bank
ASI	–	Archeological Survey of India
ASO	–	Assistant Safeguards Officer
CTE	–	Consent to Establishment
CTO	–	Consent to Operate
CPCB	–	Central Pollution Control Board
EHS	–	Environmental Health & Safety
EIA	–	Environmental Impact Assessment
SEIAA	–	State Environmental Impact Assessment Authority
EMP	–	Environmental Management Plan
GOI	–	Government of India
GOR	–	Government of Rajasthan
IEE	–	Initial Environmental Examination
PIU	–	Project Implementation Unit
PMU	–	Project Management Unit
LSGD	–	Local Self Government Department
MOEF& CC	–	Ministry of Environment, Forest and Climate Change
MLD	–	Million Liters per Day
LPCD	–	Liters per Capita per Day
PE	–	Polyethylene
DWC	–	Double Corrugated Duct
NHAI	–	National Highways Authority of India
NOC	–	No Objection Certificate
PHED	–	Public Health Engineering Department
PWD	–	Public Works Department
REA	–	Rapid Environmental Assessment Checklist
ROW	–	right-of-way
RPCB	–	Rajasthan Pollution Control Board
RUIDP	–	Rajasthan Urban Infrastructure Development Project
RSTDSP	–	Rajasthan Secondary Towns Development Sector Project
SPS	–	Safeguard Policy Statement, 2009
STP	–	Sewage Treatment Plant
ULB	–	urban local body
WTP	–	water Treatment plant

WEIGHTS AND MEASURES

°C	Degree Celsius
km	kilometre
lpcd	litres per capita per day
mm	milli meter
m	metre
MLD	million litres per day
mm	millimetre
nos	numbers
km ²	square kilometer

NOTE

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

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EXECUTIVE SUMMARY

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

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

¹ The project towns under consideration for the sector loan are: Abu Road, Banswara, Didwana, Fatehpur, Khetri, Kuchaman, Ladnu, Laxmangarh, Makrana, Mandawa, Pratapgarh, Ratangarh, Sardarshahar and Sirohi. Out of these towns, Khetri and Mandawa are heritage towns.

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

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

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

sanitation(CWIS),financial sustainability and gender equality and social inclusion (GESI) action plan implementation, (iii) about 500 girls will report enhanced knowledge in conducting water audits in schools and households, and (iv) data platforms will be established in all project towns.⁵

Banswara water supply and sewerage subproject is one of the subprojects proposed under the investment component of RSTDSP. Water supply at present in Banswara is intermittent, unreliable and suffers with huge losses and quality issues. Though some works of sewer are under progress in the town but overall no sewer system is functional in the town. Due to lack of sewerage system, most of the households depend on septic tanks for disposal of sewage. Effluent from septic tanks and sullage is let off into open drains which ultimately collect in low lying areas and natural drains in the outskirts of the town.

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

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

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

Project Scope. The subproject is formulated to address gaps in water and sewerage infrastructure in a holistic and integrated manner. The main objective of the RSTDSP is to improve water efficiency, security, and provide safe sewage collection and with the on-going investments in sewage treatment, this will have an important effect on public health and environment. In Banswara, proposed sewerage works include (i) Construction of STP of 9.6 MLD including co-treatment of fecal sludge with provision of Treated Effluent Elevated Reservoir (TEER) and Treated Effluent Storage Reservoir (TESR) (ii) Construction of 2 nos. of SPS (0.60 MLD at Ward no 21, near Nathelav Pond and 1.70 MLD in Ward no. 1 near Pratapgarh Road) (iii) sewage collection system- 89.0 Kms including 4,3 km trenchless (iv) Sewage pumping main of 1.6 km (v)

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

House connections approx. 13000 nos(vi) Upgrade existing WSP based STP of 6.34 MLD capacity to achieve the current treatment standards(vii) Fecal sludge management in areas of low density by providing 3 desludging trucks (capacity 4000 L- 1 no and 1000 L-2 nos), Water Supply works include (i) necessary arrangements at Kagdi Pick-up Weir including mechanical and electrical works (intake already present)- replacement and upgradation of existing raw water pumping system;(ii) Construction of new WTP of 9.25 MLD capacity at PHED AEN campus (iii) Rehabilitation of existing WTPs at AEN Campus (10.40 MLD) and Kagdi pickup weir (6.75 MLD) (iv) Clear water reservoir of 1550 KL capacity at AEN campus Head Works (v) Construction of new Clear Water Pump houses at AEN campus WTP and Kagdi WTP campus (vi) Clear Water Pumping System in the existing clear water pump houses at AEN campus and Kagdi WTP campus (vii) Transmission system of 15.80 Kms of pipe dia from 100 mm to 500 mm of DI K-9 Pipes (viii) Distribution network of 286.70 Km DI-K7 (100-400 mm dia) & 43.22 km of HDPE (75-280 mm dia) new pipe network, including replacement of existing AC pipes & PVC pipes (ix) Rehabilitation of existing OHSRs (16 nos.) and CWR (3 nos.)(x)provision of SCADA, Electrical, Mechanical and Allied Works, (xi) provision of house service connections with consumer meters approx. 26600 Nos. The new distribution system will be conveniently divided into District Metering Areas. Project will also provide bulk water meters, house service connections with consumer meters

Description of the Environment. Subproject components are located in Banswara Town and in its immediate surroundings which were converted into urban use for many years ago, and there is no natural habitat left at the proposed sites. The project sites are in Government lands (for structures) and in existing road right of way (RoW) for pipe laying. There are no protected areas, wetlands, mangroves, or estuaries in or near the project locations.

Presently source of Banswara town is surface water. Source of Banswara city is Kagdi Pickup Weir. Raw Water source is Mahi Dam which has abundant flow throughout the year even during lean seasons. Based on water level data, outflow through spillway and rainfall data of Mahi dam from 1982 to 2017, It may be concluded that reservoir water is sufficient to meet the demand of the project (Appendix 7). No objection Certificate for allocation of reservoir water is also attached in Appendix 7. Quality of raw water is, in general, of acceptable quality and that which can be used for potable purposes after conventional treatment and disinfection. There are no notable pollution sources near the intake. There are no wastewater disposal points in the upstream vicinity of the intake.

Potential Environmental Impact and Mitigation Measures. In this draft IEE, negative impacts were identified in relation to location, design, construction and operation of the improved infrastructure. Environmental impacts as being due to the project design or location were not significant as various measures are already included in site planning and preliminary design.

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

Potential impacts were identified in relation to location, design, construction and operation of the improved infrastructure. During the construction phase, impacts mainly arise from the need to dispose of large quantities of waste soil and disturbance of residents, businesses, and traffic. These are common temporary impacts of construction in urban areas, and there are well developed methods for their mitigation. Mitigation measures have been developed to reduce all

negative impacts to acceptable levels. Resettlement Plan prepared separately for the Banswara Subproject addresses temporary resettlement/livelihood issues resulting mainly from laying of sewer/pipelines in busy commercial areas.

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

Subproject includes rehabilitation of existing infrastructure like intake, pumping stations and OHSRs/CWRs and WTPs. Presence of asbestos containing material (ACM), mainly AC pipes in the existing infrastructure is the main concern. Asbestos is recognized as a cause of various diseases and is considered health hazard if inhaled. It has been proposed to remain AC pipes in-situ but under unavoidable conditions, when AC pipes are encountered and need to be removed, separate arrangement for AC containing materials such as handling, transportation, storage and disposal is also prepared.

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

Environmental Management. An Environmental Management Plan (EMP) has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels, along with the delegation of responsibility to appropriate agency. Various design related measures are already included in the project design. During construction, the EMP includes mitigation measures such as (i) selection of construction methodology for rehabilitation of intake on dams.; (ii) proper planning of sewer and water supply works to minimize the public inconvenience; (iii) barricading, dust suppression and control measures; (iv) traffic management measures for works along the roads and for hauling activities; (v) provision of walkways and planks over trenches to ensure access will not be impeded; and (vi) finding beneficial use of excavated materials to extent possible to reduce the disposal quantity. EMP will guide the environmentally-sound construction of the subproject. EMP includes a monitoring program to measure the effectiveness of EMP implementation and include observations on- and off-site, document checks, and interviews with workers and beneficiaries. A copy of the updated EMP/ SEMP shall always be kept on-site during the construction period. The EMP shall be made binding on all contractors operating on the site and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document shall constitute a failure in compliance. To monitor the operation stage performance, there will also be longer-term surveys to monitor raw and treated water quality, treatment efficiency of STP (raw and treated sewage quality), sludge at STPs. Mitigation and monitoring measures, along with the project agency responsible for such actions, form part of the Environmental Management Plan. The estimated implementation cost of the EMP is INR 67,927,345. This indicative cost includes INR 7,000,000 for asbestos management (identification, inventory, removal, transport, temporary storage, disposal/treatment, and overall supervision of contractor related to asbestos materials) and INR 350,000 for grievance redressal solutions.

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

Implementation Arrangements. Government of Rajasthan's Local Self Government Department (LSGD) acting through the RUDSICO will be the project executing agency. The PMU is housed in RUDSICO's division for externally aided projects (EAP). There will be two zonal offices in Jaipur and Jodhpur, and PIUs in each project town/urban local body (ULB). PMU will be responsible for submitting environmental assessment and monitoring reports to ADB, monitoring of safeguards compliance, addressing safeguards issues, providing support and guidance to PIUs. The PIUs will be responsible for day-to-day monitoring of EMP implementation, information disclosure, consultations and other field-level activities. PMU has appointed a project officer for environment and each PIU will deputize assistant safeguard officers (ASOs). The PMU Environment Project Officer will be assisted by specialists from project management and capacity building consultants (PMCBC) and construction management and supervision consultants (CMSC).

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

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

Conclusions. The citizens of the Banswara Town will be the major beneficiaries of this subproject. With the improved water supply, they will be provided with a constant supply of better quality water, piped into their homes. The sewerage system will remove the human waste from their homes safely and quickly. Combined with the on-going investments in sewage treatment, this subproject, in addition to improved environmental conditions, will improve the over-all health condition of the town. People would spend less on healthcare and lose fewer working days due to illness, so their economic status should also improve, as well as their overall health.

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

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

- Obtain all statutory clearances at the earliest time possible and ensure conditions/provisions are incorporated in the detailed design;
- Include this IEE in bid and contract documents;
- Update and implement the asbestos management plan per site-specific conditions;
- Update and implement the recommendations from the biodiversity assessment report;
- Update/revise this IEE based on detailed design and/or if there are unanticipated impacts, change in scope, alignment, or location;
- Conduct safeguards induction to the contractor upon award of contract;
- Ensure that sludge management protocols are compliant with environmental regulations (Solid Waste Management Rules 2000 and its amendments) and solid waste disposal should have a designated site (dumping on vacant lot is not allowed);
- Strictly supervise EMP implementation;
- Ensure contractor appointed qualified environment, health and safety (EHS) officers prior to start of works;
- Documentation and reporting on a regular basis as indicated in the IEE;
- Continuous consultations with stakeholders;
- Timely disclosure of information and establishment of GRM;
- Involvement of contractors, including subcontractors, in firstlevel GRM;
- Commitment from PMU, PIUs, project consultants, and contractors to protect the environment and the people from any impact during project implementation.

I. INTRODUCTION

A. Background

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

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

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

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

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

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

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

2. A series of subprojects will be implemented under the project, with each subproject providing improvements to water supply or sanitation (on-site and off-site) or both in a project town. Banswara Town water supply and sewerage subproject is one of the subprojects proposed in RSTDSP. Water supply is currently intermittent and suffers with huge losses and quality issues. At present no sewerage system exists in the town. Though some works of sewer are under progress in the town but overall sewer system is non-functional in the town. ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguards Policy Statement (2009). Accordingly, this Initial Environmental Examination (IEE) has been conducted to assess the environmental impacts and provide mitigation and monitoring measures to ensure that there are no significant impacts because of the subproject.

3. The project town has an existing sewerage system laid under GoR scheme UIDSSMT (Seven City) and at commissioning. Under this project one STP of 6.34 MLD on Waste Stabilization Ponds constructed along with 106 kms piped sewer network; Existing sewerage coverage is only 40 % of total town population. Banswara Municipality does not have any organized sewerage system. In balance area, the wastewater from kitchens and bathrooms is discharged into storm water drains culminating finally to the Nallah or on ground, which pollutes the environment and contaminates the ground water. Open defecation is not uncommon. Most of the residential and commercial buildings and educational institutions have on-site septic tanks and soak pits. Though septic tank is an accepted onsite treatment, but as the septic tanks are not designed and maintained properly, the effluent does not conform to the standards. The effluent from the septic tanks is directly let into the open drains.

4. In the absence of safe disposal system of sewage as mentioned above, the people of Banswara are facing unhealthy and unhygienic environmental conditions therefore public representatives are also demanding facilities of sewerage system on priority basis. The town requires sound drainage and sewerage system.

B. Purpose of Initial Environmental Examination Report

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

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

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

7. This IEE will be updated and finalized during detailed design stage and project implementation and updated if there is any change in scope of works, change in location of component and change in cost due to addition or subtraction of components which can change the environmental impacts, and revised IEE shall supersede the earlier version of IEE. and shall be contractually applicable to the contractor after approval from PMU and ADB.

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

C. Report Structure

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

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

II. DESCRIPTION OF THE PROJECT

A. Banswara Town

10. District Banswara is situated in the southern - most part of Rajasthan. It has an area of 5037 square kilometre and lies between 23.11° N to 23.56° N latitudes and 73.58° E to 74.49° E. longitudes. Banswara is one of the project towns selected for implementation of the ADB-funded RSTDSP subprojects. Under the investment component of the project, it is proposed to improve the water supply and sewerage system in Banswara town.

B. Present Status of Water Supply and Sewerage

11. **Source of Water.** Main Source of Banswara town is Kagdi Pickup weir surface water. Kagdi pickup weir/lake is filled by hydel water coming from Mahi dam through channel. Raw Water from intake well is taken to existing Kagdi pickup weir WTP and AEn Campus WTP for treatment. To improve the tail end pressures, in all 13 tube wells exists which are located at the tail end of the colonies of the town and directly connected to the distribution system.

12. **Water Treatment Plants.** Raw Water taken from intake well is pumped to existing Kagdi pickup weir WTP and AEN Campus WTP for treatment. Both the plant are rapid sand filter treatment plant. Capacity of Kagdi Pickup Weir WTP is 5.45 MLD while capacity of AEN Campus WTP is 10.40 MLD.

13. **Transmission Mains.** For transferring of raw water from Kagdi Pickup Intake to AEn Campus HW WTP 500 mm dia DI K-7 gravity-based pipeline is used, while for kagdi Pickup weir WTP is getting water through pumping main of 350 mm. Water collected from WTP after treatment is further pumped into different CWR and OHSR's by rising main pipeline. In Banswara town almost 80-85% rising/transmission pipeline is of DI K-7 material.

14. **Treated Water storage.** Presently, three (3) Clear water reservoir and sixteen (16) overhead service reservoirs are available in the town at different locations.

15. **Distribution System in Town.** There are 18 water supply zones in Town area. Town area is provided with distribution system with gravity fed from respective OHSRs. The total length of existing distribution system is reported to be about 250 km which consists of AC and PVC pipes of sizes varying from 63 to 400 mm dia. Present (2018) population of town is 1,12,760 souls. Water is supplied for one and half hour daily @ ~120 lpcd. Water supply is currently intermittent and suffers with distribution losses and quality issues. Water supply is from surface water. Water supply. Water is available from Kgdi-up weir for ultimate design year and after upgradation/refurbishment of Intake system, which is part of project, 135 lpcd will be available at consumer end.

16. **Sewerage.** Banswara Municipality does not have any organized sewerage system. Presently, the wastewater from kitchens & bathrooms is discharged into storm water drains culminating finally to the Nallah or on ground, which pollutes the environment and contaminates the ground water. Open defecation is not uncommon. Most of the residential and commercial buildings and educational institutions have on-site septic tanks and soak pits. Though septic tank is an accepted onsite treatment, but as the septic tanks are not designed and maintained properly, the effluent does not confirm to the standards. The effluent from the septic tanks is directly let into the open drains.

17. Some of sewers were laid about 25 years back by PHED and a STP (6.34 MLD) was constructed in Samania location on Waste Stabilization Pond (WSP) technology, but works were not completed and sewer system not commissioned. In recent years some works of sewer line were also started by Rajasthan Urban Drinking Water Sewerage and Infrastructure Corporation (RUDSICO) under Urban Infrastructure Development Scheme for Small & Medium Towns (UIDSSMT) under which approximately 106 kms of sewerage pipe lines were laid.

18. Presently, sewerage system in part of the town is being provided under a separate contract between Banswara Nagar Parishad and M/s UEM. It is proposed to provide sewerage system in the remaining areas of the town. In this contract, sewerage system is proposed to be laid in the remaining areas of the town such as: Sarda Colony, Maharana Pratap Colony, Shiv Colony, R.S.E.B. Colony, Vidhyut Nagar, Housing Board Colony, Mahi Colony, Shastri Colony, Pragati Nagar, Subhas Nagar, Nathlev Colony, Bahuli Colony, New Housing Board Colony, Khandu Colony, Mohan Colony etc. Areas covered in the on-going sewerage project is proposed to be commissioned by end of this year. Around 107 Km sewer line of diameter 200 mm to 900 mm has been laid under seven sewerage project of GoR in the city and under commissioning along with STP.

19. In the absence of safe disposal system of sewage as mentioned above, the people of Banswara are facing unhealthy and unhygienic environmental conditions therefore public representatives are also demanding facilities of sewerage system on priority basis. The town requires sound drainage and sewerage system.

C. Environmental Audit of Existing Water Supply and Sewerage components.

20. As per ADB SPS, environmental audit of existing water supply and sewerage project is done. Details audit report of existing water supply is given in Appendix 2 and existing sewerage system is given in Appendix 3. Following regulatory non-compliance is noted from environmental audit of existing water supply and sewerage infrastructure in town-

- (i) Existing WTPs- 10.40 MLD at AEN Campus and 6.75 MLD WTP at Kagdi Pickup weir are not having consents (CTE/CTO) from Rajasthan State Pollution Control Board. As these WTPs are being considered for rehabilitation works under RSDTSP, therefore CTE/CTO for these plants will be required before start of construction works
- (ii) Existing STP of 6.34 MLD which is based on WSP technology and considered for upgradation under RSDTSP also not having consents (CTE/CTO) from Rajasthan State Pollution Control Board. Therefore CTE/CTO for these plants will be required before start of construction works

D. Infrastructure Improvements Proposed in Banswara under RSTDSP

21. **Water Supply.** The water supply project proposed for Banswara has objective to achieve ultimate goals of continuous water supply system, sustainability, imparting energy efficiency, control on NRW, and Introducing (SCADA) automation for efficient management of water supply system.

22. Under water supply component of the Banswara town, the proposed works: (i) necessary arrangements at Kagdi Pick-up Weir including mechanical and electrical works (intake already present)- replacement and upgradation of existing raw water pumping system; (ii) Construction

of new WTP of 9.25 MLD capacity at PHED AEN campus (iii) Rehabilitation of existing WTPs at AEN Campus (10.40 MLD) and Kagdi pickup weir (6.75 MLD) (iv) Clear water reservoir of 1550 KL capacity at AEN campus Head Works (v) Construction of new Clear Water Pump houses at AEN campus WTP and Kagdi WTP campus (vi) Clear Water Pumping System in the existing clear water pump houses at AEN campus and Kagdi WTP campus (vii) Transmission system of 15.80 Kms of pipe dia from 100 mm to 500 mm of DI K-9 Pipes (viii) Distribution network of 286.70 Km DI-K7 (100-400 mm dia) & 43.22 km of HDPE (75-280 mm dia) new pipe network, including replacement of existing AC pipes & PVC pipes (ix) Rehabilitation of existing OHSRs (16 nos.) and CWR (3 nos.) (x) provision of SCADA, Electrical, Mechanical and Allied Works, (xi) provision of house service connections with consumer meters approx. 26600 Nos. The new distribution system will be conveniently divided into District Metering Areas. Project will also provide bulk water meters, house service connections with consumer meters.

23. Raw Water Source and Sustainability. Presently PHED is drawing 18 MLD water from Kagdi Pickup Weir Intake and through 500 mm dia gravity main. Assurance given by the PHED department to PHED for providing 25 MLD water till year 2051.

24. Presently source of Banswara town is surface water. Source of Banswara city is Kagdi Pickup Weir. Raw Water source is Mahi Dam which has abundant flow throughout the year even during lean seasons. Based on water level data, outflow through spillway and rainfall data of Mahi dam from 1982 to 2017, It may be concluded that reservoir water is sufficient to meet the demand of the project (Appendix 4). No objection Certificate for allocation of reservoir water is also attached in Appendix 4. Quality of raw water is, in general, of acceptable quality and that which can be used for potable purposes after conventional treatment and disinfection. There are no notable pollution sources near the intake. There are no wastewater disposal points in the upstream vicinity of the intake.

25. Sewerage. At present sewerage work is under execution in some areas, remaining area is being covered under this project. Sewerage works proposed in Banswara are mainly- (i) Construction of STP of 9.6 MLD including co-treatment of fecal sludge with provision of Treated Effluent Elevated Reservoir (TEER) and Treated Effluent Storage Reservoir (TESR) (ii) Construction of 2 nos. of SPS (0.60 MLD at Ward no 21, near Nathelav Pond and 1.70 MLD in Ward no. 1 near Pratapgarh Road) (iii) sewage collection system- 89.0 Kms including 4,3 km trenchless (iv) Sewage pumping main of 1.6 km (v) House connections approx. 13000 nos (vi) Upgrade existing WSP based STP of 6.34 MLD capacity to achieve the current treatment standards (vii) Fecal sludge management in areas of low density by providing 3 desludging trucks (capacity 4000 L- 1 no and 1000 L-2 nos).

26. Excavation for the pipe/sewer laying works will be undertaken through open trenching, which will be maximum width of 1 m only on one side of the road ROW with maximum length, an average 140 m per day for water supply lines and 70 m for sewers. Excavation, laying of pipes and backfilling will be completed within the day. Subsequent to completion of works, road reinstatement will be undertaken by the contractor as part of the civil works. The same shall be mentioned in the bid document to make it binding on the contractor.

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

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

28. Excerpts on reuse from Rajasthan state Sewerage and Wastewater Policy is provided in Appendix 5.

29. To further the implementation of the Policy, to promote the reuse and provide guidance to the stakeholders, the Local Self Government Department (LSGD) is currently in the process of publishing "Guidelines for Reuse of Treated Wastewater in Rajasthan 2019. These guidelines:

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

30. Under the subproject, following the State Policy, treated effluent will be reused in applications such as agriculture, horticulture, development of urban forestry and industry as appropriate. A Treated Effluent Reuse Plan will be prepared by the DBO Contractor during the detailed design phase as envisage by the State Policy, and reuse modalities will be firmed up. To facilitate reuse and supply of treated effluent, A treated effluent storage reservoir (TESR), effluent pumping station and a treated effluent elevated reservoir (TEER) are proposed at the STP in the subproject. Total storage capacity of TESR and TEER at each STP is 15% of respective STP treatment capacity. Treated effluent will be chlorinated and prior to its entry into TESR/TEER. Appendix 5 provides the Guidelines for Sewerage System Operations, Reuse of Treated Effluent and Sludge from STP for Beneficial Purposes

31. **Discharge of treated wastewater.** The excess / surplus treated wastewater that is not reused will be discharge into nearby water channels/drains, and necessary facilities like pipelines and pumping requirements, will be developed. Treated effluent from STP shall be discharged in nearby drain, which is under Government of Rajasthan, the NOC is included in Appendix 4.

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

33. **Fecal Sludge and Septage Management (FSSM).** It is proposed to provide FSSM system in areas where the population density is low (less than 100 persons per hectare) and will

not generate sewage in adequate quantity to convey by sewer network. FSSM will provide low cost sanitation in areas where sewer network is not an immediate requirement, will make septage collection, treatment and effluent management environment- friendly. In Banswara town, there are 7 wards (Wards 1, 18, 21, 22, 23, 41 and 44) having population 9% for year 2021 covered under FSSM, that have areas with scattered development and low population density. Under the FSSM, fecal sludge / septage will be collected from the household level septic tanks using truck mounted mobile desludging equipment and transported to Sewage Treatment Plant (STP) for treatment. STP will have necessary provisions to receive and treat the septage along with the wastewater received via sewer network. STP will be designed accordingly by the successful bidder during the detailed design phase to comply with the treated effluent discharge standards specified in the bidding documents, The proposed FSSM will help the ULB to cover entire population with safe disposal of human excreta by serving areas which are not feasible to be provided with a sewerage system. Uncovered areas of town by sewer networks; will be served by this method.

34. Summary of work proposed in Banswara town area are provided in Table 1 and details of land required for each components is presented in Table 10. Conceptual layout plans and google earth images are shown in Figure 1 to Figure 12.

Table 1: Proposed Subproject Components

S.No	Components	Function	Description of works	Location
Sewerage Works				
1.	Construction of STP with reuse options	Treatment of collected wastewater to meet stipulated discharge standards	Construction of one new STP of 9.60 MLD on SBR technology with Treated Effluent Elevated Reservoir (TEER) of 1000 KL, Treated Effluent Storage Reservoir (TESR) of 500 KL, Effluent Pumping Station (EPS)	Udaipur Road within existing STP campus
2.	2 nos. of Sewerage Pumping Station	Sewer pumping stations are used to move wastewater to higher elevations in order to allow transport by gravity flow until the sewage reaches treatment plant	0.60 MLD (Ward 21, Near Nathelav Pond), 1.70 MLD (Ward 1, near Pratapgarh Road)	SPS 0.60 MLD- near Nathelav Pond SPS 1.7 MLD- near PPratapgarh Road
3.	Rising Mains for pumping sewage	For pumping of raw sewage from SPS to manholes, to lift the raw sewage from low areas, from where it reaches to STP	(i) From SPS near Nathlev Pond for zone 2 to existing MH Approx. length of 775 m, Diameter of 150 mm DI K9 pipes (ii) From SPS near Pratapgarh Road for zone 7 to existing MH Approx. length of 850 m, Diameter of 250 mm DI K9 pipes.	Existing ROW of roads

S.No	Components	Function	Description of works	Location	
4.	Networks for sewer collection system	Collect wastewater from houses and convey by a combination of gravity and pressure pumping to pumping station and ultimately to the STPs	89,00 km sewer networks of following diameters and materials – HDPE DWC SN8 -82 km, RCC pipes NP4 – 7.0 km, Including Trenchless Method adopting with HDPE PE-100 / PN-6 -4.3 Km	Existing ROW of roads	
5.	House Connections	For collection of sewage from houses within municipal boundary	Connection of existing sanitary system from inside property boundary up to road side inspection / property chamber- during design build approx. 12400 nos, during O&M period-1400 nos.	Houses within municipal boundary	
6.	Faecal Sludge and Septage Management	Desludging of septage from household pits/ septic tanks, transportation & discharge to STP	Desludging of septage from household pits/ septic tank, transportation to STP, Disposal to designated unit in STP including operation and maintenance of the equipment with all accessories complete in all respect, from areas which are having the low density, unfavorable topography and safe disposal of wastewater generated from these wards is also a major problem	in total 7 wards as below-	
				Ward no.	Population covered
				1	3825
				18	1074
				21	415
				22	408
				23	906
				41	3078
				44	435
Total Population covered	10141				
Water Supply Works					
1.	Raw water pumping system	To pump raw water from raw water source to WTP for further treatment and distribution	Existing Intakes at Kagdi Pickup- Kagdi Pickup Intake-replacement and upgradation of existing raw water pumping system	Kagdi Pick up weir	
2.	Construction of WTP	Treatment of raw water up to specified standards for distribution in town	Construction of Rapid Gravity Filter WTP 9.25MLD capacity	at AEN Campus	
3.	New clear water pump house including complete	To lift treated water from WTP to CWR/OHSR or	1. Pump House at Kagdi WTP Campus- a. to Direct Distribution on VFD, Zone – 8.	At WTP AEn campus headwork	

S.No	Components	Function	Description of works			Location
	pumping system for distribution.	direct pumping in to distribution network	b. to OHSRs/GLSR– Kalika Mata GLSR (Zone-13) & Kalika Mata OHSR (Zone-14) 2. Pump House at AEN PHED Campus a. to Direct Distribution on VFD, Zone – 5. b. to Direct Distribution on VFD, Zone – 7. c. to Direct Distribution on VFD, Zone – 9 d. to OHSRs– Tripoliya (Zone-15)			At WTP Kagdi Pickup
4.	New clear water pumping system in the existing clear water pump house	To lift treated water from WTP to CWR/OHSR or direct pumping in to distribution network	Indicative Pump Details (2036) 1. Existing pumphouse at Kagdi WTP Campus. a. to OHSRs/GLSR– Kalika Mata GLSR (Zone-13) & Kalika Mata OHSR (Zone-14) b. to OHSR– Gaushala (Zone- 12) 2. Existing pump house at WTP A.En. Campus. a. to OHSRs– Collectorate (Zone-10) & Muslim Colony (Zone-11) b. to OHSRs– Bahubali Colony (Zone-17), Khandu Colony (Zone-18) & New Housing Board (Zone-6). c. to OHSRs– Civil lines (Zone-03), RSEB (Zone-04), Mahi Sarovar (Zone-02), Hospital & Housing Board (Zone-01).			Existing pumphouse at Kagdi WTP Campus Existing pump house at WTP A.En. Campus.
5.	New Clear Water Reservoir (CWR)	For temporary storage of treated water from WTP for further distribution	Construction of new CWR of 1550 KLcapacity			at PHED AEN campus
6.	Transmission Main – DI K-9 Pipe Dia ranging from 100mm to 400mm	Higher diameter pipe lines for bulk supply of water from one point to another point	DI K7 and K9 pipes of various diameters- 15.80 Km			Different locations
7.	Distribution network of DI K7 and HDPE pipe	For distribution of treated water from CWR/OHSR in to	Diameter (mm)	Length (m)	Material	ROW of different roads in the municipal area of town
			75 – 280 mm	43220	HDP E	

S.No	Components	Function	Description of works			Location
		distribution networks to houses	100 – 400 mm	28679 3	DI-K7	
			Total	330013		
8.	Rehabilitation of Intake at Kagdi Pickup Weir	Increase efficiency of intake to cope up with proposed water supply system	Rehabilitation & Refurbishment of existing Intake system consisting of Civil & Electro-Mechanical works.			Kagdi Pickup Weir
9.	Rehabilitation of existing WTPs (2 nos.)	Increase efficiency of WTPs to cope up with proposed water supply system	Rehabilitation of existing WTP 10.40 MLD at AEN Campus and 6.75 MLD WTP at Kagdi Pickup weir			AEN campus and Kagdi Pick up weir
10.	Rehabilitation of existing CWRs, Pump Houses, OHSRs, RWRs & Staff Quarters	Repair/refurbishment of existing structures to increase life up to project contract period	Rehabilitation of existing 16 OHSRs, 3 CWRs, 2 Pump houses and boundary wall with gate for 5 OHSRs			Various locations in town
11.	Consumer Relation Management Centres (CRMC), Central Control Centre (CCC) and Master Control Centre (MCC)	Consumer relations and SCADA system control for entire water supply system	Construction of CRMC- 2 nos., CCC- 1 no. and MCC- 1 no at suitable location for entire system			MCC at AEN campus WTP site, locations of CRMCS and CCC to be decided later
12.	House service connections with consumer meters	House service connection from water supply distribution pipe line up to water meter chamber of houses	Aapprox..26600 Nos(23600 nos. during Design build and 3000 nos. during O&M along with Multi jet magnetic type domestic water meter, Class-B type confirming to IS:779			Houses in town
13.	Provision of SCADA, Electrical, Mechanical and Allied Works	For automation of entire water supply system	Whole water supply system			Different locations of town

Source: Section 6: Employer's Requirement of Bid documents.

35. Locations of proposed project sites are given in Figures 3-6 and coordinates of existing/proposed project sites are given in Table 2 below:

Table 2: Coordinates of project components

COMPONENTS	Latitude	Longitude
WTP AT Aen Office	23°32'53.94"N	74°26'33.22"E
WTP AT Kagdi pickup	23°32'47.35"N	74°28'9.86"E
STP	23°34'4.75"N	74°25'0.52"E
Discharge point	23°34'19.28"N	74°24'53.52"E
S.P.S-near Nathelav Pond	23°32'19.33"N	74°26'12.37"E
S.P.S-Pratapgarh Road	23°33'57.20"N	74°26'35.63"E

E. Subproject Benefits

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

F. Investment Program Implementation Schedule

37. The detailed design of this subproject is completed in January 2020. After the approval, bid will be prepared and tenders will be invited by RUDSICO, and the contract will be awarded after technical and financial evaluations. Construction will take about 36months after the award of works. Dates for bids and works awards will be finalized by RUDISCO in due course of time. After completion of construction and commissioning, scheme will be operated by DBO contractor for 10 years, and after which the O&M will be carried out by ULB.

Figure 1: Proposed Water supply improvement works in Banswara

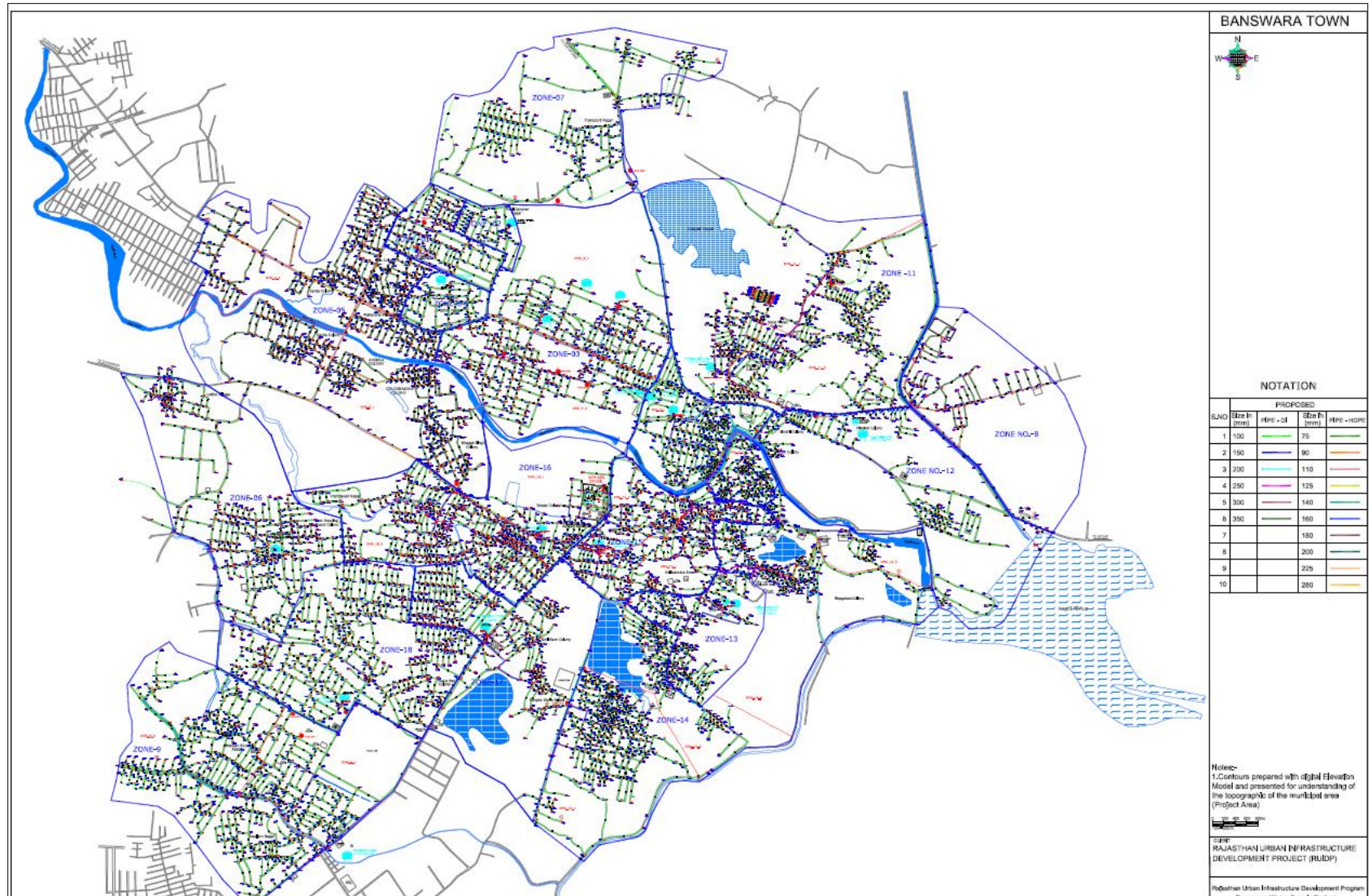


Figure 2: Proposed Sewer Network Coverage – Banswara town

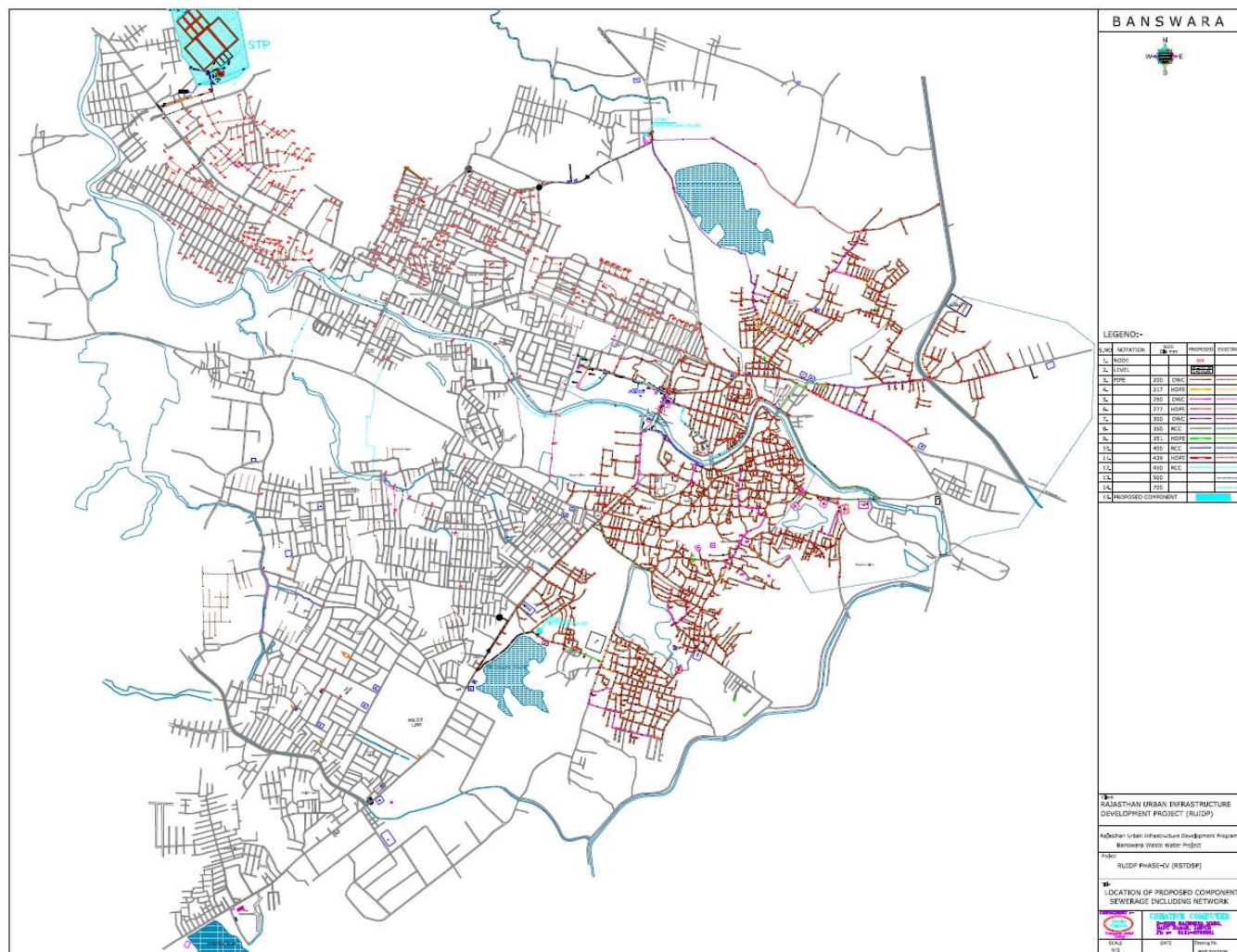


Figure 3: Google Earth Map of proposed STP site

Latitude- 23°33' 54.86"N
Longitude-74°24' 55.91"E



Figure 4: Google Earth Map of proposed SPS site -Nathelav Talab

Latitude- 23°32' 19.33"N
Longitude-74°26' 12.37"E



Figure 5: Google Earth Map of proposed SPS site - Pratapgarh Road

Latitude- 23°33'57.20"N
Longitude-74°26'35.63"E



Figure 6: Google Earth Map of proposed WTP at AEn Office along with Layout

Latitude- 23°32'53.94"N
Longitude- 74°26'33.22"E



Figure 6A: Google Earth Map of existing WTP at Kagdi Pick up



Figure 7: Layout plan of proposed WTP at A. En Campus

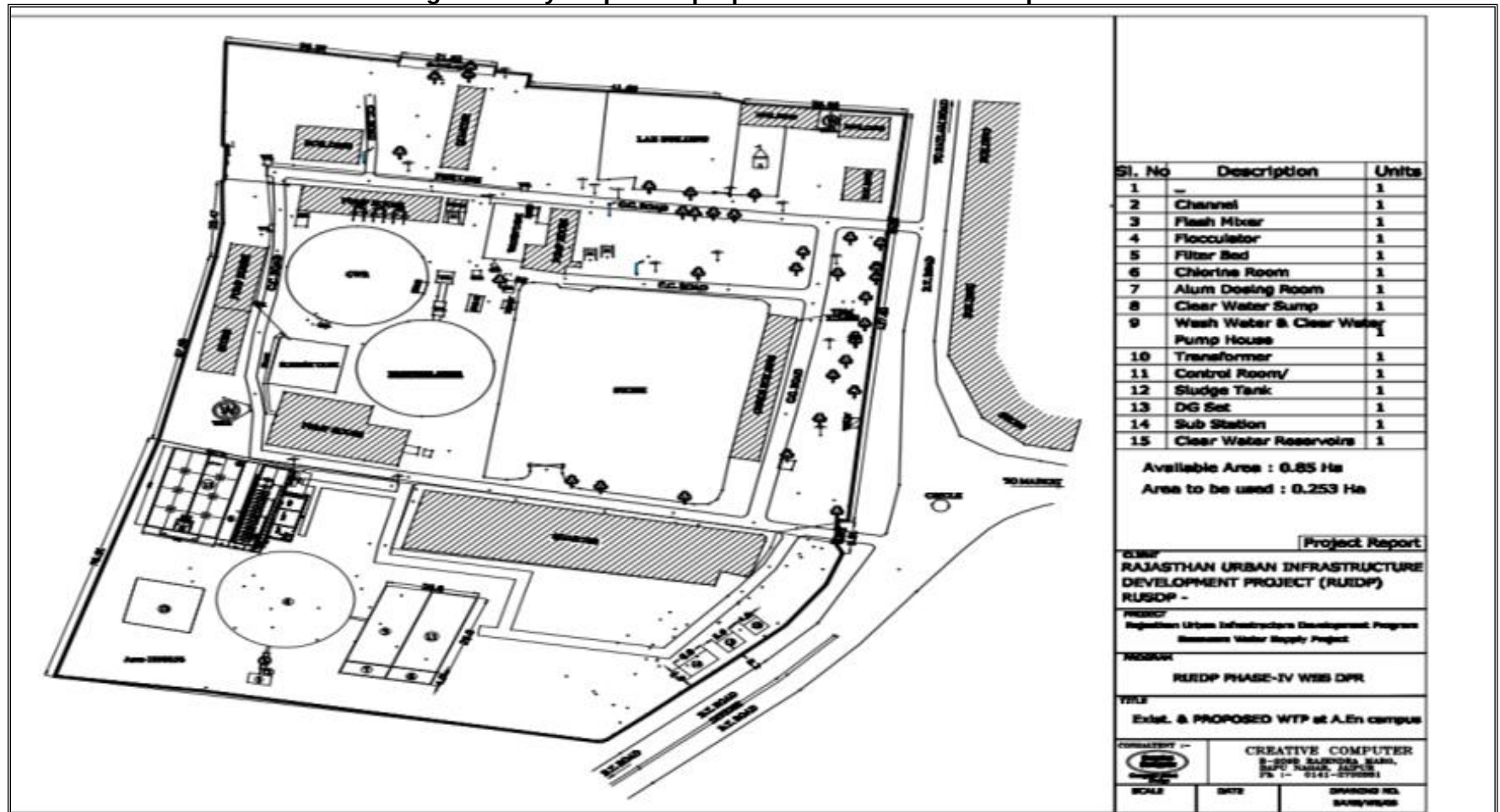


Figure 8: Schematic flow diagram for the proposed WTP

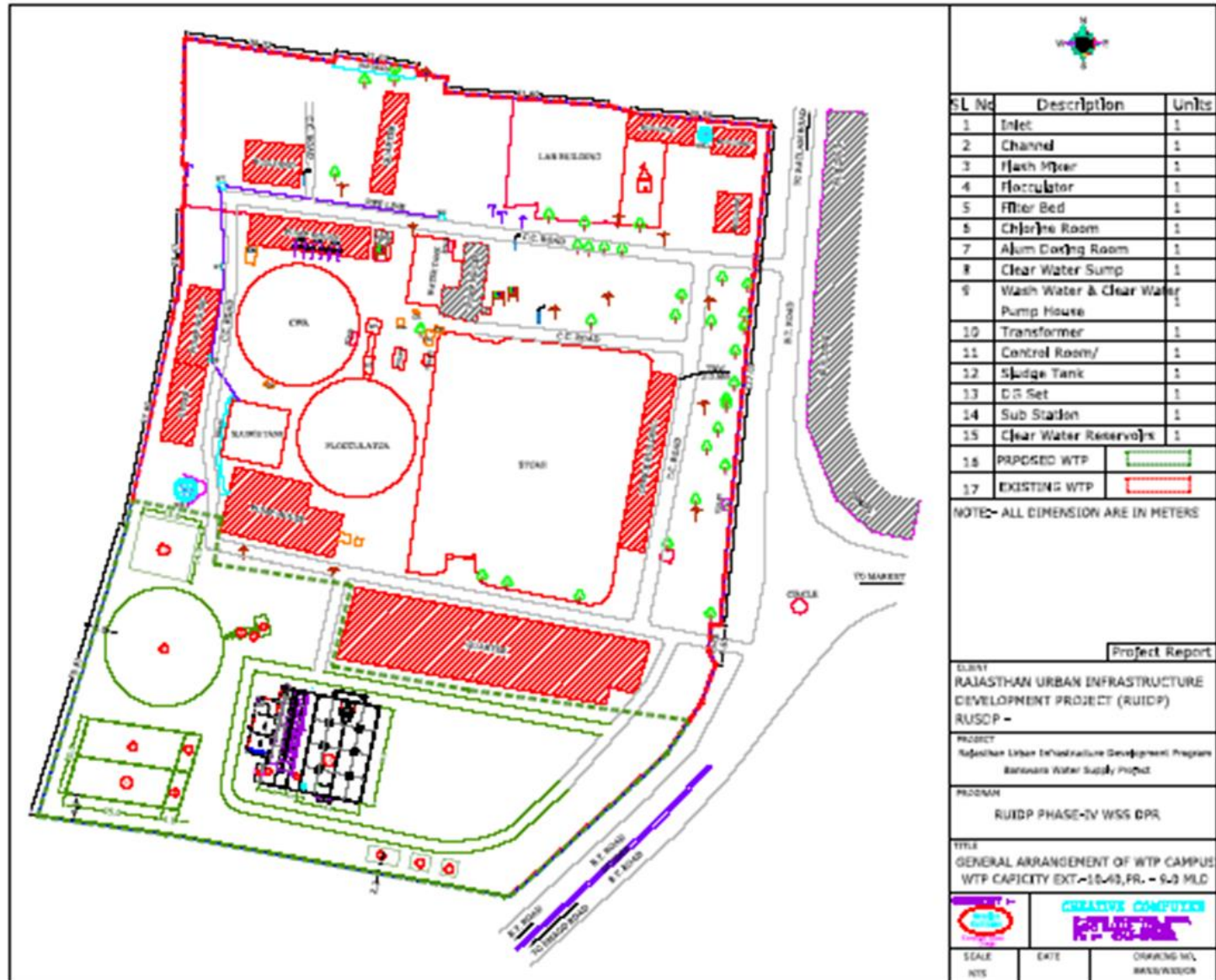


Figure 9: Schematic flow diagram for the proposed SBR Technology STP

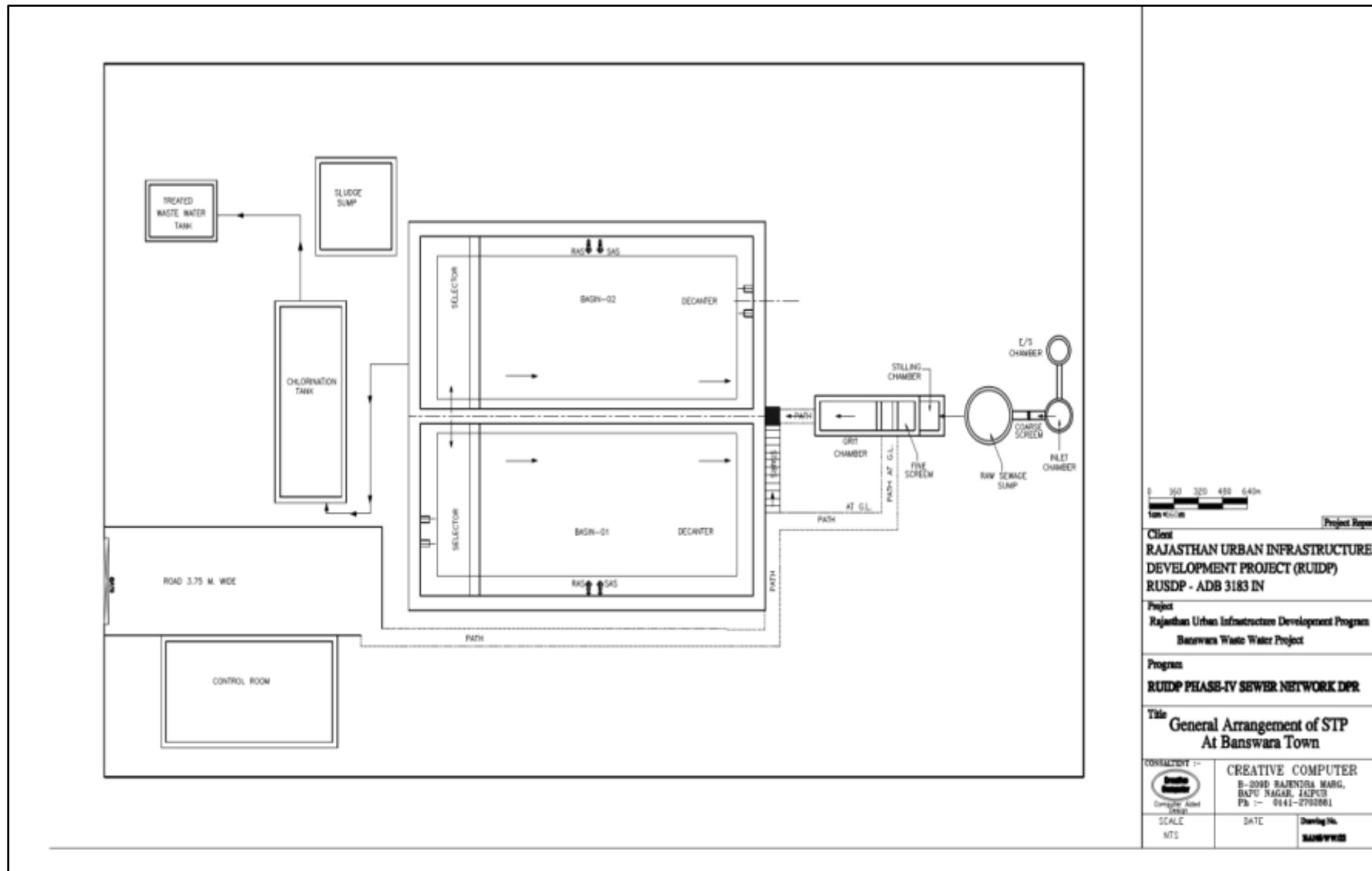


Figure 11: Process Flow Diagram of proposed WTP

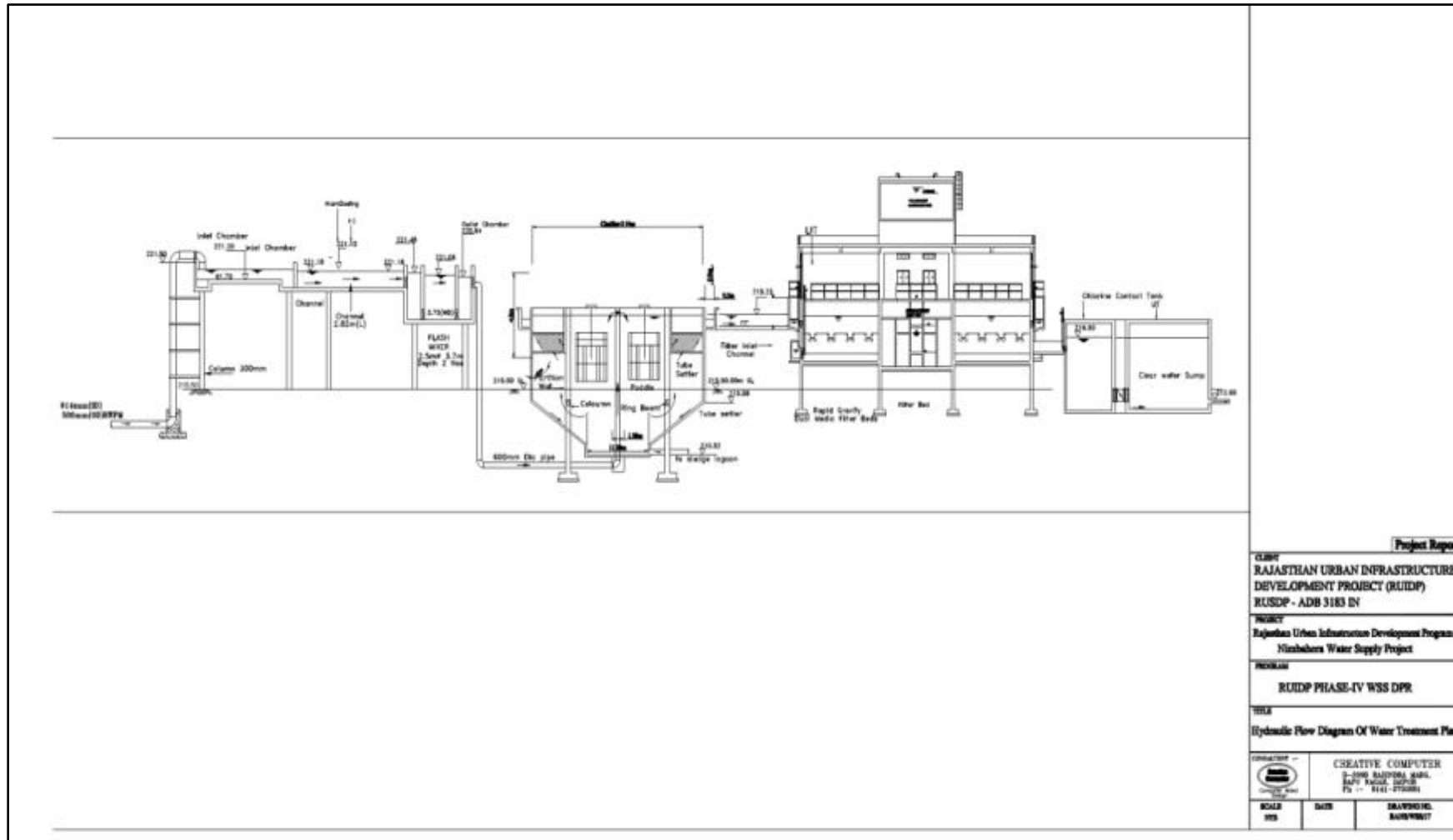
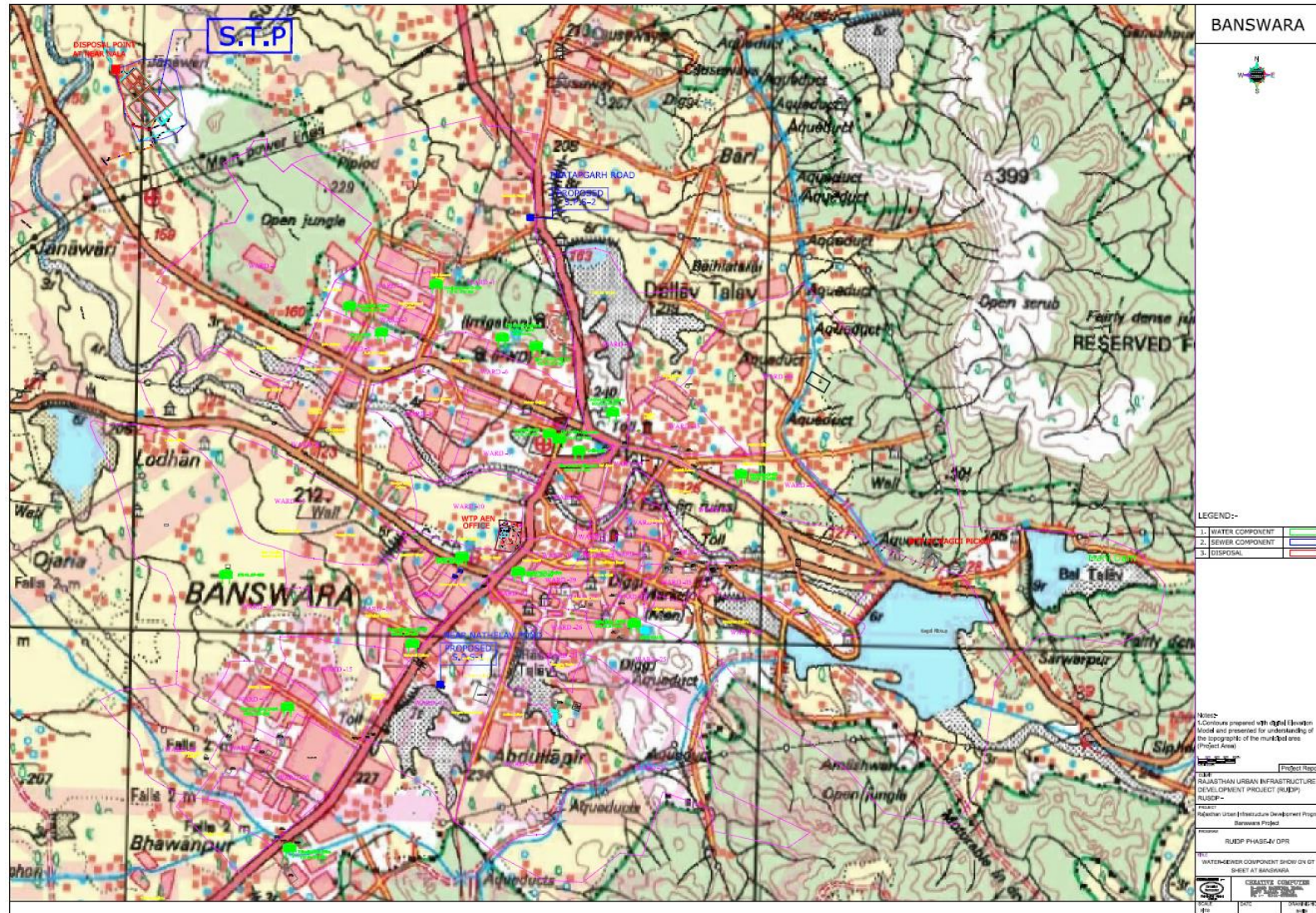


Figure 12: Proposed components of Water Supply and Sewerage in GT Sheet



III. ANALYSIS OF ALTERNATIVES

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

39. During the preliminary design various analysis were undertaken regarding location and selection of project sites, feasibility and sustainability of water sources for required demand, design of project components, selection of pipe materials, process design, institutional capacity, financial analysis etc.

Table 3: Analysis of Alternatives

1.	Project Need – No Project Alternative
Type of alternative	'No project' alternative
Description of alternatives	Banswara subproject is proposed to improve the service levels of basic infrastructure – water supply and sewerage, which will ultimately improve At present, Banswara residents suffer from inadequate, intermittent and low-pressure supply at a rate considerably less than the norm of 135 LPCD. System is old, inefficient, and leakages are frequent in water pipes, and consequently water losses are high. At present there is no sewerage system in the town; households depend on individual septic tanks or direct discharge into open drains that meant for surface drainage. Living conditions due to lack of proper water supply and sewerage, are poor, unhealthy, unhygienic. Lack of infrastructure is also causing environmental pollution, overall poor quality of life. Poor environmental quality affects the urban poor more. The project intends to provide following benefits to the town population, and the “no project” alternative will deprive people of these benefits: (i) increased availability of potable water at appropriate pressure to all households including urban poor; (ii) reduced time and costs in accessing alternative sources of water. (iii) better public health particularly reduction in waterborne and infectious diseases; (iv) reduced risk of groundwater contamination; (v) reduced risk of contamination of treated water supplies; and, (vi) improvement in quality of water bodies due to disposal of treated effluent meeting disposal standards
Selected Alternative	Without subproject would yield the town to be continuously under-serviced that puts the health of the general public at an increasing risk and could potentially worsen the living environment. This 'no project' scenario would impede further social and economic development of the district and the defer commitments to improve the proportion of the population with sustainable access to clean water and basic sanitation. Given the large-scale benefits to the population and environment, 'no project' alternative is considered inappropriate
2	Alternative source of water
Type of alternative	'Water source'

Description of alternatives	As detailed in earlier sections, analysis of requirement for future water demand was done and matter was discussed with PHED and Water Resource Department (WRD). As there is sufficient surface water available with WRD in Kagdi lake through Mahi dam and PHED is already drawing the required amount of the water, which meets the requirement of proposed water supply, therefore no alternate source as ground water was considered.																																																
Selected Alternative	No alternate ground water source was considered																																																
3	Sewage treatment process																																																
Type of alternative	Sewage treatment technology																																																
Description of alternatives	Various secondary treatment technologies have been considered in the sewage treatment process after the primary treatment consisting of screening and grit removal. Secondary treatment is the critical process that removes the organic putrescible organic matters and brings down the BOD of the effluent to meet the discharge standards. Following process technologies considered: Waste Stabilization Ponds; Aerated Lagoons; Up Flow Anaerobic Sludge Blanket (UASBR) + FAL; Conventional Activated Sludge Process; and Cyclic Activated Sludge Process/Sequential Batch Reactor (SBR) A comparison of various treatment technologies is presented below in terms of merits of the process over key parameters like quality characteristics and land requirement: <table border="1"> <thead> <tr> <th>Item</th><th>Conventional Activated Sludge</th><th>Extended Aeration</th><th>UASB followed by Facultative Aerobic Lagoon</th><th>Cyclic Activated Sludge Process / SBR</th></tr> </thead> <tbody> <tr> <td>Performance (Typical)</td><td>Mostly stable</td><td>Mostly stable</td><td>Varying with temperature variations</td><td>Complete Stable</td></tr> <tr> <td>BOD</td><td><30 ppm</td><td><30 ppm</td><td><30 ppm</td><td><10 ppm</td></tr> <tr> <td>COD</td><td><250 ppm</td><td><250 ppm</td><td><250 ppm</td><td><100 ppm</td></tr> <tr> <td>Suspended solids</td><td><50 ppm</td><td><50 ppm</td><td><100 ppm</td><td><10 ppm</td></tr> <tr> <td>Total Nitrogen</td><td>No Treatment</td><td>No Treatment</td><td>No Treatment</td><td><10 ppm</td></tr> <tr> <td>Total Phosphorous</td><td>No Treatment</td><td>No Treatment</td><td>No Treatment</td><td><2 ppm</td></tr> <tr> <td>Coliform removal, %</td><td>60-90</td><td>60-90</td><td>-</td><td>99.99%</td></tr> <tr> <td>Re-use Options</td><td>can only be used for low end usages like flushing and gardening tertiary treatment required for high and usages like construction water, industrial usages, cooling water etc.</td><td>can only be used for low end usages like flushing and gardening tertiary treatment required for high and usages like construction water, industrial usages,</td><td>can only be used for low end usages like flushing and gardening tertiary treatment required for high and usages like construction water, industrial usages,</td><td>Can be used for low end usages as well as for high end usages without any tertiary treatment.</td></tr> </tbody> </table>				Item	Conventional Activated Sludge	Extended Aeration	UASB followed by Facultative Aerobic Lagoon	Cyclic Activated Sludge Process / SBR	Performance (Typical)	Mostly stable	Mostly stable	Varying with temperature variations	Complete Stable	BOD	<30 ppm	<30 ppm	<30 ppm	<10 ppm	COD	<250 ppm	<250 ppm	<250 ppm	<100 ppm	Suspended solids	<50 ppm	<50 ppm	<100 ppm	<10 ppm	Total Nitrogen	No Treatment	No Treatment	No Treatment	<10 ppm	Total Phosphorous	No Treatment	No Treatment	No Treatment	<2 ppm	Coliform removal, %	60-90	60-90	-	99.99%	Re-use Options	can only be used for low end usages like flushing and gardening tertiary treatment required for high and usages like construction water, industrial usages, cooling water etc.	can only be used for low end usages like flushing and gardening tertiary treatment required for high and usages like construction water, industrial usages,	can only be used for low end usages like flushing and gardening tertiary treatment required for high and usages like construction water, industrial usages,	Can be used for low end usages as well as for high end usages without any tertiary treatment.
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			cooling water etc.	cooling water etc.	
	Land requirement (m ² /person)	0.1-0.18	0.08-0.15	0.2-0.25	0.035-0.07
	Process Power requirement (kWh/person/year)	12-15	16-19	4-5	6-8
	Sludge handling	Sludge needs digestion prior to drying on beds or use mech. devices	Digested sludge, dry on beds or use mech. devices	Digested sludge, dry on beds or use mech. Devices	Digested sludge, dry on beds or use mech. devices
	Equipment requirement (excluding screening and grit removal)	Aerators, recycle pumps, scrapers, thickeners, digester, dryers, gas equipment	Aerators, recycle pumps, sludge scrapers, (for large settlers)	Nil (gas collection optional)	Diffuse aeration system, recycle sludge and waste sludge pumps, decanters
	Operational characteristics	Skilled Operation required	Simpler than activated sludge	Simpler than activated sludge	Complete automatic operation by computer and PLC. Negligible manpower Intervention required
	Special features	Considerable equipment and skilled operation required especially if gas collection and usage involved. Method considered mainly for large sized plants	BOD removal high, effluent nitrified relatively high power requirement, favoured for small and medium sized plants	Minimal to negligible power requirement of the system makes it an economical alternative if gas revenue is neglected land requirement is also relatively small but depends on type of past treatment adopted	Highest treatment efficiency with crystal quality power requirement is 50% of conventional technologies land requirement is less than 50% of conventional technologies
Selected Alternative	Selected processes: Sequential batch reactor (SBR) The genesis of selecting a suitable treatment process is primarily correlated with degree of treatment aimed to be achieved. In India, the latest court Order of April 2019 (NGT				

	Order dated 30 April 2019) mandates all the civic authorities to adopt the treated sewage characteristics applicable are as shown in table below: <table border="1"> <thead> <tr> <th>Parameter</th><th>Standards</th></tr> </thead> <tbody> <tr> <td>BOD, mg/l</td><td>10</td></tr> <tr> <td>TSS, mg/l</td><td>20</td></tr> <tr> <td>COD, mg/l</td><td>50</td></tr> <tr> <td>Nitrogen-Total, mg/l</td><td>10</td></tr> <tr> <td>Phosphorus- Total, mg/l</td><td>1</td></tr> <tr> <td>Fecal Coliform (MPN/ 100 ml)</td><td>100 (permissible 230)</td></tr> </tbody> </table> SBR provides highest treatment efficiency possible in a single step biological process. The system is operated in a batch reactor mode this eliminates all the inefficiencies of the continuous processes. A batch reactor is a perfect reactor, which ensures 100% treatment. Separate modules are provided to ensure continuous treatment. The complete process takes place in a single reactor, within which all biological treatment steps take place sequence. The complete biological operation is divided into cycles. Each cycle is of 3 – 5-hour duration, during which all treatment steps take place.	Parameter	Standards	BOD, mg/l	10	TSS, mg/l	20	COD, mg/l	50	Nitrogen-Total, mg/l	10	Phosphorus- Total, mg/l	1	Fecal Coliform (MPN/ 100 ml)	100 (permissible 230)
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4	Treated wastewater disposal														
Type of alternative	Treated wastewater disposal – reuse applications														
Description of alternatives	For the discharge of treated waste water emerging from STP following two alternatives were considered- (i) Discharge of treated wastewater into ponds / on land (ii) Reuse the treated wastewater in non-potable uses Rajasthan is a water scarce region and receives low rainfall. Recognizing the importance of treated wastewater in reducing the demand on water, Sewerage and Wastewater Policy, 2016, of Rajasthan promotes the reuse of treated sewage for non-potable applications, and to make sewerage projects environmentally sustainable. This policy prioritizes reuse in irrigation (agriculture, forestry, and landscaping), followed by fish farming, industry and non-potable domestic reuse. Policy suggests construction of storage tanks to store treated wastewater to facilitate reuse. Policy prescribes that the detailed project report (DPR) should clearly define the best reuse option specific to the town and prepare a Reuse Action Plan part of the DPR following water quality norms and legal implications. Accordingly, it is proposed to utilize the treated wastewater for non-potable uses. A detailed Reuse Action Plan will be prepared during the detailed design phase, and, implemented. It is also proposed that the excess / surplus treated wastewater which is not being utilized in reuse will be discharged into local drains/streams and necessary facilities – pipelines and pumping facilities, will be developed.														
Selected Alternative	Reuse in non-potable applications and discharge excess/surplus														
5	Project Locations														
Description of alternatives	It has already been decided that only Government lands will be used for construction works under RSTDSP. There are limitations with land availability at suitable location with Government departments; therefore sites were selected on the basis of Government land available nearest the required locations. In this project; required areas of lands for construction of WTP and STP are available within existing premises of WTP (AEN campus, PHED and WTP at Kagdi Pickup Weir) and existing STP campus and required land for construction of SPSs are also available at desired locations. Therefore no alternate land was accessed in project design phase. Pipe lines are proposed within ROW of the road to avoid any land acquisition for pipe laying.														

6	Selection of Pipe Materials for Water Supply and Sewerage				
Description of alternatives	<i>Selection of pipe materials for water supply:</i> The pipe material proposed for the Clear water transmission network is duly considering the durability of the material and its strength to withstand the expected normal internal and external stresses. The selection of pipe material has been done considering the parameters like: Ability to withstand internal / external pressure, Ease in handling and lowering of pipes, Corrosion resistance, Pipe jointing materials should be effective and reliable, Trouble-free maintenance operation should be ensured, Availability of specials and fittings, Pipe roughness coefficient. Various available alternates were compared during detail design like uPVC pipes, CC, DI and HDPE. uPVC pipes were not adopted due to leakages and not robust for the NRW reduction and CC pipes were not considered due to profuse leakages and heavy in handling. Therefore DI K-9 pipes were considered for transmission and HDPE /DI K-7 pipes were considered for distribution networks. <i>Selection of pipe materials for Sewerage system:</i> The appropriate choice of pipe material would undoubtedly make a remarkable contribution to the conventional centralized sewerage system. A sewerage system involves a series of conduits to be linked up for the conveyance of sewage from residential, commercial, and industrial areas, as well as rainfall or surface water. The sewage is transported under gravity (or via pumping facilities, when necessary) to a sewage treatment plant before discharging into water bodies. Consequently, high resistance to internal pressure is seldom required, and thus less expensive piping materials are used. The following pipe materials have been considered: a) <i>Double Walled Corrugated (DWC) HDPE Pipe</i> - DWC-HDPE pipes shall conform to IS 16098 part-2. Specifically, the double wall corrugated (DWC) High Density Polyethylene (HDPE) pipe is a new product designed to accommodate all the properties required for wastewater and drainage system. The DWC HDPE is a new technology for India. As the name suggests, the pipe is double layered. The inner wall is smooth while the outer wall is corrugated. Its properties offer advantages for the transportation of waste material while offering good overload force bearing properties. This technology ensures that when the pipe is laid underneath a road, there is no damage to the pipe from the traffic on the road. This pipe is designed for only gravity flow applications like sewage and drainage but it can still withstand an internal pressure of 2.5 kg/cm² which enables periodic flushing and maintenance as required. Advantages and disadvantages of DWC pipe were considered during pipe design and list of comparison is as below- <table border="1"> <thead> <tr> <th><u>Advantage:</u></th><th><u>Disadvantages:</u></th></tr> </thead> <tbody> <tr> <td> Good resistance to corrosion attack. Relatively light weight Flexible Low frictional resistance Comprehensive range of fittings available Higher flexibility and flexural strength ensures its capabilities to sustain greater overburden as well as live load impact. Low, Maintenance, because of non-adherence of sewage elements on the chemically inert pipe surfaces, no chance of corrosion and zero to low damages </td><td> Compare to cost wise, costlier than other material In case of maintenance/replacement, getting new pipe for smaller quantity is difficult </td></tr> </tbody> </table>	<u>Advantage:</u>	<u>Disadvantages:</u>	Good resistance to corrosion attack. Relatively light weight Flexible Low frictional resistance Comprehensive range of fittings available Higher flexibility and flexural strength ensures its capabilities to sustain greater overburden as well as live load impact. Low, Maintenance, because of non-adherence of sewage elements on the chemically inert pipe surfaces, no chance of corrosion and zero to low damages	Compare to cost wise, costlier than other material In case of maintenance/replacement, getting new pipe for smaller quantity is difficult
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	b) Concrete Pipes- Concrete pipes can be manufactured to any reasonable strength required by varying the wall thickness and the percentage of reinforcement and shape of the reinforcing cage. Concrete pipes are manufactured as non-pressure pipes with classes of NP2, NP3 and NP4. They are manufactured in sizes from 200 mm to 2000 mm. However, these pipes are subjected to corrosion where acid discharges into sewer or where velocities are not sufficient to prevent septic conditions or where the soil is highly acidic or contains excessive sulphates. Protective linings or coatings should be used inside and outside where excessive corrosion is likely to occur. The pipes may be manufactured vertical casting with sulphate resistant cement. Only high alumina cement lining should be given where the pipes are exposed to corrosive sewage or industrial wastes. Advantages and disadvantages of DWC pipe were considered during pipe design and list of comparison is as below- <table border="1"> <tr> <td> <u>Advantages of Concrete Pipes</u> Providing the required strength to the pipes may be relatively easier. With Socket and spigot ends the pipes could be installed with Elastomeric rubber joints at faster rate. </td><td> <u>Disadvantages of concrete pipes</u> Concrete pipes are heavier and require lifting arrangements especially for large dia. pipes. NP2 pipes are not suitable for sewers since three edge bearing strength of these pipes are much lower than NP3 and NP4 pipes. Lining with high alumina cement may be required to protect the pipe from corrosion. </td></tr> </table> c) PVC-U pipe– For sewer house connections, joining to house chamber and network manholes PVC-U pipe has been adopted due to easy in handling, durability, and suitability for sewerage and easy in connection, in comparison to other pipes such as HDPE, CC and ceramic pipes available in market.	<u>Advantages of Concrete Pipes</u> Providing the required strength to the pipes may be relatively easier. With Socket and spigot ends the pipes could be installed with Elastomeric rubber joints at faster rate.	<u>Disadvantages of concrete pipes</u> Concrete pipes are heavier and require lifting arrangements especially for large dia. pipes. NP2 pipes are not suitable for sewers since three edge bearing strength of these pipes are much lower than NP3 and NP4 pipes. Lining with high alumina cement may be required to protect the pipe from corrosion.
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IV. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. ADB Policy

40. ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB SPS, 2009. This states that ADB requires environmental assessment of all project loans, program loans, sector loans, sector development program loans, and loans involving financial intermediaries, and private sector loans.

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

- (i) **Category A.** Projects could have significant adverse environmental impacts. An EIA is required to address significant impacts.

- (ii) **Category B.** Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. An IEE is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.
- (iii) **Category C.** Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.
- (iv) **Category FI.** Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all Projects will result in insignificant impacts.

42. **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.

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

44. **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.

45. **Consultation and Participation.** ADB SPS require borrower to conduct meaningful consultation¹¹ 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.

46. **Grievance Redress Mechanism.** ADB SPS require borrowers to establish a mechanism to receive and facilitate resolution of affected people's concerns, complaints, and grievances

¹¹Per 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;¹ (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

about the subproject's performance. The grievance mechanism shall be scaled to the risks and adverse impacts of the subproject.

47. **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.

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

49. **Occupational Health and Safety.** ADB SPS requires the borrower¹² to ensure that workers¹³ are provided with a safe and healthy working environment, considering 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.

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

51. **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.

52. **ADB SPS International Best Practice Requirements.** ADB SPS requires that, during

¹² 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

¹³ 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.

the design, construction, and operation of the project, the executing agency shall apply pollution prevention and control technologies and practices that are consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines. (IFC's General EHS Guidelines¹⁴ and Sector Specific (Water and Sanitation) Guidelines).¹⁵ These standards contain performance levels and measures that are normally acceptable and applicable to projects. These standards contain performance levels and measures that are normally acceptable and applicable to projects. When Government of India regulations differ from these levels and measures, the PMU and PIUs will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the PMU and PIUs will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

B. National and State Laws

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

54. 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.

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

56. **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.

57. None of the components of this water supply and sewerage subproject falls under the

¹⁴<https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES>

¹⁵<https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B-%2BWater%2BAnd%2BSanitation.pdf?MOD=AJPERES>

ambit of the EIA Notification 2006, and, therefore EIA Study or EC is not required for the subproject.

58. 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 4.

Table 4: Applicable Environmental Regulations

Law	Description	Requirement	Relevance to Project Phase
National Environment Policy (NEP), 2006.	NEP is a comprehensive guiding document in India for all environmental conservation programs and legislations by Central, State and Local Government. The dominant theme of this policy is to promote betterment of livelihoods without compromising or degrading the environmental resources. The policy also advocates collaboration method of different stakeholders to harness potential resources and strengthen environmental management.	RSTDSP should adhere to NEP principle of “enhancing and conservation of environmental resources and abatement of pollution”.	All phases of project
Rajasthan State Environment Policy, 2010 including And Rajasthan Environment Mission and Climate Change Agenda for Rajasthan (2010-14)	Follows the National Environment Policy, 2006 and core objectives and policies are: -Conserve and enhance environmental resources; assure environmental sustainability of key economic sectors; and, improve environmental governance and capacity building - it recommends specific strategies and actions to address the key environmental issues: water resources, desertification and land degradation, forest and biodiversity, air quality, climate change: adoption and mitigation, mining, industry, tourism, energy, urban development, etc. - Establishment of Environment Mission under the chairpersonship of the Chief Minister and a Steering Committee under the chairpersonship of Chief Secretary, Government of Rajasthan Tasks force set up for six key areas	Project implementation should adhere to the policy aims of: conservation and enhancement of environmental resources, integration of environmental concerns into projects/plans, and capacity building in environmental management. Under water sector, major concerns, as the policy notes, are huge water losses and wastage, declining water availability, pollution. Relevant recommendations for the project include control of losses, integrated water resources management, control of raw water pollution ¹⁸ , reuse and recycling. Avoid/minimize use of forest lands. With reference to climate change adoption and mitigation following should be considered	All phases of project

Law	Description	Requirement	Relevance to Project Phase
		in the project: (i) diminishing flows in surface water bodies, and groundwater depletion, and revival traditional water bodies as water sources (lakes/tanks); (ii) equal stress on demand side management in water; and (iii) minimize energy use - design energy efficiency systems.	
EIA Notification, 2006	Projects indicated in the schedule of this notification requires EIA study and environmental clearance.	None of the components of this subproject falls under the ambit of the notification; no EIA study or environmental clearance required	-
Central Ground Water Authority Public Notice 2/100	Public Notice specifies districts and areas where there are restrictions on the construction and installation of any new structure for extraction of groundwater resources without specific approval from the CGWA	Subprojects belonging to the Notified Areas in the Public Notice and will require new structures on extracting groundwater should seek the permission from the Central Groundwater Authority	
Public Health Engineering Department Office Order P5 (1) PHE-2010 dated July 14 2020	PHED Office Order states that the State Government is instructed that permits for any new tube wells, bore wells or any structures extracting ground water shall be secured from the District Collector	Subprojects with components shall secure permits from the District Collector for components that include any new tube wells, bore wells or structures extracting groundwater	
Air (Prevention and Control of Pollution) Act of 1981, Rules of 1982 and amendments.	This Act was enacted to achieve prevention, control and abatement of air pollution activities by assigning regulatory powers to Central and State boards for all such functions. The Act also establishes ambient air quality standards. The projects having potential to emit air pollutants into the atmosphere have to obtain CTE and CTO under Section 21 of the Act from RPCB. The occupier of the project/facility has the responsibility to adopt necessary air pollution control measures for abating air pollution.	The following will require CTE and CTO from RPCB: (i) Diesel generators); (ii) Batching Plant hot mix plants; and (iii) stone crushers, if installed for construction. All relevant forms, prescribed fees and procedures to obtain the CTE and CTO can be found in the RPCB website (http://environment.rajasthan.gov.in) If ready mix concrete and hot mix bitumen is procured from third party, contractor to ensure that the plants, from where material is being purchased is having CTE/CTO and copy	Construction and operation

Law	Description	Requirement	Relevance to Project Phase
		should be collected from third party and submitted in PIU	
Biodiversity Act of 2002	This Act primarily addresses access to genetic resources and associated knowledge by foreign individuals, institutions or companies, to ensure equitable sharing of benefits arising out of the use of these resources and knowledge to the country and the people.	Not Applicable	-
Wildlife Protection Act, 1972 and amendment 1991	This overarching Act provides protection to wild animals, birds, plants and matters connected with habitat protection, processes to declare protected areas, regulation of wildlife trade, constitution of state and national board for wildlife, zoo authority, tiger conservation authority, penalty clauses and other important regulations.	Not applicable – none of the project components are located in protected areas. None of the components of the subproject are located within the protected Area. Therefore, this act is not applicable.	Construction
Forest (Conservation) Act, 1980	The Forest (Conservation) Act prohibits the use of forest land for non-forest purposes without the approval of Ministry of Environment Forests & Climate Change (MoEFCC), Government of India	Not applicable; none of the components of the subproject are located in forest.	Construction
Environmental (Protection) Act, 1986 amended in 1991 and the following rules/notifications:	This is an “umbrella” legislation that empowers the Central Government to take all necessary measures to protect and improve the quality of the environment and prevent, control and abate environmental pollution. Empowers central government to enact various rules to regulate environmental pollution, including standards for quality of air, water, noise, soil; discharge standards or allowable concentration limits for environmental pollutants, handling of hazardous substances, locating/prohibiting industries, etc.,	There are rules / notifications that have been brought out under this Act, which are relevant to RSTDSP, and are listed below	Construction and operation
Environmental Standards (ambient and discharge).	Emissions and discharges from the facilities to be created or refurbished or augmented shall comply with the notified standards	Appendix 6 provides ambient air quality standards, emission limits and emission stack height requirements for diesel generators Appendix 7 provides STP discharge standards	Construction and operation
Noise Pollution (Regulation and Control)	Rule 3 of the Act specifies ambient air quality standards in respect of noise for different areas/zones.	Appendix 8 provides applicable noise standards and noise limits for DG sets	Construction and operation

Law	Description	Requirement	Relevance to Project Phase
Rules, 2000 amended up to 2010.			
Indian Drinking Water Standards	Gives details of the permissible and desirable limits of various parameters in drinking water as per the Bureau of Indian Standards	Appendix 10 provides drinking water standards	Construction and operation
Solid Waste Management Rules 2016	Responsibility of Solid Waste Generator segregate and store the waste generated in three separate streams namely bio-degradable, non-biodegradable and domestic hazardous wastes in suitable bins and handover segregated wastes to authorized waste pickers or waste collectors as per the direction or notification by the local authorities from time to time; store separately construction and demolition waste, as and when generated, in his own premises and shall dispose off as per the Construction and Demolition Waste Management Rules, 2016; (iii) No waste generator shall throw, burn or bury the solid waste generated by him, on streets, open public spaces outside his premises or in the drain or water bodies.	Contractor to follow all the rules during construction works	Construction and operation
Construction and Demolition Waste Management Rules 2016	(i) Every waste generator shall segregate construction and demolition waste and deposit at collection centre or handover it to the authorized processing facilities (ii) Shall ensure that there is no littering or deposition so as to prevent obstruction to the traffic or the public or drains (iii) Large generators (who generate more than 20 tons or more in one day or 300 tons per project in a month) shall submit waste management plan and get appropriate approvals from the local authority before starting construction or demolition or remodeling work, (iv) Large generators shall have environment management plan to address the likely environmental issues from construction, demolition, storage, transportation process and disposal / reuse of C & D Waste.	Construction waste shall be collected at stockpile area for 8-10 days and will be sent to disposal site. Disposal site shall be identified and allotted by Municipal Council after mobilization of contractor (during SIP period) and can't be mentioned at this time. Contractor to follow all the rules during construction works. Sludge or any material if classified as hazardous waste / material is to be handled and disposed according to this Rules	Construction

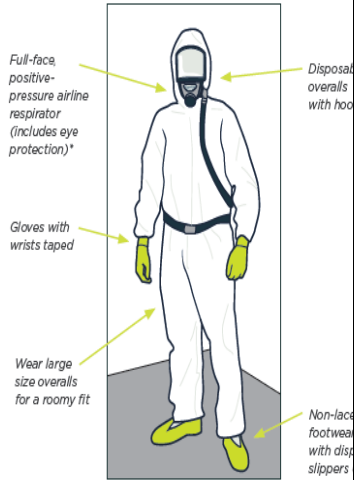
Law	Description	Requirement	Relevance to Project Phase
	(v) Large generators shall segregate the waste into four streams such as concrete, soil, steel, wood and plastics, bricks and mortar, (vi) Large generators shall pay relevant charges for collection, transportation, processing and disposal as notified by the concerned authorities;		
Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016,	Responsibilities of the occupier for management of hazardous and other wastes.- (1) For the management of hazardous and other wastes, an occupier shall follow the following steps, namely:- (a) prevention; (b) minimization; (c) reuse, (d) recycling; (e) recovery, utilization including co-processing; (f) safe disposal. (2) The occupier shall be responsible for safe and environmentally sound management of hazardous and other wastes. (3) The hazardous and other wastes generated in the establishment of an occupier shall be sent or sold to an authorized actual user or shall be disposed of in an authorized disposal facility. (4) The hazardous and other wastes shall be transported from an occupier's establishment to an authorized actual user or to an authorized disposal facility in accordance with the provisions of these rules. (5) The occupier who intends to get its hazardous and other wastes treated and disposed of by the operator of a treatment, storage and disposal facility shall give to the operator of that facility, such specific information as may be needed for safe storage and disposal. (6) The occupier shall take all the steps while managing hazardous and other wastes to- 6 (a) contain contaminants and prevent accidents and limit their consequences on human beings and the environment; and (b) provide persons working in the site with appropriate training, equipment and the information necessary to ensure their safety.	Contractor to comply all the requirements of this Act during construction works. There are asbestos cement (AC) in the existing water supply system. As per these Rules, any waste with asbestos concentration limit exceeding 10,000 mg/kg (i.e. 1%), and is in the form of friable, powdered or finely divided state, is classified as hazardous waste. As per Bureau of Indian Standards (BIS), "AC pipes generally contain about 10-15% asbestos fibers in a cement matrix that comprises the rest of the materials and are termed as locked in asbestos products as these products have the asbestos fibers bound in cement. There is very little possibility of generation of airborne asbestos fibers during any reasonable handling, storage, and use of such products. However, during storing and installation, recommended work practices shall be followed to avoid harmful exposure". Except over the ground connections near CWRs, almost all the AC pipes were laid underground. In RSTDSP, no AC pipes are proposed, existing AC pipes will be left as it is. However, some pipes may have to removed / handled, and if such waste pipes confirm to	Construction and operation

Law	Description	Requirement	Relevance to Project Phase
		the provisions of this act, waste shall be treated as hazardous waste and disposed as per the rules.	
Wetlands (Conservation and Management) Rules, 2017	The Rules specify activities which are harmful and prohibited in the wetlands such as industrialization, construction, dumping of untreated waste and effluents, and reclamation. The Central Government may permit any of the prohibited activities on the recommendation of Central Wetlands Regulatory Authority.	Not applicable as subprojects components are not located in or near to designated wetland area.	
Ancient Monuments and Archaeological Sites and Remains Act, 1958 and Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010.	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 Archaeological Survey of India (ASI).	Not applicable. In case of chance finds, the contractor/ PIU will be required to follow a protocol as defined in the Environmental Management Plan (EMP)	Construction
The Building and Other Construction Workers (BOCW) Act 1996 and Rajasthan Building and Construction Workers Rules 2009	Employer shall- • Provide and maintain, at suitable point, sufficient quantity of wholesome drinking water, such point shall be at least 6 meters away from any washing areas, urinals or toilets • Provide sufficient urinals and latrines at convenient place, easily accessible by workers • Provide free of charge, temporary living accommodations near to work sites with separate cooking place, bathing and lavatory facilities and restore the site as preconditions after completing the construction works • Provide crèche with proper accommodation, ventilation, lighting, cleanliness and sanitation if more than fifty female	Contractors are required to follow all the provisions of BOCW Act and Rajasthan BOCW Rules. Salient features of Rajasthan BOCW Rules are- Chapter III, section 17- Registration of establishments Chapter VIII, section 61- Hours of works, intervals or rest and spread over, overtime Section 62- weekly rest Section 63- night shift Section 67- registers of workers Section 68- Muster roll, wages register Section 70- latrine and urinal facilities Chapter XI- Safety and Health Section 78- fire protection Section 79- emergency action plan	Construction

Law	Description	Requirement	Relevance to Project Phase
	workers are engaged • Provide first aid facilities in all construction sites For safety of workers employer shall provide- • Safe access to site and workplace • Safety in demolition works • Safety in use of explosives • Safety in operation of transporting equipment and appoint competent person to drive or operate such vehicles and equipment • Safety in lifting appliance, hoist and lifting gears • Adequate and suitable lighting to every workplace and approach • Prevention of inhalation of dust, smoke, fumes, gases during construction works and provide adequate ventilation in workplace and confined space • Safety in material handling and stacking/un stacking • Safeguarding the machinery with fly-wheel of moving parts • Safe handling and use of plants operated by compressed air • Fire safety • Limit of weight to be lifted by workers individually • Safety in electric wires, apparatus, tools and equipment • Provide safety net, safety sheet, safety belts while working at height (more than 1.6 mtrs as per OSHA) • Providing scaffolding, ladders and stairs, lifting appliances, chains and accessories where required • Safety in pile works, concrete works, hot asphalt, tar, insulation, demolition works, excavation, underground construction and handling materials • Provide and maintain medical facilities for workers • Any other matters for the safety and health of workers	Section 80- fencing of motors Section 81- lifting and carrying of weight Section 82- H&S policy Section 83- dangerous and harmful environment Section 84- Overhead protection Section 88- eye protection Section 89- PPEs Section 90- electrical hazards Section 97- use of safety helmets and shoes Chapter XIII-lifting appliances and gears Chapter XV- transport and earth moving equipments Chapter XVI- concrete works Chapter XVII- demolition works Chapter XVIII-Excavation and tunneling Chapter XX- ladders and step ladders Chapter XXII- structural frame and formworks Chapter XXIV- medical facilities and first aid box	
Contract Labor (Regulation)	Provides for welfare measures to be provided by the Contractor to contract labor and in case the Contractor fails	• Applicable to all construction works in the project	Construction and operation

Law	Description	Requirement	Relevance to Project Phase
and Abolition) Act, 1970; The Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979	to provide, the same are required to be provided by the Principal Employer by Law. The principal employer is required to take Certificate of Registration and the Contractor is required to take a License from the designated Officer. The Act is applicable to the establishments or Contractor of principal employer if they employ 20 or more contract labor. The inter-state migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home up to the establishment and back, etc.,	• Principle employer (RUDSICO-EAP) to obtain Certificate of Registration from Department of Labour, as principle employer • Contractor to obtain license from designated labor officer • Contractor shall register with Labor Department, if Inter-state migrant workmen are engaged • Adequate and appropriate amenities and facilities shall be provided to workers including housing, medical aid, traveling expenses from home and back, etc., Appendix11 provides applicable labor laws including amendments issued from time to time applicable to establishments engaged in construction of civil works.	
The Child Labour (Prohibition and Regulation) Act, 1986	Prohibits employment of children below 14 years of age in certain occupations and processes Employment of child labor is prohibited in building and construction Industry.	No child labour shall be employed	Construction and operation
Minimum Wages Act, 1948	Minimum wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of buildings, roads and runways are scheduled employment.	Applicable to all construction works in the project. All construction workers should be paid not less than the prescribed minimum wage	Construction and operation
Workmen Compensation Act, 1923	Provides for compensation in case of injury by accident arising out of and during the course of employment.	Compensation for workers in case of injury by accident	Construction and operation
Equal Remuneration Act, 1979	Provides for payment of equal wages for work of equal nature to male and female workers and not for making discrimination against female employees in the matters of transfers, training and promotions etc.	Equal wages for work of equal nature to male and female workers	Construction and operation
The Rajasthan Monuments, Archaeological Sites and Antiquities Act, 1961;	Any construction/excavation work in the 'protected area' (as declared by GoR under the Act) requires priori permission of Department of Archeology & Museums -Application under the Rules shall be submitted to Director, State	Not applicable. In case of chance finds, the contractor/ PIU will be required to follow a protocol as defined in the Environmental Management Plan (EMP).	Construction

Law	Description	Requirement	Relevance to Project Phase
the Rajasthan Monuments, Archaeological Sites and Antiquities (amendment) Act 2007	Archeological Department, at least 3 months prior to the work. Department provides conditional permission, including time for completion, procedures to be followed during the work and for chance finds etc.		
Rajasthan Forest Act, 1953 and Rajasthan Forest Rules, 1962	This Act makes the basis for declaration of Reserved Forests, constitution of village forest committees, management of reserved forests and penalties and procedures.	Not applicable; none of the components / pipeline alignment are in forest areas.	Construction
IS 11768: 1986/2005: Recommendations for disposal of asbestos waste material	The standard emphasizes that every employer who undertakes work which is liable to generate asbestos containing waste, shall undertake adequate steps to prevent and /or reduce the generation of airborne dust during handling, storing, transportation and final disposal of asbestos and asbestos containing products.	The crux is waste avoidance: the practice inculcated should focus on minimal waste generation. Waste Collection: In the project circumstance, the waste is referred to the damaged powered asbestos which will be collected in the Permissible plastic bags to be disposed to the nearest TSDF facilities.	Construction
IS 12081: Pictorial Warning to be implemented on equipment containing Asbestos Contaminated Products.	The objective of the caution is to make the person handling to take all pre-cautionary measures and make them aware of all the possible risk.	The following signs and personal protective equipment shall be used in handling ACM. 	Construction

Law	Description	Requirement	Relevance to Project Phase
			
IS 11451: Safety and Health Requirements related to Occupational Exposure to Asbestos contaminated Products.	This standard details the occupational exposure allowable and safety at work place to be enforced.	In the project the norms pertaining to limiting number of hours working with ACM will be 8.0 hrs/48 hrs a week and the medical examination has to be periodic, the environmental monitoring has to be done as per the protocol. The safety at work place shall be enforced.	Construction
IS 11768: Waste Disposal Procedure for Asbestos Containing Products.	The protocol pertaining to disposal of the waste is emphasized.	The collection of ACM powered will be in permissible plastic bags, which will be twisted tight at the neck so that the wear and tear due to abrasion will be minimum and the transportation of the asbestos waste has to be done by the authorized vendor to the approved landfill site.	Construction
International conventions and treaties			
Ramsar Convention, 1971	The Ramsar Convention is an intergovernmental treaty that provides the framework for national action and international co-operation for the conservation and wise use of wetlands and their resources. India is one of the signatories to the treaty. The Ramsar convention made it mandatory for the signatory countries to include wetland conservation in their national land use plans.	There are no Ramsar sites in or near Abu Road. Not applicable to Abu Road water supply and sewerage subproject.	-
Convention on	India is a signatory of this convention which aims to control	Not applicable in this project as no endangered species of wild	-

Law	Description	Requirement	Relevance to Project Phase
International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973	international commercial trade in endangered species	fauna and flora is found in project town.	
Montreal Protocol 1992	India is a signatory of this convention which aims to reduction in the consumption and production of ozone-depleting substances (ODS), while recognizing differences in a nation's responsibilities. Ozone depleting substances are divided in two groups Chlorofluorocarbons (CFCs) and Hydrochlorofluoro carbons (HCFCs)	Not applicable in this project as no ODS are involved in construction works	-
Basel Convention on Trans-boundary Movement of Hazardous Wastes, 1989	India is a signatory of this convention which aims to reduce trans-boundary movement and creation of hazardous wastes	Contractor to follow the provisions of Hazardous Waste Rules 2016 for storage, handling, transport and disposal of hazardous waste emerged during construction works Under this Convention, asbestos or asbestos waste in the form of dust and fibers is classified as hazardous waste.	-
Convention on Migratory Species of Wild Animals (CMS), 1979 (Bonn convention)	CMS, also known as Bonn convention, was adopted in 1979 and entered into force on 1 November 1983, which recognizes that states must be the protectors of migratory species that live within or pass through their national jurisdictions, and aims to conserve terrestrial, marine and avian migratory species throughout their ranges. Migratory species threatened with extinction are listed on Appendix I of the Convention. CMS Parties strive towards strictly protecting these species, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them. Migratory species that need or would significantly benefit from	Not applicable to this project as no migratory species of wild animals are reported in the project areas.	-

Law	Description	Requirement	Relevance to Project Phase
	international cooperation are listed in Appendix II, and CMS encourages the Range States to conclude global or regional agreements.		

59. **Clearances / permissions to be obtained prior to start of construction.** Table 5 shows the list of clearances/permissions required for project construction. This list is indicative and the contractor should ascertain the requirements prior to start of the construction, and obtain all necessary clearances/permission prior to start of construction.

Table 5: Clearances and Permissions required for Construction activities

S. No	Construction Activity	Statute under which Clearance is Required	Implementation	Supervision
1	Construction of new WTP and STP & Upgradation of exiting STP and WTPs	Consent to establish and consent to operate under Water Act, 1974 from RSPCB	PIU & Contractor	PMU
2	Tree Cutting	State forest department/ Revenue	PIU	PMU
3	Hot mix plants, Crushers and Batching plants	Consent to establish and consent to operate under Air Act, 1981 from RSPCB	Contractor	PIU
5	Storage, handling and transport of hazardous materials	Hazardous Wastes (Management and Handling) Rules. 2016 Manufacturing, Storage and Import of Hazardous Chemicals Rules, 1989 from RSPCB	Contractor	PIU
6	Sand mining, quarries and borrow areas	Permission from District Collector/ State Department of Mining	Contractor	PIU
7	New quarries and borrow areas	Environmental clearance under EIA Notification 2006	Contractor	PIU
8	Temporary traffic diversion measures	District traffic police	Contractor	PIU
9	Construction Waste and Demolition Debris Management	Approval from Municipal Council for diposal site is required per Construction and Demolition Waste Management Rules 2016	Contractor	PIU
10	Use of highway ROW for construction area/ crossing	National Highway authority of India	PIU	PMU

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

V. DESCRIPTION OF THE ENVIRONMENT

A. Physical Resources

1. Location, Area & Connectivity

61. Banswara is district headquarter of Banswara District in south Rajasthan in India. Banswara is situated on the southern region boundary of the state of Rajasthan in western India. Geographically, the town is located at 23.55°N 74.45°E and has an average elevation of 302 metres (990 ft). Banswara District is bounded on the north-east by Dhariawad, Pipalkoot&Arnod tehsils of Pratapgarh district of Rajasthan; on the east by Ratlam district of Madhya Pradesh; on the west by Sagwara and on north-west by Aspur tehsils of Dungarpur district of Rajasthan; on the south-east by Jhabua district of Madhya Pradesh and on south & south-west the Dohad district of Gujarat. Location map of Banswara is given in **Figure 11**.

62. The Banswara district forms eastern part of the region known as Vagad or Vagwar. The district was formerly a princely state ruled by the Maharavals. It is said that a Bhil ruler Bansia ruled over it and Banswara was named after his name. Bansia was defeated and killed by Jagmal Singh who became the first Maharaval of the princely state. It is also named so because of the bamboos (Bans) which were found in abundance in the forests. With the merger of the princely states in the Union of India, the Banswara State and Kushalgarh chiefship got merged in the Greater Rajasthan in 1949 and Banswara was carved out as a separate district by merging these principalities.

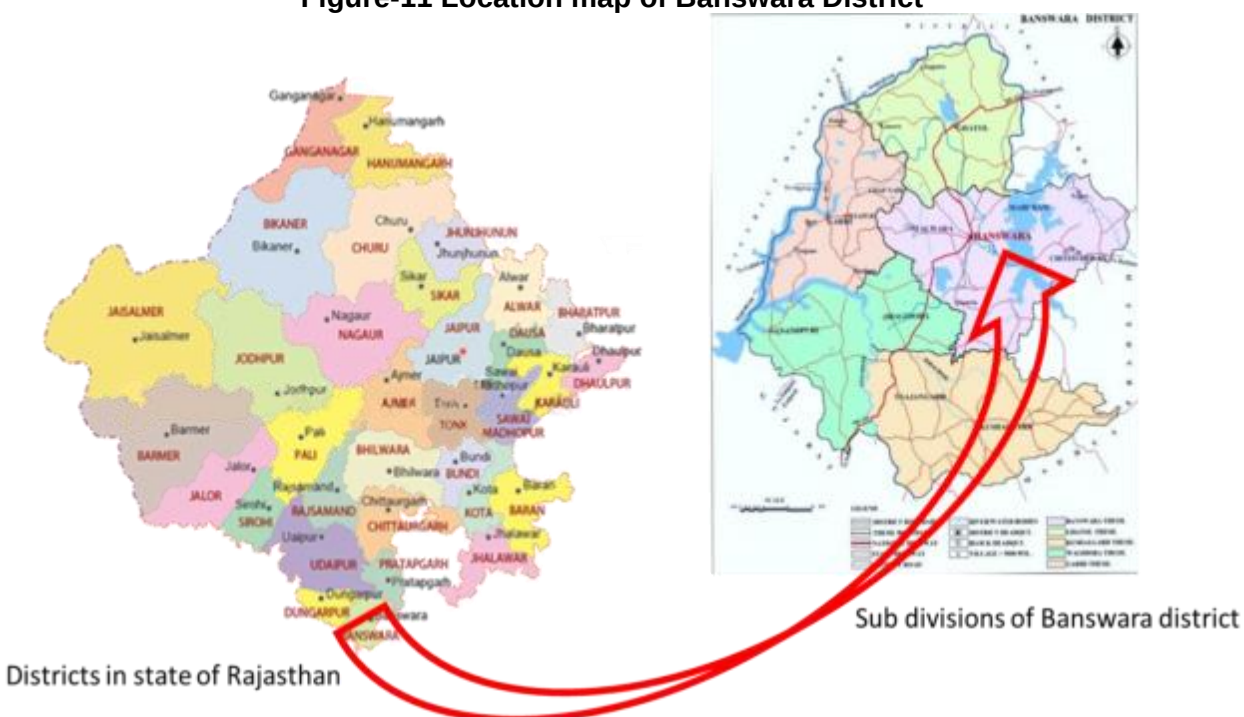
63. District Banswara has an area of 5037 square kilometer. The total length of different type of roads in the district is 3965.88 Km. Two state highway passes through the district. These roads are maintained by the state Public Works Development. (Source: PWD Administrative Report 2016-17 [postionupto Dec,2016], Govt. of Rajasthan). The district has no railway facility. The railway stations, which are near, to Banswara, are Ratlam and Dohad (Madhya Pradesh) of western Railway. The rail borne traffic of the district is mostly carried over the main line between Mumbai and Delhi. The nearest national Airport is Dabok, in Udaipur.

2. Topography, Soils and Geology

64. **Topography.** Topographically Banswara district represents a rugged terrain. The eastern part of district is occupied by flat-topped hills of the Deccan trap. The drainage system belongs to the Mahi river basin. Its main tributaries are Anas, Chap, Haran, Kagdi&Nal. There are scattered ranges of Aravalis in the eastern half of the district. Minimum elevation (113 m) is found in Anandpuri block whereas highest elevation is reached (581 m) in Kushalgarh block. (Source: Ground Water Department, Hydrogeological Atlas of Rajasthan, Banswara District: 2013)

65. **Soil.** The soils of the district fall under the two broad categories Black soil and red soil. Black soil is found predominantly in the district mostly in northern, southern, central and eastern parts. Red soil is mostly found in western portion of the district from north to south. The soil in the study area varies from clayey black cotton soil to sandy gravel with silt soils. Banswara is almost plain with some hill formations in the southern part forming part of Aravali mountain range. Average elevation is 436 m above the mean sea level. (Source: Ground Water Department, Hydrogeological Atlas of Rajasthan, Banswara District: 2013)

Figure-11 Location map of Banswara District

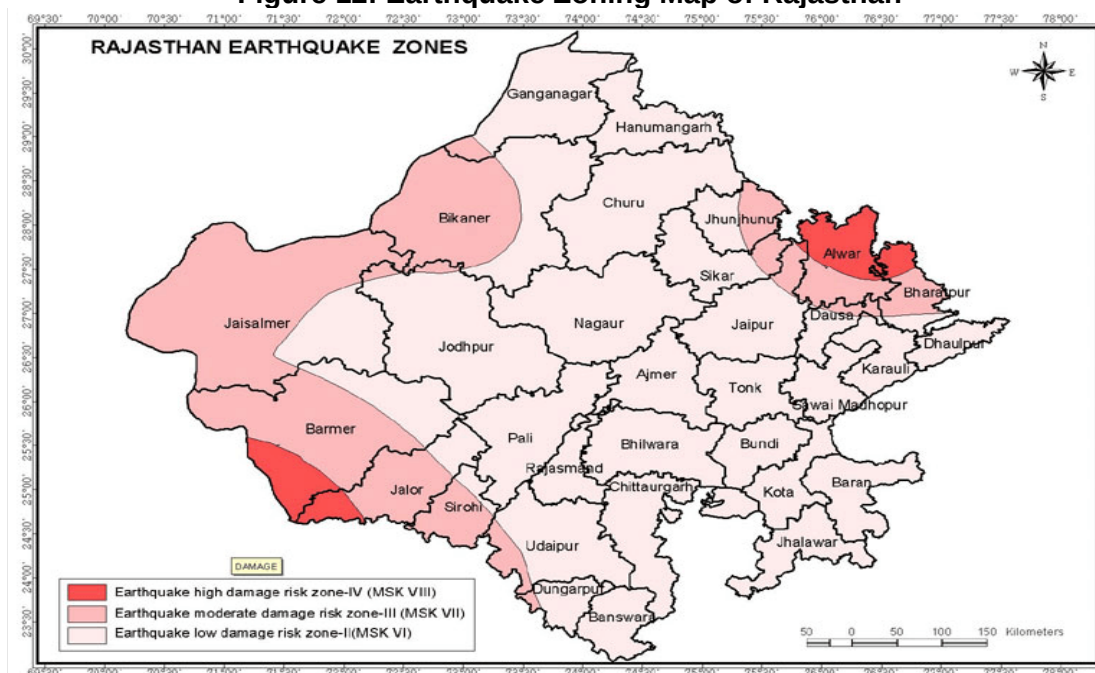


66. **Geology.** District geology includes Bhilwara Super Group, Aravalli meta-sediments, post-Aravalli intrusive and Younger flows. The Aravalli Super Group of formation consists in parts of Ghatol, Garhi, Banswara, Aandpuri and Sajjangarh blocks. The meta-sediments are comprised of quartzite, mica schist, conglomerates, quartz-chlorite schist, phyllites, dolomitic marble and gneisses. The post-Aravalli intrusive is granites, pegmatite, quartz veins and Amphibollite. The eastern and southeastern part covering Kushalgarh, part of Banswara and Chhoti Sarwan block, is occupied by Deccan trap basalt. (Source: Ground Water Department, Hydrogeological Atlas of Rajasthan, Banswara District: 2013)

67. The District lies in the Mahi River basin. The Mahi flows north through the district from its origin in the Vindhya Range of Madhya Pradesh, entering the district from the southeast and flowing north towards the northern end of the district, where it turns southwest to form the boundary between Banswara and Dungarpur districts before entering Gujarat and emptying into the Gulf of Cambay.

3. Seismology

68. As per the seismic zoning map of India, Distt Banswara falls under the Zone II, as per Bureau of Indian Standards, IS: 1983 (Part 1) 2002, where the maximum intensity expected would be around MSK VI. which is the lowest earthquake risk zone in India (Figure 13). This zone is termed as "low damage risk zone".

Figure 12: Earthquake Zoning Map of Rajasthan

4. Climatic Conditions

69. **Temperature.** The project influence area comes under the semi-arid zone. The nearest IMD (Indian Meteorological Department) center from project site is IMD center Banswara. In the region the monthly mean maximum temperature rises upto 41.5°C in May month of summer season while monthly mean minimum temperature drops upto 11.8°C in January month of winter season. In whole the year monthly mean temperature vitiate from 20 to 34°C.

70. **Humidity.** The average maximum humidity is observed to vary between 75.00-90.00 percent, with the highest humidity observed in the month of August. The average minimum humidity varies between 17.00-35.00 percent, the lowest observed in the months of March- April. The variation between maximum and minimum humidity is relatively larger in the months of June and July.

71. **Rainfall.** Rainfall received by the district is fairly good. The general distribution of rainfall across can be visualized from isohyets presented in Plate III. Here, southeastern part receives more rainfall as compared to rest of the district and its gradually decreasing towards northwest. In northwestern part (like Garhi) receives maximum annual rainfall (up to 524 mm) whereas Kushalgarh receives more Monsoon rainfall (up to 1,011 mm) in southern part of the district. Average annual rainfall in Banswara district was about 680.2 mm as per the data from available rain gauge stations in the year 2015. The highest average annual rainfall noticed in Kushalgarh block. Approximately 85 % of total rainfall is received during monsoon season from south-west monsoon in the months of July and August. (Source: Hydrogeological Atlas of Rajasthan, Banswara District, Ground Water Department, Rajasthan)

5. Surface Water

72. The main river flowing through the district is River Mahi whose origin is at Amjera Hills in Madhya Pradesh. Anas, Erav, Chanp, Kagdi and Haran are its main tributaries. At a distance of

16 km from Banswara town is built the Mahi Bajaj Sagar Dam which is utilized to collect the river water and water from the rainfall. It is situated 16kilometre fromBanswaratowninBanswara district of Rajasthan. The dam was constructed between 1972 and 1983 for the purposes of hydroelectric power generation and water supply. It is the second largest dam in Rajasthan. It is named after Jamnalal Bajaj. Dam has an Installed capacity of 140 MW power generations.

73. Present source for Banswara town is surface water from Kagdi Pickup Weir and PHED already taking the water for the Banswara Town. Kagdi is a lake on the downstream of the Mahi Dam and located within the Banswara Town. This weir/lake is filled by hydel water coming from Mahi dam through channel.

74. Water quality of raw water from Kagdi Pickup Weir is being monitored by PHED on regular basis and results show that raw water quality is suitable for drinking purpose. Results of raw water quality test at Kagdi Pickup Weir WTP is shown in **Table6** below-

Table 6: Raw Water Quality at Kagadi Pickup Weir WTP

Location and Date Parameters	New Filter House, PHED AEN campus, 01.01.2018	New Filter House, PHED AEN campus, 9.02.20 18	New Filter House, PHED AEN campus, 27.03.2018	New Filter House, PHED AEN campus, 09.04.2018	Kagadi Filter House, 19.02.2018	Kagadi Filter House, 27.03.2018	Kagadi Filter House, 14.04.2018
pH of Raw Water	8.0	8.2	8.0	8.2	8.0	8.4	8.2
Turbidity (NTU)	4.3	2.4	4.2	3.6	2.8	5.8	4.0
Temperature (°C)	22.6	27.0	33.8	34.9	27.0	34.0	34.6
Colour	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.
Odour	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.
Alum Dose (mg/L)	10	10	10	10	10	10	10
Chlorine Demand (mg/L)	3.0	3.0	2.5	3.0	3.0	3.0	3.0
Carbonate Hardness (as CaCO ₃)	90	100	100	110	100	100	110
Non Carbonate Hardness (as CaCO ₃)	0	0	0	0	0	0	0
Total Dissolved Solids (mg/L)	186	214	180	260	220	170	265
pH of Treated Water	7.7	7.7	8.0	7.9	7.8	8.0	7.8

Source: PHED, Banswara.

75. Kagdi River is a seasonal river, which is downstream of Kagdi reservoir and water is discharged from Kagdi Pickup weir, when there is excess water in Kagdi reservoir. Generally water is discharged in monsoon season. There are no downstream water usages of Kagdi River. Treated water from proposed STP is planned to be disposed in this river, which is approximately 300 mtrs from STP site. There are some small ponds and reservoirs in Banswara, which are mostly filled after mansoon and used for irrigation in nearby agricultural fields.

76. Source of raw water for existing and proposed water supply inBanswara is Mahi-

Bajajsagar reservoir. There is existing water intake facility at Kagdi Pick up Weir constructed by PHED. Proposed works at existing intake site of Kagdi weir pickup is only mechanical and electrical works and will not have impact on surface water quality. Ecology of Mahi-Bajajsagar dam is given in Appendix 12. No works are proposed within any surface water body.

6. Groundwater

77. Major Water bearing formations are Basalt, Limestones, Quartzites, Phyllite & Schist and Granite Gneiss. Depth to water level in Pre-monsoon (2007) is 1.60 – 13.25 (mbgl), in Post-monsoon (2007) is 0.01 – 9.90 (mbgl), Long term decline water level trend (1998-2007) in m/yr is 0.114. Ground water occurs under unconfined to semi-confined condition. Weathered zone below the water table acts as a good storage. The joints, fissures and other plains of structural weakness as well as their extent, size, opening and inter connection control occurrence & movement of ground water. Phyllites and schists are predominating in Banswara City and these formations are intercalated with dolomitic limestone, quartzite and basic intrusive. Alluvium area is restricted to riverbeds.

7. Air Quality

78. Ambient air quality in Rajasthan is monitored by Rajasthan Pollution Control Board. However, at present there is no monitoring station in Banswara, therefore no data on ambient air quality is available. In Banswara town there are no major polluting industries (except few textile industries, which are about 12 kms from town) and therefore level of air pollution is not high. Source of air pollution in the town is only agricultural activities and means of transport.

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

B. Ecological Resources

80. **Protected areas.** The nearest wildlife sanctuary is Sita Mata Sanctuary located 50 km from project town. In the forest blocks of Ghatol and Pipalkhut, some wild animals like blue bull, sambar, Jackal, jungle cat, deer, wild boar, monkey, wild dogs etc. have been observed. But there is no notified breeding or nesting bird site/ecological sensitive area/Ramsar convention site/Area notified under Wild Protection Act-1972 in these forest blocks as well as in town but there are some protected forest blocks present in the district namely Karmdia, Manohargarh, Huda Bavji, Ghatol and punapather.

81. **Wildlife.** In the forest blocks especially in Ghatol and Pipalkhut forest block, some wild animals are observed which are blue bull, sambar, Jackal, jungle cat, deer, wild boar, monkey, wild dogs etc. Our experts were told by locals that reptiles like common garden lizard (*Chameleon zeylanicaul*), common Indian monitor (*Varanus beagalansis*), Indian Cobra (*Najanaaja*), and Krait (*Bungaruscoerulens*) are rarely found in agriculture fields during rainy season. Common birds found in the region are Little egret (*Egretta garzetta*), Common Green Pigeon (*Treron phoenicoptera*), Blue Rock Pigeon (*Columba livia*), House swift (*Apus affinis*), Pheasant tailed Jacana (*Hydrophasianus chirurgus*) etc. No rare or migratory birds are reported in the project areas.

82. **Flora.** Major tree species in project area include Babul, Sagwan, Khakhra, *Terminalia belarica* (Behara), *Azadirachta indica* (Neem), Khejri- *Prosopis cineraria*, Lasura or Lehsua- *Cordia dichotoma*, Kair or Teat - *Capparis deciduas*, Pakori- *Ficus rumphii*, etc. There are no

vulnerable, threatened and/or endangered species of flora and fauna is available in the project areas. Common shrub species found in the area are *Adhatodavasica*, *Calotropis procera*, *IpomeaCarnea*, *Prosopis juliflora*, *Achyranthes aspera*, *Ageratum conyzoides*, Argemone etc. in the project areas. On the review of available information, no rare or endangered species of flora and fauna prescribed by IUCN or WPC, 1972 are found along the project areas, though some species of near threatened (NT), endangered (EN), critically endangered (CR) and Vulnerable (VU) are found in Banswara district but no impact of these are envisaged as the project area is already a developed urban area and no such species are reported from the proposed project sites.. Biodiversity Assessment was done through Integrated Biodiversity Assessment Tool (IBAT) and report is attached as Appendix 13.

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

C. Economic Development

1. Land use

84. Urbanized area is around 1000 hectare out of total 2057.00 hectare areas of Banswara Nagar Palika. Out of this Urbanized area 816 hectare is developed with 40.69% in residential, 4.53 % in commercial, 15.69 % in industrial, 3.43 % in state use, 3.19 % in recreational, 13.72% in public and semi-public use and 18.75 is under Circulation/roads.

Table 7: Existing Land Use of Banswara Town (2011)

S.No	Land use	Area (Ha)	Developed area%	Urbanize area%
1	Residential	332	40.69	33.20
2	Commercial	37	4.53	3.70
3	Industrial	128	15.69	12.80
4	State use	28	3.43	2.80
5	Recreation	26	3.19	2.60
6	Public & semi-public	112	13.72	11.20
7	Circulation	153	18.75	15.30
	Total Developed area	816	100	81.6
8	State Reserved	18		1.80
9	Agriculture	5		0.50
10	Vacant	160		16.00
11	Reservoir	1		0.10
	Total Urban Area	1000		100

Source: Banswara Master Plan.

2. Industry & Agriculture

85. Banswara is the mini hub of textile industries in the state after Bhilwara as there are about 700 units of hosiery and garments. The other major industry is based on wood and bamboo having about 1000 units. These are mostly small scale industries. Other types of industries are food

products, basic mining based industries, basic metal based industries, cotton and textiles, machinery and parts, repairs and services and agriculture based industries. There are eight large and medium industrial units registered in the district. Banswara Syntax Ltd., Rajasthan Spinning & Weaving Mills (RSWM) Ltd (3 units), Bhilwara Melba De. Wital Ltd., Trinetra cement Ltd., Mayur Floorings Ltd. and Narag Distillery Ltd. are the registered medium and large scale industries in the town giving employment to about 17000 people.

86. Marble is one of the important minerals of the district and found in Tripura Sundar Bhimkund, Odhabasi, Vitthaldeo areas, in the reserves of marbles are estimated at around 190 million tones. There are about 337 units in town based on mining and minerals.

87. Most of the rural population depends on agriculture for their livelihood. Main agricultural crops in Banswara are- Maize, Paddy, wheat, pulses (gram, urd), soyabean, cotton. Vegetables are also important agriculture produce. Main vegetables grown in Banswara are ridge gourd, brinjal, tomato, onion, cauliflower. Main horticulture crops are mango, lime, guava, aonla and papaya. Main fodder crops are Lucerne, bajra, maize, jowar etc. Cow, buffaloes, goat and sheep are mostly domesticated animals which support people in agriculture and serve as additional source of income.

3. Infrastructure

88. **Water Supply.** *Source:* Presently source of Banswara town is surface water. Source of Banswara city is Kagdi Pickup Weir. Kagdi is a lake on the downstream of the Mahi Dam and located within the Banswara Town. This weir/lake is filled by hydel water coming from Mahi dam through channel. During summer when hydel is closed water level in the Kagdi Pickup weir goes down and more silt come with the water and bad smell due to water level near to dead storage. To get the surface water in summer, Mahi Dam will be used as additional source. There is existing Intake Well at Mahi Dam constructed by the PHED, two vacant slots are available for pumps for the Banswara demand, where pumps shall be installed at this intake. Demand of the town for the year 2051 is 25.08 MLD and sufficient water available from the source. The water level data indicating source sustainability, water allocation letter are presented in Appendix 4.

89. Raw Water taken from intake well is pumped to existing Kagdi pickup weir WTP and AEN Campus WTP for treatment. Both the plants are rapid sand filter treatment plant. Capacity of Kagdi Pickup Weir WTP is 4.54 mld while capacity of AEN Campus WTP is 10.40 mld. For transferring of raw water from Kagdi Pickup Weir to AEN Campus HW WTP 500mm DI pipeline is used. Presently this 500 mm DI pipe line is gravity based line no booster pump is attached with the line. Other than surface water PHED is having 13 Tube wells which are located at the tail end of the colonies and directly connected to the distribution system. Presently 3 Clear water reservoir and 16 overhead service reservoirs are available in the town at different locations. Present population of town is 111130 souls while water production is 12.85 mld. With the rate of 115 lpcd which is less than the CPHEEO norms.

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

91. Previously some sewerage works (including STP of 6.34 MLD) has been done by Nagar Parishad Banswara under UIDSSMT project, but works are not completed and no sewerage system is functional in the town .

92. **Solid Waste Management:** Banswara Nagar Parishad collects solid waste via municipal bins and waste collection points from all municipal wards. Some of the areas are served through door to door solid waste collection. Waste from community dust bins/open collection points is manually or mechanically lifted into vehicles for transportation to the disposal site. Currently there is no solid waste processing facility and solid waste is dumped without any segregation. The un-segregated waste collected from the city is disposed-off by crude open dumping method at outskirt areas of town.

93. **Storm Water Drainage.** Drainage system in Banswara town is in the form of road-side open drains, and major drains that convey runoff from the city collector drains to natural water bodies through open nallah. Due to lack of sewerage system, these drains primarily carry sullage and sewage discharged by households. There are no major polluting industries in Banswaramunicipality area therefore no any Industrial waste is discharged into these drains.

94. **Power Supply.** Thermal power is the main source of energy in Rajasthan, followed by wind and solar. Total installed capacity of energy generation in Rajasthan is provided in Table 8 below

Table 8: Installed capacity (in MW) of power utilities (as on 31.03.2016)

Ownership/ Sector	Thermal			Renewable			
	Coal	Gas	total	Nuclear	Hydro	RES	Grand total
State	5190.00	603.80	5793.80	0.00	987.96	23.85	6805.61
Private	3196.00	0.00	3196.00	0.00	0.00	5378.30	8574.30
Central	1014.72	221.23	1235.95	573.00	731.34	0.00	2540.29
Total	9400.72	825.03	10225.75	573.00	1719.30	5402.15	17920.20

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

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

96. The power supply in Banswara district is continuous and reliable, except in warmer months with periodic outages in warmer months, and large fluctuations in voltage. There are two divisions and nine sub divisions for power distribution in Banswara. There are 77 sub stations of 11/33 KV, with installed capacity of 283.9 MVA. Maximum demand of the district is 59 MW.

97. **Transport.** The old city area is characterized by very narrow roads that are frequently congested with traffic and pedestrians. Total road length in the district is 1,747 km, as of 31 March 2000, consisting of bitumen/tar roads, cement concrete roads and gravel roads. Most of the roads are maintained by Nagar Parishad Banswara, while major intercity roads and highways are maintained by the Public Works Department (PWD) or National Highway Authority of India. Road the condition is generally poor, with many roads in need of repairs and resurfacing. This plus the absence of parking spaces and pedestrian walkways leads to slow traffic and congestion.

Transport in the city is mainly by personal vehicles (cars and motorcycles) and motor- and bicycle-rickshaws. The Rajasthan State Road Transport Corporation (RSRTC) runs public buses to neighboring villages and towns and to larger towns, such as Udaipur, Doongarpur, Kushalgarhand Jaipur etc.

D. Socio Cultural Resources

1. Demography

98. As per data of Census India, population of Banswara city in 2011 is 99,969; of which male and female are 51,000 and 48,969 respectively. Although Banswara city has population of 99,969; its urban / metropolitan population is 101,017 of which 51,585 are males and 49,432 are females.. Population details of Banswara town are given in table 9 below-

Table 9: Population (2011 Census) of BanswaraCity

Banswara City	Total	Male	Female
City + Out Growths	101,017	51,585	49,432
City Population	99,969	51,000	48,969
Literates	75,169	40,517	34,652
Children (0-6)	12,274	6,598	5,676
Average Literacy (%)	85.72 %	91.25 %	80.04 %
Sex ratio	960		
Child Sex ratio	860		
Banswara City	Total	Male	Female
City + Out Growths	101,017	51,585	49,432
City Population	99,969	51,000	48,969
Literates	75,169	40,517	34,652
Children (0-6)	12,274	6,598	5,676
Average Literacy (%)	85.72 %	91.25 %	80.04 %
Sex ratio	960		
Child Sex ratio	860		

99. The sex ratio of Banswara city is 960 per 1000 males. Child sex ratio of girls is 860 per 1000 boys. Total children (0-6) in Banswara city are 12,274 as per figure from Census India report on 2011. There were 6,598 boys while 5,676 are girls. The child forms 12.28 % of total population of Banswara City. In education section, total literates in Banswara city are 75,169 of which 40,517 are males while 34,652 are females. Average literacy rate of Banswara city is 85.72 percent of which male and female literacy was 91.25 and 80.04 percent.

100. Hinduism is majority religion in Banswara city with 64.83 % followers. Islam is second most popular religion in city of Banswara with approximately 26.32 % following it. In Banswara city, Christianity is followed by 1.13 %, Jainism by 6.73 %, Sikhism by 0.21 % and Buddhism by 0.21 %. Around 0.01 % stated 'Other Religion'; approximately 0.74 % stated 'No Particular Religion'. Main languages spoken are Rajasthani, and Hindi.

2. History, Culture and Tourism

101. **History:** The district was formerly a princely state ruled by the Maharavals. It is said that a Bhil ruler Bansia ruled over it and Banswara was named after his name. Bansia was defeated and killed by Jagmal Singh who became the first Maharaval of the princely state. It is also named so because of the bamboos (Bans) which were found in abundance in the forests.

102. In 1913 some bhils revolted under the headship of a social reformer Govindgiri and Punja which was suppressed in November, 1913. Hundreds of Bhils were shot dead at the Mangarh hillock where they were holding a peaceful meeting. The event is also known as the Mini Jalianwala Bagh massacre. The place has become sacred and is better known as the Mangarh Dham. With the merger of the princely states in the Union of India, the Banswara State and Kushalgarh chiefship got merged in the Greater Rajasthan in 1949 and Banswara was carved out as a separate district by merging these principalities.

103. The district is predominantly inhabited by tribals mainly Bhils, Bhil Meenas, Damor, Charpotas, Ninamas, etc. The main occupation of the people, specially of tribals, is agriculture. The tribals live in small one-room houses, known as "tapra", which lie scattered all over the area. The other major castes are Patels, Rajputs, Brahmans, Mahajans, and Muslims. The dialect spoken in the district is Wagri, a mixture of Gujrati and Mewari.

104. **Culture:** Holi is the most important festival for the tribal community. The tribes of the region wear their traditional dresses on Holi carrying swords and sticks and perform the 'Gair Dance' which is a typical tribal dance of this region. Divasa is another festival, which is celebrated by the tribal people on the last day of the first fortnight of Shravanmaas. It is a festival wherein the bullocks and the animals are worshipped and made to bathe as they are considered God's another form. Various food items are also prepared. The biggest tribal fair is held at Baneshwar at the confluence of Mahi, Som and Jhakham, which are believed to be holy rivers of the region. A number of tribals from Madhya Pradesh, Gujarat and Rajasthan gather to immerse the mortal remains of the dead. They worship, sing and dance on Magh Purnima, sometime in the month of February, which is considered to be a holy period in this region. It starts in Magh Shukla Gyaras and Magh Krishna Panchami (peak period of this fair is Magh Purnima). Other important festivals of the district are Amligyaras, Ghotia Amba fair, Mangarh etc.

105. **Tourism:** Tripura Sundari Temple is about 20 km from Banswara City. On the Banswara Dungarpur road near Talwara is situated the ancient temple of the presiding mother deity of the region Raj Rajeshwari Tripura Sundari in the Umrai village. Govind Guru, was a popular saint of the Bhils who made the Mangarh hill a centre of faith. It is also known as Jallianwala Bagh of Rajasthan. Arthuna is a major spot of historical importance in the district and is protected by the archaeological survey of India. Arthuna is 65 km. from Banswara. The Arthuna temples are the reminders of the glorious past of this place. The temples are a portrayal of the ancient sculpture and ancient Indian philosophy. Mahi Bajaj Sagar dam is the lifeline of Banswara district which has turned out to be a great source of agricultural and economic development of the region. This Mahi Dam is the biggest water reservoir in the Udaipur division. In the backwater of Mahi Dam there is a beautiful natural place Chacha Kota which is 14 Kms. from the city of Banswara. The approach

to the place is equally charming with Kalpvriksha and Baitalaab lake falling on the roadside on the way to Chachakota. 40 Kms. From Banswara on Kushalgarh road is situated the famous Jain pilgrimage spot Andeshwat temple. The stone idol of Jain Tirthankar Parshwanath is placed in this temple. On the eastern part of the city of Banswara; Kagdi Pick-up is a prominent centre of attraction for the tourists. The Kagdi lake and the garden on the side are worth seeing.

E. Environmental Settings of Investment Program Component Sites

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

107. Proposed site of STP is away from habitations and surrounded by agricultural lands. Some trees and shrubs are present at these sites. No wild fauna is found in these sites. Proposed sites of SPS are vacant Govt lands and there are no trees present at these sites. Nearest habitation exists at 300 mtrs area from the site.

108. Proposed site of WTP (9.25 MLD) is existing PHED (AEN) campus near old bus stand, where enough vacant space is available. There are about 20 trees in this space, which need to be cut for construction of proposed facility. There are staffs quarters beside the proposed site therefore mitigation measures will be required during construction so that no impact may be on habitants. During detail design all efforts should be done to reduce numbers of trees to be cut for construction works. There are some abandoned staff quarters which need to be demolished for site clearance. Measures should be taken for safety during demolitions works and safe disposal of demolished muck.

109. Proposed rehabilitation works of WTPs (at PHED AEN campus and Kagdri Pick up weir WTP) are within the campus of existing WTPs where there will no impact on environment due to rehabilitation works.

110. Raw water source is Kagdi Pickup weir in which water coming from Mahi Dam, where intake arrangements are already made by PHED. Under this project works mainly include mechanical and electrical works (installation of pumps) in the existing intake points. No works will be done in the water reservoir.

Table 10 : Environmental Features of Prominent Sites

Project Component	Location	Environmental Features	Photo
Sewerage			
9.5 MLD Sewerage Treatment Plant (STP)	Udaipur Road	Proposed site is vacant government land within campus of existing STP, no trees present at site, no wild fauna reported, demarcated by boundary wall and fencing, nearest habitation is about 300 mtr away, natural seasonal drain flows near the site, agriculture practices nearby sites	

Project Component	Location	Environmental Features	Photo
0.60 MLD Sewerage Pumping Station	Ward 21, Near Nathelav Pond,	SPS site near Nathelaav Talab is a government land and there is government building near it. No trees present at site, some residences also exist near to site	
1.70 MLD Sewerage Pumping Station	Ward 1, near Pratapgarh Road	SPS site on Pratapgarh road is a government land is near scattered habitation. A small temple of KhatuShyam ji is situated beside this site. Approach road from two sides is available for site.	
Water Supply			
Construction of WTP-9.25 MLD capacity	Existing PHED Campus	Proposed site is within PHED AEN campus, near existing WTP, there are some trees present and some old abandoned staff quarters also exist, site is demarcated by boundary wall, approach road is present to reach site.	
New Clear Water Reservoir-1550 KL	Existing PHED Campus	Proposed site is within PHED AEN campus, near existing WTP, there are some trees present and some old abandoned staff quarters also exist, site is demarcated by boundary wall, approach road is present to reach site.	
Raw water pumping system at exiting intake system.	Kagdi Pickup Weir	intake is already established in Kagdi weir pickup on the side of reservoir, there is circular building of pump house and a bridge is available for approach to pump house	
Clear water pumphouse	Existing Kagdi WTP campus	Situated at PHED existing campus, no tree present at site	
Rehabilitation of existing WTP	AEN office campus	Situated at PHED existing campus, no tree present at site	

Project Component	Location	Environmental Features	Photo
Rehabilitation of existing WTP	Kagdi Pickup Weir WTP campus	Situated at PHED existing campus, no tree present at site	

VI. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Introduction

111. 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.

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

- (i) **Location impacts** include impacts associated with site selection and include loss of on-site biophysical array and encroachment either directly or indirectly on adjacent environments. It also includes impacts on people who will lose their livelihood or any other structures by the development of that site.
- (ii) **Design impacts** include impacts arising from Investment Program design, including technology used, scale of operation/throughput, waste production, discharge specifications, pollution sources and ancillary services.
- (iii) **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.

113. 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).

114. 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.

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

116. 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 located in an urban area, will not cause direct impact on biodiversity values. The project will be in properties held by the local government and access to the project location is through public rights-of-way and existing roads hence, land acquisition and encroachment on private property will not occur.

B. Location Impacts

117. Location impacts (odour nuisance) of new STP. One STP of 9.5 MLD has been proposed at Udaipur Road. Land required for construction of STP is available with Nagar Parishad. Land is vacant and there are no any trees present in the proposed site of STP at Udaipur road. There are agricultural fields nearby the site and few scattered habitations exists within 500 mtrs from the site. Location of proposed STP site indicating sensitive receptors in Google Earth map is given in following **Figure 14**.

118. As the STP is located away from the major habitations and, the proposed treatment technology, SBR, being an aerobic process and conducted in a compact and a closed system with automated operation, odour nuisance will be very minimal and negligible. Limited bad odors may be generated from wet well, primary treatment units and sludge treatment. Mitigation measures as per RUDSICO-EAP policy on compensatory afforestation should be adopted.

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

119. Location impacts of proposed SPS sites- Location impacts of proposed SPSs are- (1) SPS site near Nathelaav Talab is a government land and there is government building near it; (2) SPS site on Pratapgarh road although a government land is near scattered habitation and will require additional plantation. Anticipated impacts are generation of foul smell, noise and safety risk. Mitigation measures such as reduction of foul smell and noise, safety of people and animals through restricted entry etc. will be required during operation of SPSs. Being a DBO Contract, contractor is expected to explore design alternatives and avoid anticipated impact through careful planning.

120. Locations impacts of CWR and WTP (9.25 MLD) at PHED campus. The CWR and WTP are proposed in existing PHED campus. Therefore prior permission from concerned department (PHED) will be required before start of construction works. There are about 20 nos of trees present at site of various species and ages. Some of these trees will need to be cut for construction works. There are also staff quarters of PHED near this site and therefore mitigation measures to reduce impacts due to disturbance during construction activities will be required. There are also some abandoned structures, which will be demolished for construction. Safety precautions during demolition works and safe disposal of demolished materials will be required.

121. Location impacts of Rising Main and Distribution Networks- There are total 15.8 km of transmission main of DI K-9 pipe and 330 kms of distribution network proposed. There are no trees being affected due to proposed works. The transmission system and distribution networks will traverse through different city roads within ROW. There are no forests exist within ROW and no any wildlife is found in these stretches. Therefore no impacts shall be envisaged regarding location. These works will require advance permission from concerned authority for road cutting

and traffic diversion etc. No tree cutting will be required as per preliminary design and if any tree cutting will be required during execution mitigation measures shall be adopted.

122. Location Impacts of Pumping Stations: The proposed Pumping Station is within existing campus of PHED therefore no location impacts will arise during construction of pumping station. All the precautions should be taken during construction to minimize the impacts on nearby residents. Some of tree cutting may be required during construction of pumping station for which mitigation measures shall be adopted as per applicable policy of RUIDP.

123. Locations of Rehabilitation Works: All Refurbishment are proposed within existing campus (PHED for water supply and STP for sewerage) and therefore no impacts are envisaged, nevertheless some tree cutting may be required for which mitigation measures will be required.

124. Location impacts of laying of Sewer Lines in the town- The sewage collection networks will traverse through different city roads within ROW. There are no forests exist within ROW and no any wildlife is found in these stretches. Therefore no impacts on biological environment shall be envisaged regarding location. Anticipated impacts are safety risks during pipe laying and traffic disturbances. These works will require advance permission from concerned authority for road cutting and traffic diversion etc. No tree cutting will be required as per preliminary design and if any tree cutting will be required during execution mitigation measures shall be adopted.

125. Location impacts of intake works- intake is already established in Kagdi weir pickup site and no any civil works are proposed on these sites. Only mechanical and electrical installations (pumps and machineries etc.) are proposed at these sites, therefore no impacts will be envisaged due to proposed works.

C. Design Impacts

126. Design of the Proposed Components. The Central Public Health and Environmental Engineering Organization (CPHEEO) manual suggests a design period of 15/30 years¹⁶ in general while designing the systems for water supply and sewerage components. It is proposed to consider 2051 as the design year for all the components in order to maintain unanimity in the design period and design population. Accordingly, 2021 shall be the base year and 2036 the intermediate year to cross check the designs pertaining to intermediate demand. The rate of water supply has been taken as 135 lpcd for 100% population. Sewage generation is 85% of water supply (including 5% to account for infiltration). Technical design of all the elements of water supply (reservoirs, pumping, transmission and distribution system etc.,) and sewerage (STP, reuse arrangements, sewer mains and network including manholes and house connections, etc., follows the relevant national planning and design guidelines, include the Sewerage and Wastewater Policy of Rajasthan 2016.

127. Following environmental considerations are already included in the project to avoid and/or minimize adverse impacts and enhance positive benefits:

- (i) Adopting conjunctive use approach in water use; utilizing feasible surface water sources and groundwater source optimally thereby reducing the existing groundwater abstraction to the extent possible

¹⁶ As per CPHEEO, pumps, motors, STP, storage reservoirs are to be designed for a life of 15 years.

- (ii) Locating components and facilities appropriately by avoiding sensitive locations like forests and protected areas (environmentally, socially, and archeologically).
- (iii) Recovering wash water from treatment process to optimise the water use
- (iv) Treatment and reuse of sludge from treatment process; providing a covered shed of adequate space to air dry the processed sludge for at least 15 days at STPs
- (v) Designing the entire system to maintain optimal flow and terminal pressure, and optimising the overall energy usage
- (vi) Avoiding usage of asbestos containing materials
- (vii) Reducing the incidence of water borne diseases by providing 100% population including urban poor with potable water supplies
- (viii) Reuse of treated wastewater from STP for non-potable uses thereby reducing the load in freshwater resources
- (ix) Adopting a combined approach of sewerage system and faecal sludge and septage management to cover 100% population of the town with safe collection, conveyance and treatment of sewage generated in the town
- (x) Provision of appropriate personal protection equipment to the workers and staff

128. **Raw Water Source and Sustainability.** Presently PHED is drawing 18 MLD water from Kagdi Pickup Weir intake well, through 500 mm dia gravity main. Assurance given by the WRD department to PHED for providing 25 MLD water till year 2051.

129. Presently source of Banswara town is surface water. Source of Banswara city is Kagdi Pickup Weir. Raw Water source for Kagdi Pick-up weir is Mahi Dam which has abundant flow throughout the year even during lean seasons. Based on water level data ,outflow through spillway and rainfall data of Mahi dam from 1982 to 2017, It may be concluded that reservoir water is sufficient to meet the demand of the project (Appendix 4). No objection Certificate for allocation of reservoir water is also attached in Appendix 4. Quality of raw water is, in general, of acceptable quality and that which can be used for potable purposes after conventional treatment and disinfection. There are no notable pollution sources near the intake. There are no wastewater disposal points in the upstream vicinity of the intake.

130. **Design Impacts of STP** -Impacts of design of STP is already minimized by choosing appropriate technology of Sequential Batch Reactor (SBR) with primary settling tank. SBR is the best suitable technology for this region and treated effluent is of best quality which can be used in agriculture or disposed in nallah/water course without causing any pollution to the receiving body. Treated effluent quality meets the criteria set by RPCB/CPCB/MOEF & CC. Consent to establish from RPCB will be required before start of construction of STP. One of the major impacts of STP and SPS is problem of foul smell around the areas of STP and SPS arising from untreated/raw sewage. Though there are no habitation within 500 meter periphery of STP site, no such impact is envisaged to habitants, there are few scattered habitations near one of proposed SPS site (Pratapgarh Road), where nearby habitants will be impacted due to foul smell. Dense plantation is required on the periphery of STP and SPSs to reduce impact of foul smell.

131. Latest effluent discharge standards as per NGT order dtd. 30.04.2019 shall be followed in this project for the construction of STP which is as under-

Table 11: Discharge Standards to be achieved as per NGT order dtd. 30.04.2019

Sl. No.	Parameters	Parameters Limit
1	pH	5.5-9.0
2	BOD (mg/l)	Not more than 10 mg/l
3	COD (mg/l)	Not more than 50 mg/l

4	TSS (mg/l)	Not more than 20 mg/l
5	P-Total (mg/l)- for discharge into ponds/lakes	Not more than 1.0 mg/l
6	N-Total (mg/l)	Not more than 10 mg/l
7	Fecal Coliform (MPN/100ml)	Desirable- Less than 100 MPN/100ml Permissible- 230 MPN/100ml

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

133. Policy provided priority to reuse in agricultural for unrestricted irrigation. It suggests blending of treated wastewater with fresh water to improve quality where possible, and crops to be irrigated shall be selected to suit the irrigation water, soil type and chemistry. Policy requires monitoring of accumulation of heavy metals and salinity. It encourages farmers to use modern and efficient irrigation technologies, and to ensure protection of on-farm workers and crops. As a contingency measure, policy requires regular monitoring of treated water quality, and emergency alerts to users in any event of deterioration of quality. Policy prohibits use of treated wastewater for artificial recharge (Excerpts from Policy on Reuse is provided in Appendix 5).

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

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

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

- (x) Thermal power plants
- (xi) Cantonments
- (xii) Individual Users

136. **Reuse Plan.** The State Sewerage Policy requires that Detailed Project Report provide reuse options and strategy to implement reuse, and detailed Reuse Action Plan. As the Banswara subproject is proposed under DBO, the Reuse plan will be prepared by the DBO contractor during the detailed design phase in consultation with the stakeholders in Banswara, and reuse modalities will be firmed up. Subproject includes following components as part of the STP to facilitate reuse: disinfection of treated wastewater, Construction of Treated effluent storage reservoir (TESR) of 500 KL capacity, construction of Treated Effluent Elevated Reservoir (TEER) with 22 m staging and treated effluent Pump House of required capacity for 16 hrs pumping, which will mainly facilitate supply to reuse applications from the TESR. Treated effluent will be chlorinated prior to its entry into TESR/TEER. Following needs to be considered in the preparation of reuse plan:

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

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

138. **Disposal of treated wastewater.** Proposed STP sites are located close to dry water channel (drain) and the excess / surplus / unused treated wastewater will be discharge into this drain. As the wastewater is treated to stringent disposal standards, no notable impacts envisaged. This drain is mostly dry except during monsoon. It carries untreated wastewater from the surrounding areas town. The disposal of treated wastewater meeting the set quality standards, in fact, will improve the quality of water by dilution. There are no water intakes or abstraction points in the downstream proximity. STP sites are surrounded mostly by agricultural and barren lands.

Considering the existing status of drains, and the degree of treatment, no significant impacts envisaged. Proper systems should be put in place at the proposed STP to ensure that treated wastewater always meet the stipulated standards prior to its disposal into drains. Any change / lowering of treatment efficiency during operation may lead to poor quality of wastewater and may further pollute the water body. It is therefore critical that STP treats the sewage as designed. Operation and maintenance of STP and change in incoming sewage quality will have impact on the treatment efficiency. This therefore requires following monitoring:

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

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

140. Subproject includes sludge management infrastructure in STP, including system for sludge collection, thickening, solar drying, and disposal at landfill/identified site. This includes a Sludge Sump to collect sludge from SBR basins; returning arrangement for supernatant from the sump to inlet/equalization tank for treatment; pumping sludge to sludge thickener and pumping thickened to mechanical sludge dewatering system (such as centrifuge). It also requires contractor to establish a shed where the dewatered sludge cake can be further air dried for 15 days. This is indicative sludge management system, and DBO contractor will design the system meeting these requirements. Bid indicates that “the sludge produced from the treatment process would be processed so it may be used as fertilizer and soil conditioner” and it requires DBO contractor “to conform to the regulations of public health and environment protection norms”. This follows the Sewerage and Wastewater Policy, 2016, which suggests “use of sludge produced from the treatment as fertilizer and soil conditioner after processing”.

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

142. Contractor will propose the sludge management plan with best methods for reuse of sludge as per guidelines of CPHEEO (guidelines are attached as Appendix 5) and best international practices in consultation with PMU and Municipal Council. Properly dried sludge can be used as soil conditioner. Periodic testing of dried sludge will be conducted to ensure that it does not contain heavy metals that make it unsuitable for food crops. Tests shall be conducted to confirm the concentrations below the following standards. As there are no specific standards notified for sludge reuse, the compost quality standards notified under the Solid Waste

Management Rules, 2016 have been adopted here. Rules stipulate that “In order to ensure safe application of compost, the following specifications for compost quality shall be met”.

Table 12: Standards for Sludge Reuse as Manure

Standards for Composting. As there are no specific standards notified for sludge reuse, the compost quality standards notified under the Solid Waste Management Rules, 2016 (Schedule II A, Standards for Composting) have been adopted here. According to the standards “In order to ensure safe application of compost, the following specifications for compost quality shall be met, namely:			
Parameters	Units	Organic Compost (FCO 2009)	Phosphate Rich Organic Manure (FCO 2013)
Arsenic	mg/kg	10	10
Cadmium	mg/	5	5
Chromium	mg/kg	50	50
Copper	mg/kg	300	300
Lead	mg/kg	100	100
Mercury	mg/kg	0.15	0.15
Nickel	mg/kg	50	50
Zinc	mg/kg	1000	1000
C/N ratio	-	<20	<20:1
pH	-	6.5 – 7.5	(1:5 solution) maximum 6.7
Moisture, percent by weight, maximum		15.0 – 25.0	25.0
Bulk density	g/cm ³	<1	Less than 1.6
Total Organic Carbon, per cent by weight, minimum	percent by weight	12	7.9
Total Nitrogen (as N), per cent by weight, minimum	percent by weight	0.8	0.4
Total Phosphate (as P ₂ O ₅) percent by weight, minimum	percent by weight	0.4	10.4
Total Potassium (as K ₂ O), percent by weight, minimum	percent by weight	0.4	-
Odour		Absence of foul Odor	
Particle size		minimum 90% material should pass through 4.0 mm is sieve	minimum 90% material should pass through 4.0 mm is sieve
Conductivity, not more than	dsm-1	4	8.2

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

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

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

- (i) Prepare a dried Sludge utilization plan for Banswara with the help of Agriculture Department / CLC; plan should also include if any additional processing is required for sludge to use as soil conditioner
- (ii) Plan should clearly various potential uses and demand in Banswara and surroundings
- (iii) Establish usage limits, where required, (geographical / crops / type of application / type of soils etc.); adopt international good practice suggested by agencies like World Health Organization (WHO), Food and Agricultural Organization (FAO) of the United Nations.

- (iv) Identify a landfill / suitable site for disposal of surplus dried sludge
- (v) Monitor sludge quality during operation phase as per the Environmental Monitoring Plan, ensure that it meets the quality parameters established by FAO
- (vi) In case of sludge not meeting the quality parameters, it shall not be used as soil conditioner, 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)

144. **Design of SPSs.** As explained earlier, one SPS is proposed near to Nathelav Pond and one SPS at Pratapgarh road where residential areas and government institutions exist, Therefore, care should be taken while designing for this SPS to avoid impacts during construction and operation phases. During detail design; design engineers should take following mitigation measures to reduce impacts due to proposed SPS:

- (i) Incorporate in design pumps of low noise
- (ii) Provide dedicated power supply to SPS, if possible, otherwise DG set to be used during power failure, should be soundproof and having acoustic enclosures with low/permitted air emission standards
- (iii) Firm barricades should be provided during construction works all around the SPS site
- (iv) Boundary wall of sufficient height with barbed wire fencing should be provided during operation phase so that no children/residents can enter in the SPS premises
- (v) Odour control system should be provided in SPS
- (vi) Plantations should be provided if space available to reduce foul smell of sewer during operation
- (vii) No workers camps should be allowed during construction works at SPS site
- (viii) Entry should be restricted through provision of gate and guard during operation of SPS

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

- (i) No industrial wastewater shall be allowed to dispose into municipal sewers
- (ii) As there is a risk of potential mixing of industrial waste, no domestic wastewater from industrial units shall be allowed into municipal sewers
- (iii) Ensure that there is no illegal discharge through manholes or inspection chambers
- (iv) Conduct public awareness programs in coordination with RSPCB and CLC

- (v) Conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated wastewater quality complies with the effluent standards

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

147. Accumulation of silt in sewers in areas of low over time, overflows, blockages, power outages, harmful working conditions for the workers cleaning sewers etc. are some of the issues that needs to be critically looked into during the sewer system design. A properly designed system is a must for system sustainability. Mitigation measures are developed to mitigate impacts in operation and maintenance (sewer line and manhole cleaning works) and are given in construction impact and mitigation section.

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

- (i) Limit the sewer depth where possible, sewers having depth of more than 3.5 mtrs will be laid by trenchless method to reduce impacts of excavation works.
- (ii) Sewers shall be laid away from water supply lines and drains (at least 1 m, wherever possible);
- (iii) In all cases, the sewer line should be laid deeper than the water pipeline (the difference between top of the sewer and bottom of water pipeline should be at least 300 mm)
- (iv) In unavoidable, where sewers are to be laid close to storm water drains, appropriate pipe material shall be selected (stoneware pipes shall be avoided)
- (v) For shallower sewers and especially in narrow roads, use small inspection chambers in lieu of manholes;
- (vi) Design manhole covers to withstand anticipated loads & 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

149. **Fecal Sludge and Septage Management (FSSM).** Under the FSSM, fecal sludge / septage will be collected from the household level septic tanks using truck mounted mobile desludging equipment and transported to Sewage Treatment Plant (STP) for treatment. At this stage, the quantity of septage generated from this area is not available. This will be estimated during the detailed design phase, and number of mobile tankers required to collect the transport the septage to STP, frequency of collection depending on the size of septic tanks etc., will be worked out accordingly. IEE needs to be updated during the detailed design phase to reflect the final project design. Although handling, transportation and disposal into STP is completely mechanized, the system will however be operated by the workers, therefore proper precautions

as workers will be dealing with highly harmful septage. Accessibility of septic tanks to mobile suction tankers to collect septage is critical for success of the septage management system. At STP, the septage will be mixed with the sewage and will be co-treated in the STP. Septage will be in concentrated and partially degraded form, and disposal of the same into STP inlet stream may upset the sewage treatment process, may generate bad odours, and may ultimately affect the quality of treated wastewater. Treatment process needs to be properly designed. Following measures are suggested for implementation:

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

150. Presence of asbestos containing material (ACM). Asbestos Containing Material (ACM); mainly AC pipes, in the existing infrastructure of water supply networks is the main concern. Asbestos is recognized as a cause of various diseases and is considered health hazard if inhaled.

151. Most of the AC pipes are old. Presently there is no use of new AC pipes in water supply networks but for repairing work in the existing network, and for replace the damaged sections, AC pipes are being used. There will be no use of any AC pipe in the future as under the present project, water supply network is being provided in the entire town with non-AC pipes. It is normal practice in Rajasthan that existing AC pipes are left as it is in the ground and new pipes will be laid in a new alignment. In town, existing AC pipes are laid long back, they are deep in ground, more than 2 m at many places, as the road level has raised considerably. In wider roads, there will be adequate space to lay the new pipelines, and therefore there is no need to remove the existing pipelines.

152. However, complete avoidance of handling and disposal of AC pipes may not be possible. There are narrow lanes, where AC pipes may be encountered during the laying of new pipes. Some connections / inlet / outlet pipes at the existing CWRs are also of AC pipes. These will be removed and replaced with new non-AC pipes. At present no maps available on the exact location / position of AC pipes. The local long serving O&M staff of PHED seem to be well aware of the location of AC pipes in the roads. Nevertheless, for safe storage of AC pipes encountered during

pipe laying works in the town, an area of 6x6 meters is identified in existing AEN campus, where new WTP is proposed to construct. Location map of this ACM temporary storage is given in **Figure 14**.

153. Bureau of Indian Standards (BIS) Guidelines for Safe Use of Products containing Asbestos states that “Asbestos cement products (such as AC pipes) generally contain about 10-15% asbestos fibers in a cement matrix that comprises the rest of the materials and are termed as locked in asbestos products as these products have the asbestos fibers bound in cement. There is very little possibility of generation of airborne asbestos fibers during any reasonable handling, storage, and use of such products. However, during storing and installation, recommended work practices shall be followed to avoid harmful exposure”. According to Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, any waste having asbestos concentration limit of 10,000 mg/kg (i.e. 1%), however this will apply only if the asbestos containing substances are in a friable, powdered or finely divided state. Under the Basel Convention¹⁷, asbestos or asbestos waste in the form of dust and fibers is classified as hazardous waste.

154. Working with or handling AC pipes in manner that produces dust, fibers, air borne particles etc., is very harmful and hazardous to the workers and general public around the work sites. The condition of existing underground AC pipes is not known, however, as these are old, pipes may be in deteriorated conditions. Condition needs to be assessed to check whether it is in friable form or in a condition in which it can release fibers before it is subjected any disturbance or removal.

155. During the IEE preparation, an expert on Asbestos and ACMs was mobilized to assist PMU to conduct an assessment and field validation of the extent of asbestos cement materials covered under the RSTDSP subprojects. The assessment has indicated that specific measures are necessary to safeguard the health and safety of the nearby communities and the potential contractors consistent with the requirements of the ADB SPS 2009. Activities such as clearing, transfer and disposal of AC pipes, work in narrow streets, and interventions in existing AC pipes may have adverse impacts on workers and surrounding population. Air borne asbestos if handled unsafely, cut, drilled or broken into pieces that may cause health issues such as Inflammation of the lungs, Mesothelioma, Peritoneal mesothelioma, Pleural plaques, Asbestosis and Bronchogenic Carcinoma. Following measures are to be implemented to avoid any impacts:

- (i) Develop and implement the ACM Management Plan (AMP) that includes identification of hazards, the use of proper safety gear and disposal methods. Sample AMP is provided in **Appendix 14**. Adhere to the workflow process suggested in Figure 13.
- (ii) Conduct awareness program on safety during the construction work
- (iii) Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day
- (iv) Provide barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches
- (v) Identify risk of intervention with existing AC pipes. If there is significant risk, implement the AMP strictly that includes identification of hazards, the use of proper safety gear and disposal methods.

¹⁷ Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, adopted in 1989.

- (vi) Appropriate actions as defined in the Asbestos Management Plan will have to be adhered to
- (vii) Maintain records of AC pipes as per the AMP

Figure 13: ACM Management Plan – Work Process Flow Chart

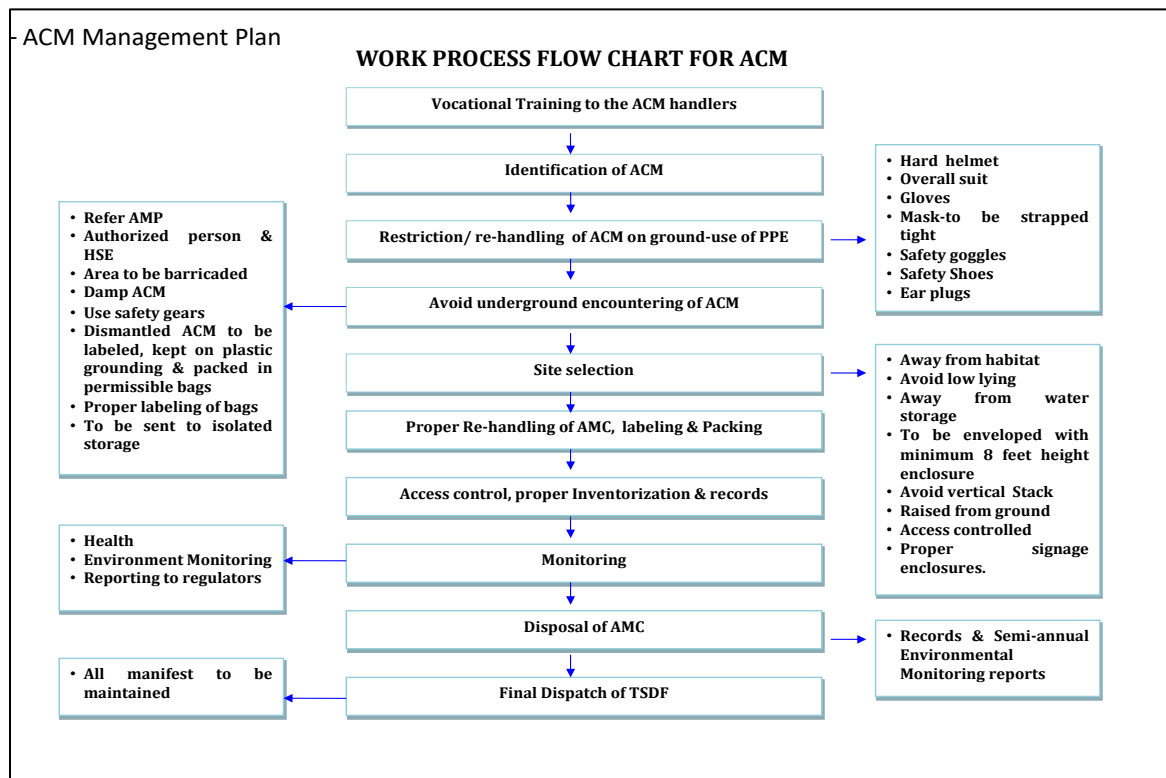
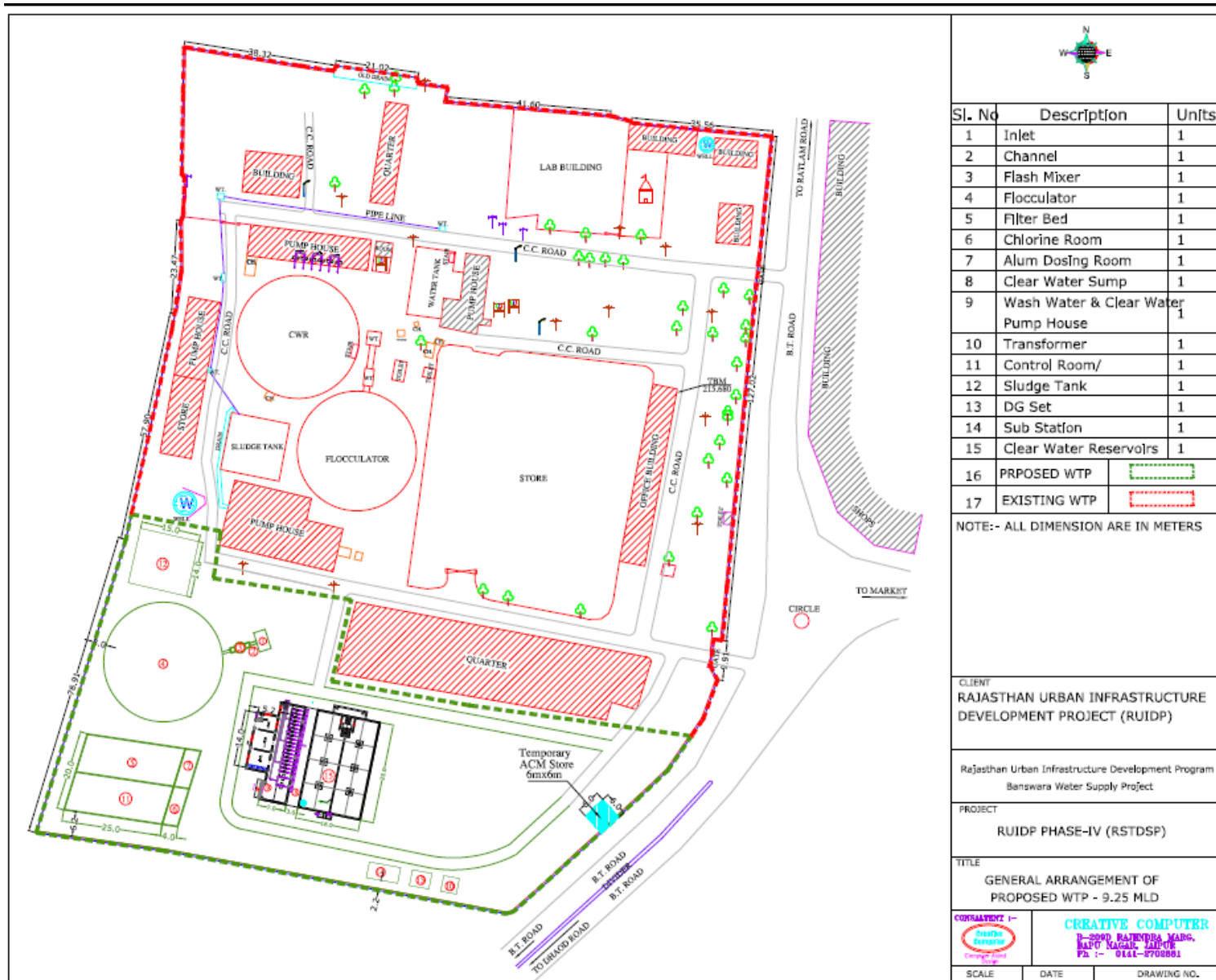


Figure 14: Location of temporary storage of ACM in PHED AEN campus



D. Preconstruction Impacts

156. **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.

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

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

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

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

E. Construction Impacts

160. The civil works for the subproject include earth work excavation for WTP, STP, SPS, sewer trenches, sewer laying, construction manholes, shifting of public utilities and providing house service connections. Earth work excavation will be undertaken by machine (backhoe excavator)

and include danger lighting at every 100 m and using side rails and barricades., while sewer laying works will include laying sewer at required gradient, fixing collars, elbows, tees, bends and other fittings including conveying the material to work spot and testing for water tightness. CTE for proposed STP and WTPs will be taken from Pollution Control Board.

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

162. Although construction of these project components involves quite simple techniques of civil work, the invasive nature of excavation and the project locations in the built-up areas of the town where there are a variety of human activities, will result in impacts to the environment and sensitive receptors such as schools, religious places, courts, hospitals and the community in general. These anticipated impacts are temporary and for short duration.

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

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

- (i) Use material sources permitted by government;¹⁸
- (ii) Verify suitability of all material sources and obtain approval of PIU; and
- (iii) Submit to PIU on a monthly basis documentation of sources of materials. . If contractor is purchasing ready mix concrete, asphalt/macadam and aggregates from third party, contractor will assure that all the parties/ suppliers are having CTE/CTO from RPCB and will collect the copy of these certificates and submit to PIU/consultants.

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

- (i) Consult with PIU/Consultant on the designated areas for stockpiling of, soils, gravel, and other construction materials;

¹⁸CTE and CTO will be required for batching plant, hot mix plant, crushers etc. if specifically established for this project. If contractor is purchasing raw material or ready mix concrete, asphalt/macadam and aggregates from third party, he has to be assured that third party is having CTE/CTO from RPCB and should collect the copy of these and submit to PIU/consultants. Quarry sites should also have the desired permissions.

- (ii) Damp down exposed soil and any stockpiled material on site by water sprinkling;
- (iii) Use tarpaulins to cover sand and other loose material when transported by trucks;
- (iv) Clean wheels and undercarriage of haul trucks prior to leaving construction site
- (v) Don't allow access in the work area except workers to limit soil disturbance and prevent access by barricading and security personnel
- (vi) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly. contractor's vehicles and equipment should compulsorily have PUC and submit PUC to PIU before deployment at site
- (vii) Obtain, CTE and CTO for batching plant, hot mix plant, crushers etc. if specifically established for this project.
- (viii) If contractor is purchasing ready mix concrete, asphalt/macadam and aggregates from third party, contractor will assure that all the parties/ suppliers are having CTE/CTO from RPCB and will collect the copy of these certificates and submit to PIU/consultants
- (ix) Maintain all the equipments and vehicles to reduce emission of smoke and keep pollution under control and keep records of periodic maintenance
- (x) Conduct ambient air quality monitoring periodically as per Environmental Management Plan (EMP)

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

- (i) Prepare and implement a spoils management plan (Appendix 15);
- (ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
- (iii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with PIU on designated disposal areas;
- (iv) Inspect all the drainage at construction site/construction camp/labor camp etc. and clear all the drainage lines so that no water stagnation/flooding may occur during heavy rainfall
- (v) As far as possible avoid trench works and excavation works (pipe laying) during monsoon season to avoid any water logging and accident due to it
- (vi) If open trenches are not avoidable during monsoon, keep ready all the mitigations measures to avoid water logging such as dewatering pumps and sufficient pipes, traffic assistance, barricades etc.
- (vii) Inspect and verify all the emergency measures and emergency control system before start of monsoon, keep the emergency response committee on high alert during monsoon/heavy rain fall
- (viii) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
- (ix) Place storage areas for fuels and lubricants away from any drainage leading to water bodies;
- (x) Dispose any wastes generated by construction activities in designated sites; and
- (xi) Conduct surface quality inspection according to the Environmental Management Plan (EMP).

167. **Noise and Vibration Levels.** Construction works will be conducted along the roads in Banswaraurban area, where there are houses, schools and hospitals, religious places and small-scale businesses. Increase in noise level may be caused by excavation, particularly breaking of

cement concrete or bitumen roads, operation of construction equipment like concrete mixers, and the transportation of equipment, materials, and people. Vibration generated from construction activity, for instance from the use of pneumatic drills, will have impact on nearby buildings. This impact is negative but short-term, and reversible by mitigation measures. The construction contractor will be required to:

- (i) Plan activities in consultation with PIU so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance;
- (ii) Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach;
- (iii) As far as possible use new construction machineries and keep all the old machineries in good and maintained state.
- (iv) 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
- (v) Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s.
- (vi) Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity;
- (vii) Consult the custodians of important buildings, cultural and tourism authorities and local communities in advance of the work to identify and address key issues, and avoid working at sensitive times, such as religious and cultural festivals.
- (viii) Conduct noise monitoring/ inspection according to the Environmental Management Plan (EMP)

168. **Landscape and Aesthetics.** Many trees will be required to cut due to which landscape and aesthetics of those sites will be reduced. The construction works will produce excess excavated earth, excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, and other similar items. Haphazard disposal of these will have negative impacts on landscape and overall aesthetics. These impacts are negative but are of short-term and reversible by mitigation measures. The construction contractor will be required to:

- (i) Take all the efforts to reduce number of tree cutting by amending design;
- (ii) Compensatory plantation in the ratio of 1:3 is required to increase landscape and aesthetics of the sites where tree cutting has been done
- (iii) Prepare and implement spoils management plan;
- (iv) Avoid stockpiling of excess excavated soils;
- (v) Coordinate with ULB for beneficial uses of excess excavated soils or immediately dispose to designated areas;
- (vi) Recover used oil and lubricants and reuse or remove from the sites;
- (vii) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- (viii) Remove all wreckage, rubbish, or temporary structures which are no longer required; and
- (ix) Request PIU to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.

169. **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 Banswaragroundwater is much deeper than the proposed trenching depth, and rains are

limited during monsoon season. However, to ensure that water will not pond in pits and voids near project location, the construction contractor will be required to conduct excavation works in non-monsoon season to the maximum extent possible. These potential impacts are temporary and short-term duration only. However, to ensure that these are mitigated, construction contractor will be required to:

- (i) Prepare and implement a spoils management plan (Appendix 15);
- (ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
- (iii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with PIU on designated disposal areas;
- (iv) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
- (v) Place storage areas for fuels and lubricants away from any drainage leading to water bodies;
- (vi) Dispose any wastes generated by construction activities in designated sites; and
- (vii) Conduct surface quality inspection according to the Environmental Management Plan (EMP).

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

- (i) Prepare and implement a Traffic Management Plan (**Appendix 16**)
- (ii) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
- (iii) Schedule transport and hauling activities during non-peak hours;
- (iv) Locate entry and exit points in areas where there is low potential for traffic congestion;
- (v) Keep the site free from all unnecessary obstructions;
- (vi) Drive vehicles in a considerate manner;
- (vii) Coordinate with Traffic Police for temporary road diversions and for provision of traffic aids if transportation activities cannot be avoided during peak hours; and
- (viii) Notify affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.
- (ix) Provide road signs and flag persons to warn of on-going trenching activities along with barricades and lights during trenching works
- (x) Maintain sufficient access to houses and shopkeepers (commercial establishments) during pipe laying work through metal sheets and temporary bridges

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

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

- (iv) Provide road signs and flag persons to warn of on-going trenching activities along with barricades and lights during trenching works

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

- (i) Prepare and implement spoils management plan (**Appendix 15**);
- (ii) Leave spaces for access between mounds of soil;
- (iii) Provide walkways and metal sheets where required to maintain access across for people and vehicles;
- (iv) Increase workforce in the areas with predominantly institutions, place of worship, business establishment, hospitals, and schools;
- (v) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and
- (vi) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.
- (vii) Notify community/ water users in advance about likely interruptions in water supply.
- (viii) Provide alternate sources of clean water until water supply is restored.

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

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

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

- (i) Comply with all national, state and local labor laws (see Appendix 11);
- (ii) Following best practice health and safety guidelines: IFC's General EHS Guidelines,¹⁹ WHO Interim Guidance (and its updates) on Water, Sanitation, Hygiene and Waste management for the COVID-19 virus (Appendix 17), and Sector Specific (Water and Sanitation) Guidelines²⁰
- (iii) Develop and implement site-specific occupational health and safety (OH&S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use personal protective equipment; (c)

¹⁹<https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES>

²⁰<https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B-%2BWater%2BAnd%2BSanitation.pdf?MOD=AJPERES>

- OH and S Training²¹ for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;
- (iv) Conduct work in confined spaces, trenches, and at height with suitable precautions and using standards and safe construction methods; do not adopt ad hoc methods; all trenches deeper than 1.5 m shall be provided with safety shoring/braces; and avoid open cutting method for trenches deeper than 3.5 m by adopting trenchless technology
 - (v) Ensure that qualified first aid is always provided. Equipped first-aid stations shall be easily accessible throughout the site;
 - (vi) Provide medical insurance coverage for workers;
 - (vii) Secure all installations from unauthorized intrusion and accident risks;
 - (viii) The project area experiences extreme temperature during summer months of April and May, which may affect the health of workers engaged in construction work. Contractor should take necessary measures during summers including the following:
 - (ix) Work schedule should be adjusted to avoid peak temperature hours (12 – 3 PM)
 - (x) Provide appropriate shade near the workplace; allow periodic resting and provide adequate water
 - (xi) Provide necessary medicine and facilities to take care of dehydration related health issues
 - (xii) Provide supplies of potable drinking water;
 - (xiii) Provide clean eating areas where workers are not exposed to hazardous or noxious substances;
 - (xiv) Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers;
 - (xv) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted;
 - (xvi) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
 - (xvii) Ensure moving equipment is outfitted with audible back-up alarms;
 - (xviii) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and
 - (xix) Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.
 - (xx) Conduct regular health check-ups for workers

²¹ Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

- (xxi) Provide periodical awareness camps and special trainings for workers for health issues and risks in construction sites
- (xxii) During working in Dam area, workers should be made aware of risks of water depth and dangerous areas of water should be properly marked by fix or floating barricades and signage of danger. Workers should also be made aware for protection of biodiversity of the water and fishing should be strictly prohibited. A boat should be made available at site for transport of labour and materials and should be well maintained for any emergency condition. Workers should not be allowed to dip or bath in water of dam. Suitable working platform should be provided during construction works in water.

175. **Asbestos Materials.** Existing water distribution network is mostly asbestos cement (AC) pipes, and because of the health risks these will be left in situ and replaced by new pipes. Details will be obtained from the PHED of the nature and location of all water supply infrastructure, and planning pipeline alignments carefully to avoid any conflict or damage. Given the dangerous nature of this material for both workers and citizens, additional measure should be taken to protect the health of all parties in the event (however unlikely) that AC pipes are encountered. RUIDP has decided not to remove the AC pipes and lay new pipes parallel to it and left AC pipes in-situ. This will remove risks of handling and disposal of AC pipes. Further, prior to start of construction works of water supply system, PIU will develop a protocol to be applied in any instance that AC pipes are encountered, to ensure that appropriate action is taken. This should be based on the approach recommended by the United States Environmental Protection Agency (USEPA),²² and amongst other things, should involve:

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

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

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

177. Central part of the town is characterized by narrow roads. Particularly, the areas located

²² In the USA, standards and approaches for handling asbestos are prescribed by the Occupational Health and Safety Administration (OHSA) and the Environmental Protection Agency (EPA) and can be found at <http://www.osha.gov/SLTC/asbestos>

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

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

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

- (i) Consult PIU before locating project offices, sheds, and construction plants;
- (ii) Minimize removal of vegetation and disallow cutting of trees;
- (iii) Provide drinking water, water for other uses, and sanitation facilities for employees;
- (iv) Ensure conditions of liveability at work camps are maintained at the highest standards possible at all times;
- (v) Prohibit employees from poaching wildlife and cutting of trees for firewood;
- (vi) Train employees in the storage and handling of materials which can potentially cause soil contamination;
- (vii) Recover used oil and lubricants and reuse or remove from the site;
- (viii) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- (ix) Remove all wreckage, rubbish, or temporary structures which are no longer required; and
- (x) Request PMU to report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.
- (xi) Conduct periodical ground water quality monitoring as per EMP.

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

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

180. **Debris disposal.** Prior to the commencement of works, contractor shall identify a debris

disposal site in consultation with the PIU. Contractor will follow all the prescribed rules²³ and will adhere to following criteria (including but not limited to)

- (i) The site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, top-soil stripping, stacking and preservation should be undertaken prior to initiation of any activities.
- (ii) Debris disposal site shall be at least 200 m away from surface water bodies.²⁴
- (iii) No residential areas shall be located within 100 m downwind side of the site.
- (iv) The site is minimum 250 m. away from sensitive locations like hospitals, religious places, ponds/lakes or other water bodies.
- (vi) The local governing body and community shall be consulted while selecting the site.
- (vii) Construction waste shall be collected at stockpile area for 8-10 days and will be sent to disposal site. Disposal site shall be identified and allotted by Municipal Council before start of construction works.

181. Preparedness for Monsoon/heavy rain fall. Banswara being susceptible for heavy rainfall, there is requirement of pre-monsoon preparedness from contractor to avoid any disturbance during monsoon. Following are the requirements for pre-monsoon preparedness-

- (i) Complete major activities of construction before monsoon, which may be affected/stopped due to heavy rainfall
- (ii) Inspect all the drainage at construction site/construction camp/labor camp etc. and clear all the drainage lines so that no water stagnation/flooding may occur during heavy rainfall
- (iii) As far as possible avoid trench works and excavation works (pipe laying) during monsoon season to avoid any water logging and accident due to it
- (iv) If open trenches are not avoidable during monsoon, keep ready all the mitigation measures to avoid water logging such as dewatering pumps and sufficient pipes, traffic assistance, barricades etc.
- (v) Inspect and verify all the emergency measures and emergency control system before start of monsoon, keep the emergency response committee on high alert during monsoon/heavy rain fall
- (vi) Follow the Guidelines of safety during monsoon attached as **Appendix 20**

182. Night works. Most of the construction works shall be undertaken only during day hours. Night works are required only in the extreme conditions such as road having heavy traffic in day time and/or no alternate access can be provided for the road users, extreme climatic conditions (extreme hot during summers), religious fairs/celebrations in day time etc. Contractors are required to take prior approval from PIU/Consultants and concerned town authorities for night works. Contractors are required to adhere following conditions for night works-

- (i) Contractors should have hand held noise level meter for measurement of noise during night hours
- (ii) Contractors should have hand held lux meter for the measurement of illumination during night hours

²³ Construction and Demolition Waste Management Rules 2016 and Solid Waste Management Rules (refer appendix 8)/ Table 1

²⁴ In the absence of site meeting the stipulated criteria, an alternate site can be selected specifying the reasons. In such a case, the construction camp management plan should incorporate additional measures specific to the site as suggested by the Construction Manager.

- (iii) Preferably electrical connections is available for running equipments otherwise sound proof/super silent Diesel Generator set should be available
- (iv) Sound level should not increase as per following-

Type of area of work	Maximum noise level dB(A)
Industrial	70
Commercial	55
Residential	45
Silence zone	40

- (v) Illumination should be as follows-

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

- (vi) As far as possible ready mix concrete from batching plant to be used, otherwise the concrete should be prepared away from residential areas and brought to the site
- (vii) All the noisy activities like hammering, cutting, crushing, running of heavy equipment should be done in day time and avoided in night time
- (viii) Workers engaged in night works should have adequate rest/sleep in day time before start of night works
- (ix) Worker engaged for night works should have previous experience of night works and should be physically fit for such works including clear vision in night
- (x) All the necessary provisions of traffic aids such as traffic signals, road signage, barricades, cautions boards, traffic diversion boards etc. should be available with fluorescent/retro-reflective arrangements
- (xi) Workers should be trained before start of night works about risks and hazards of night works and their mitigation measures and should be provided all the protective aids (PPEs) including fluorescent/retro-reflective vests
- (xii) Horns should not be permitted by equipment and vehicles
- (xiii) Workers should not shout and create noise
- (xiv) First aid and emergency vehicles should be available at site
- (xv) Emergency preparedness plan should be operative during night works
- (xvi) Old persons and pregnant women and women having small kids should not work in night time
- (xvii) All the vehicles and equipment being used at night works should have adequate type of silencers/enclosures/mufflers to reduce noise

- (xviii) All the vehicles should be checked for working head lamps, tail lamps, inner lights etc. before start of night works
- (xix) PIU/DSC site engineers and contractors safety personnel should closely monitor the safety of works continuously and noise and illumination levels on hourly basis and maintain photographic and videographic records as well as register the observations.
- (xx) Night works should be stopped early in the morning at least one hour before start of pedestrian/traffic movement
- (xxi) After completion of night works all the site should be cleaned and maintained obstruction free for day time movement of vehicles and pedestrians
- (xxii) Drivers and workers should be alert and responsive during night works
- (xxiii) All the wages to workers working in night hours should be as per the applicable labour acts
- (xxiv) Avoid any nuisance which may create problems to nearby habitants and work peacefully during night hours
- (xxv) Night works should not be conducted near hospitals and during peak seasons such as peak tourist season, students' exam times etc.

F. Operation and Maintenance Impacts

183. Operation and Maintenance of the water supply and sewerage system will be carried out by DBO contractor for 10 years and then by Banswara Nagar Parishad directly or through an external operator. The system have a design life of 30 years, during which shall not require major repairs or refurbishments and should operate with little maintenance beyond routine actions required to keep the 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. It has to ensure by contractor that desired consents from RPCB are obtained for operation of WTP and STP further to ensure that treated effluent meet the parameters as set by CPCB/RPCB will be contractor's responsibility. Emerging sludge from WTP should be disposed in designated site only in scientific manner adhering guidelines as set by CPCB/RPCB. Contractor will also ensure compliances to all the conditions as mentioned in the CTO.

1. Water Supply

184. **Handling and safe disposal of sludge from WTP-** Surface water Treatment for potable supplies typically involves coagulation, flocculation, Sedimentation, and filtration processes for removing colloidal as well as suspended solids from raw water. All water treatment plants (WTPs) produce waste/residue known as water treatment sludge (WTS) during the purification of raw water. The sludge produced in a typical WTP generally consists of about 45-65% fine sand in grain size range 150-75 μ . Silica, alumina, ferric oxide and lime constitute the major percentage of chemical components present in the sludge. Lead, chromium, arsenic, barium and other metals may be present in significant concentration. Therefore, Simple method of discharging sludge directly into nearby hydric bodies or dumping in the landfill sites is not sustainable solution. It is needed to develop suitable sludge management plan for sustainable development. Recycling the sludge in building and construction industry could be a safe disposal option and utilization of sludge/waste from WTPs would also prevent the excessive exploitation of raw materials and pave the way for sustainable development. Other options of sludge utilization in wastewater treatment, in removal of heavy metals from aqueous solutions and in nutrient reduction from laden soils and runoffs also possess great potential to reduce the burden on safe disposal. Utilization of WTS in

brick making, in ceramics making, in the manufacture of cement and cementitious materials and as a substitute to building materials could provide safe disposal route. Reuse in wastewater treatment, in removal of heavy metals from aqueous solutions and in nutrient reduction from laden soils and runoffs are also some of the possible alternatives. It is required to explore suitable option for developing sustainable sludge management strategies under stringent environmental norms. Municipal Council is required to prepare a plan for safe handling and disposal of sludge from WTP. During trial commissioning sludge coming out from WTP needs to be tested in lab for the constituents and if it is not having heavy metals or having these in safe limits can be disposed in land fill sites otherwise other safe disposal options should be explored as indicated above.

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

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

186. Recurrence of pipe bursting and leakage problems in water supply system will be managed by the leak detection and water auditing surveys. The operating agency will be required to ensure that the leak detection and rectification time is minimized.

187. Water treatment and disinfection in the CWRs is one of the main operation activities of the water supply system. This activity produces wastewater, solid waste, and poses safety risk due to handling of chlorine.

188. During the operation phase, it is necessary that the facility is operated by trained staff as per the standard operating procedures.

- (i) Chlorinator facility is operated only by trained staff and as per the standard operating procedures
- (ii) In case of any accident and/or maintenance activity, the staff should follow documented procedures only
- (iii) It is suggested to develop an Emergency Response System (ERS) for the chlorine leakage.

189. Following measures are suggested for implementation / compliance during the operation phase:

- (i) Judiciously utilize the available water in Mahi Dam/Kagdi Pick up Weir resources by adapting conjunctive use; prepare a water utilization plan every year post monsoon season depending on the water availability
- (ii) Ensure that water supplied to the consumers at all times meet the drinking water standards; carry out regular sampling and testing, and disseminative information
- (iii) Ensure zero wastewater discharge from the water treatment process via collection and recirculation of process wastewater / backwash water;

- (iv) Implement sludge management plan; ensure collection, processing, drying, and safe disposal / reuse accordingly
- (v) 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
- (vi) Conduct periodic testing of sludge as per the environmental monitoring plan
- (vii) Ensure valid consent to operate (CTO) from RSPCB for operation of WTP
- (viii) Ensure that all conditions/standards prescribed by RSPCB are complied duly
- (ix) 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
- (x) Implement Emergency Response System (ERS) for the chlorine leakage; Guidelines and Emergency plan for handling and storing chlorine is attached as Appendix 18.

2. Sewerage

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

191. **Sludge Management:** Subproject includes sludge management infrastructure in STP, including system for sludge collection, thickening, solar drying, and disposal at landfill/identified site. This includes a Sludge Sump to collect sludge from SBR basins; returning arrangement for supernatant from the sump to inlet/equalization tank for treatment; pumping sludge to sludge thickener and pumping thickened to mechanical sludge dewatering system (such as centrifuge). It also requires contractor to establish a shed where the dewatered sludge cake can be further air dried for 15 days. This is indicative sludge management system, and DBO contractor will design the system meeting these requirements and prepare sludge management plan. Bid indicates that “the sludge produced from the treatment process would be processed so it may be used as fertilizer and soil conditioner” and it requires DBO contractor “to conform to the regulations of public health and environment protection norms”. The norms for safe use of processed sludge as fertilizer and soil conditioner are already discussed in this IEE. This follows the Sewerage and Wastewater Policy, 2016, which suggests “use of sludge produced from the treatment as fertilizer and soil conditioner after processing”. A sludge disposal site will be identified during the detailed

design phase to dispose unutilized dried sludge in reuse applications. The updated IEE will include the details of disposal site. If the sludge is managed accordingly, there will be no impacts.

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

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

- (i) Ensure that treated wastewater meets the established discharge standards all times; Conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated effluent quality complies with design standards;
- (ii) Ensure implementation of Reuse Plan, and ensure intended quality for each direct reuse
- (iii) Assess composition and characteristics of sludge from the first batch operation at the initial phases, and confirm the handling, management and disposal/reuse actions suggested in the management plan
- (iv) Conduct periodic testing of dried sludge/compost to check presence of heavy metals and confirming the concentrations to use as compost as specified in the Standards for Composting, Schedule II A, Solid Waste Management Rules, 2016, FCO = Fertilizer Control Order, 1985, amendments in 2009 and 2013. It shall not be used for food crops.
- (v) Ensure valid consent to operate (CTO) from RSPCB for operation of STP
- (vi) Ensure that all conditions/standards prescribed by RSPCB are complied duly
- (vii) Ensure that chlorinator facility is operated only by trained staff and as per the standard operating procedures; in case of any accident and/or maintenance activity, ensure that the staff follows documented procedures only
- (viii) Implement Emergency Response System (ERS) for the chlorine leakage; Guidelines and Emergency plan for handling and storing chlorine is attached as Appendix 18
- (ix) Ensure proper knowledge transfer, hands-on training to municipal staff engaged in STP operation has been provided by contractor prior to handover of facility;
- (x) Operate and maintain the facility following standard operating procedures of operational manual;
- (xi) Undertake preventive and periodic maintenance activities as required;
- (xii) Conduct periodic training to workers; ensure that all safety apparatus at STP including personal protection equipment are in good condition all times; and are at easily accessible and identifiable place; periodically check the equipment, and conduct mock drills to deal with emergency situations;
- (xiii) No wastewater from industrial premises (including domestic wastewater) shall be allowed to dispose into municipal sewers; monitor regularly and ensure that there

is no illegal discharge through manholes or inspection chambers; conduct public awareness programs; in coordination with RSPCB:

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

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

195. **OHS Risks:** There is an occupation health risk to workers engaged in sewer maintenance activities. During cleaning/clearing of manholes and sewer lines great precautions should be

taken for the safety of workers conducting such works. Therefore O&M contractor will be required to-

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

196. Biological hazards are among the environmental risks that may adversely impact the health and wellness of the workers and the community. Breakouts of diseases such as diarrhea, flu or pandemics such as the COVID-19 shall be avoided. Designs and implementation of treatment systems shall ensure that disease-causing pathogens or viruses are disinfected and will not cause any health issues. The World Health Organization has released an interim guidance on Water, Sanitation, Hygiene and Waste Management for the COVID-19 virus (see Appendix 17). Measures on managing wastewater and fecal waste and keeping water supplies safe is critical to avoid the start or spread of any disease.

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

- (i) Create awareness program on the FSSM in general public
- (ii) Implement Health and Safety Plan for FSSM
- (iii) Provide proper training to the workers, and staff in safe handling of FSSM tasks, provide all necessary personal protection equipment and ensure their usage;
- (iv) Ensure that the system is operated completely mechanically, with least involvement of workers; there shall be no direct contact of septage to any worker or staff
- (v) Ensure proper facilities for workers including showers, wash areas, toilets, drinking water, eating and resting places

- (vi) Conduct regular health checks
- (vii) Ensure that tankers cleaning is done mechanically, and in the demarcate area at STP, and the wastewater generated in the process shall be discharged into STP

198. In Banswara, at present people depend on septic tanks for discharge of sewage. Once the sewerage system is operational, these septic tanks will be decommissioned, and the wastewater outlets from the houses will be connected to sewers. Contractor should prepare a decommissioning plan for all septic tanks.

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

VII. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Overview

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

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

B. Public Consultation

202. The public consultation and disclosure program is a continuous process throughout the project implementation, including project planning, design and construction. Socio economic surveys were conducted in June, 2017. Business persons (vendors, hawkers, shopkeepers etc.) were considered in this survey. Government officials, women and residents were consulted during public consultations in June 2017. Details of public consultations done are given in **Appendix 19**.

1. Consultation during Project Preparation

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

204. Focus-group discussions with affected persons and other stakeholders were conducted to learn their views and concerns. A socio economic household survey has been conducted in the town, covering sample households, to understand the household characteristics, health status, and the infrastructure service levels, and also the demand for infrastructure services. General public and the people residing along the project activity areas were also consulted during visits to the project sites. Report of socio-economic survey and public consultations with stakeholder is attached as **Appendix 19**.

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

206. A town-level City Level Committee has been formed in Banswara City by Government orders. City Level Committee meeting was organized during the detailed design stage to which representatives of primary and secondary stakeholders were invited. The feedback and concerns of the stakeholders was taken into consideration for finalization of design and scope of works. The project was agreed by the committee for further course of action of RUIDP..

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

2. Consultation during construction

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

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

C. Information Disclosure

210. Executive summary of the IEE will be translated in the local language and made available at the offices of Nagar Parishad Banswara, RUIDP PMU and PIU. Copies of summary will be provided to participants of city level workshop to be organized in Banswara. 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 Nagar Parishad Banswara and PIU, RUIDP after approval of the IEE by Government and ADB. Stakeholders will also be made aware of grievance register and redress mechanism.

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

212. 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.

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

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

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

215. A concise summary of project and draft IEE report (in Hindi), providing all necessary details of proposals, implementation arrangements, subproject locations, likely issues and mitigation and monitoring measures and grievance redress mechanism, shall be made available to the stakeholders at consultation meetings. This should also provide contact information of project agency. This summary shall also be displayed at the notice boards of PMU, PIU and other

public places. During project implementation, relevant information about any major changes to project scope will be shared with beneficiaries, affected persons, vulnerable groups, and other stakeholders. The following documents will be submitted to ADB for disclosure on ADB website. PMU will send written endorsement to ADB for disclosing these documents:

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

VIII. GRIEVANCE REDRESS MECHANISM

216. A project-specific, three-tier GRM covers both environment and social issues. The GRM will be established to receive, evaluate, and facilitate the resolution of affected persons' concerns, complaints, and grievances about the social and environmental performance at project level. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns related to the project. Assessment of the GRM designed and implemented for Rajasthan Urban Sector Development Program (RUSDP)²⁵ the system was effective in timely resolution of grievances in a transparent manner.²⁶ The multichannel, project-specific, three-tier GRM is functional at RUSDP, hence the design of GRM for RSTDSP takes into account the proposed institutional structure for RSTDSP and the positive features and learnings from the previous GRM.²⁷

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

218. Public awareness campaigns within entire ULB/Municipal area will ensure that awareness on grievance redress procedures is generated. The nodal officer- social/environment at field level through community awareness and public participation consultant (CAPPC) will conduct ULB/Municipal area-based awareness campaigns to ensure that poor and vulnerable households are made aware of grievance redress procedures and entitlements. Contractors will provide

²⁵The procedures followed for grievance redress during implementation of RUSDP Phase III included the project GRM and the pilot GRM software application (Smart Check) in Pali, the Sampark portal of Government of Rajasthan, and the Chief Minister's helpline. Complaints received through various channels were mostly minor and pertained to damage to existing water supply pipelines and disruption of water supply during construction, delays in road restoration, and pending new connections. Complaints related to damage to private property (compound walls/steps, etc.) were less in number. The grievances were mostly possible to resolve in coordination with the contractors. Complaints received were immediately referred by the CAPC/PMDSC supervision staff to the PIU Nodal officer (safeguards) and concerned engineer at PIU, who advised them on further action. Follow up with the contractor on complaint resolution was undertaken by PIU Nodal officer CAPC and PMDSC and final feedback sought from complainant upon resolution. Complaints requiring inter-departmental coordination were referred to the PMU for resolution, and feedback provided to complainant. The PMU kept regular track of grievances through WhatsApp and email alerts, ensuring registration and follow-up until resolution.

²⁶Town-level grievance registration data indicates that a large number of grievances were registered, pointing to the effectiveness of the multi-channel GRM. No major grievance was received for RUSDP Phase III. The GRM helped smoothen the process of project implementation, hence the proposed architecture for the RSTDSP GRM remains similar, with some refinement, taking into account the changes in institutional setup proposed for project implementation.

²⁷Continued logistics support at field level will be key to successful management of grievance redress under RSTDSP. The target date for establishment of the first level (PIU level) and second level (Zonal level) of GRM is before loan negotiation.

pamphlets to communities prior to start of works and billboards during construction. The pamphlets and billboards will include relevant environmental and social safeguards, GRM information, and contact details of key personnel from PIU and contractors.

219. Affected persons will have the flexibility of conveying grievances/suggestions by dropping grievance redressal/suggestion forms in complaint/suggestion boxes that will be installed by project PIUs or by e-mail, by post, or by writing in a complaints register in ULB offices/complaints register at contractor's work site²⁸ or by sending a WhatsApp message to the PIU²⁹ or by dialling the phone number of town level PIU/CAPPC or by dialling a toll-free number.³⁰ Any aggrieved person can also avail the facilities of online grievance monitoring system 'Rajasthan Sampark' portal to register their grievances which is a parallel mechanism of grievance registration, in addition to the project GRM.³¹ Careful documentation of the name of the complainant, date of receipt of the complaint, address/contact details of the person, location of the problem area, and how the problem was resolved will be undertaken and feedback provided to the complainant on action/decision taken. The Safeguard and Safety Officer of town/city level PIU will have the overall responsibility for timely grievance redressal on environmental and social safeguards issues and for registration of grievances, related disclosure, with the assistance of project consultants. In case of grievances that are immediate and urgent in the perception of the complainant, the contractor, and officials of PIU with assistance from construction management and supervision consultants (CMSC) and CAPPC on-site will provide the most easily accessible or first level of contact for quick resolution of grievances. Contact numbers and names of the concerned PIU safeguard and safety officer, contractors, CAPPC and CMSC personnel will be posted at all construction sites at visible locations.

- (i) **1st level grievance.** The contractors, PIU Executive Engineer /Assistant Engineer designated as safeguard and safety officer (social and environment), CMSC (safeguard staff) and CAPPC can immediately resolve issues on-site, in consultation with each other and will be required to do so within 7 days of receipt of a complaint/grievance. If required, city level monitoring committee (CLMC)³² will be involved in resolution of grievances at the 1st level.
- (ii) **2nd level grievance.** All grievances that cannot be redressed within 7 days at field/PIU level will be brought to the notice of Zonal PIU headed by Additional Chief Engineer (ACE). The ACE at zonal PIU will resolve the grievance within 7 days of receipt of complaint/grievance in discussion with the ASO, field level PIU, CMSC, CAPPC and the contractor.
- (iii) **3rd level grievance.** All the grievances that are not addressed by Zonal PIU within 7 days of receipt will be brought to the notice of the PMU. Depending on the nature of grievance, the Project Officer (Social/Environment) at PMU will resolve the

²⁸RUSDP piloted an online application based live GRM counter for resolution of public grievances over and above the usual process of grievance registration and redressal. This app based GRM - "RUIDP Smart Check" is available at Google play store (free of cost) and is operational. The RUIDP Smart Check "app" was launched in Pali town in July 2017 and is proposed to be scaled up in RSTDSP project towns. For persons without access to the application, the traditional channels will continue to be available.

²⁹It is suggested for each PIU to have a dedicated WhatsApp group for registration of grievances and receipt of quick feedback, to be followed by more formal communication.

³⁰Project contractors in all project towns will have a toll-free number with specific working hours for registration of grievances related to RSTDSP.

³¹<http://www.sampark.rajasthan.gov.in/RajSamWelcome.aspx>

³²The CLMC has been formed at the town/city level for planning and monitoring of work, resolve issues related to departmental coordination etc. It is headed by Commissioner/Executive Officer ULB (Chairman) and city engineer of public health engineering department (PHED), public works department (PWD) and head of PIU acting as Member Secretary.

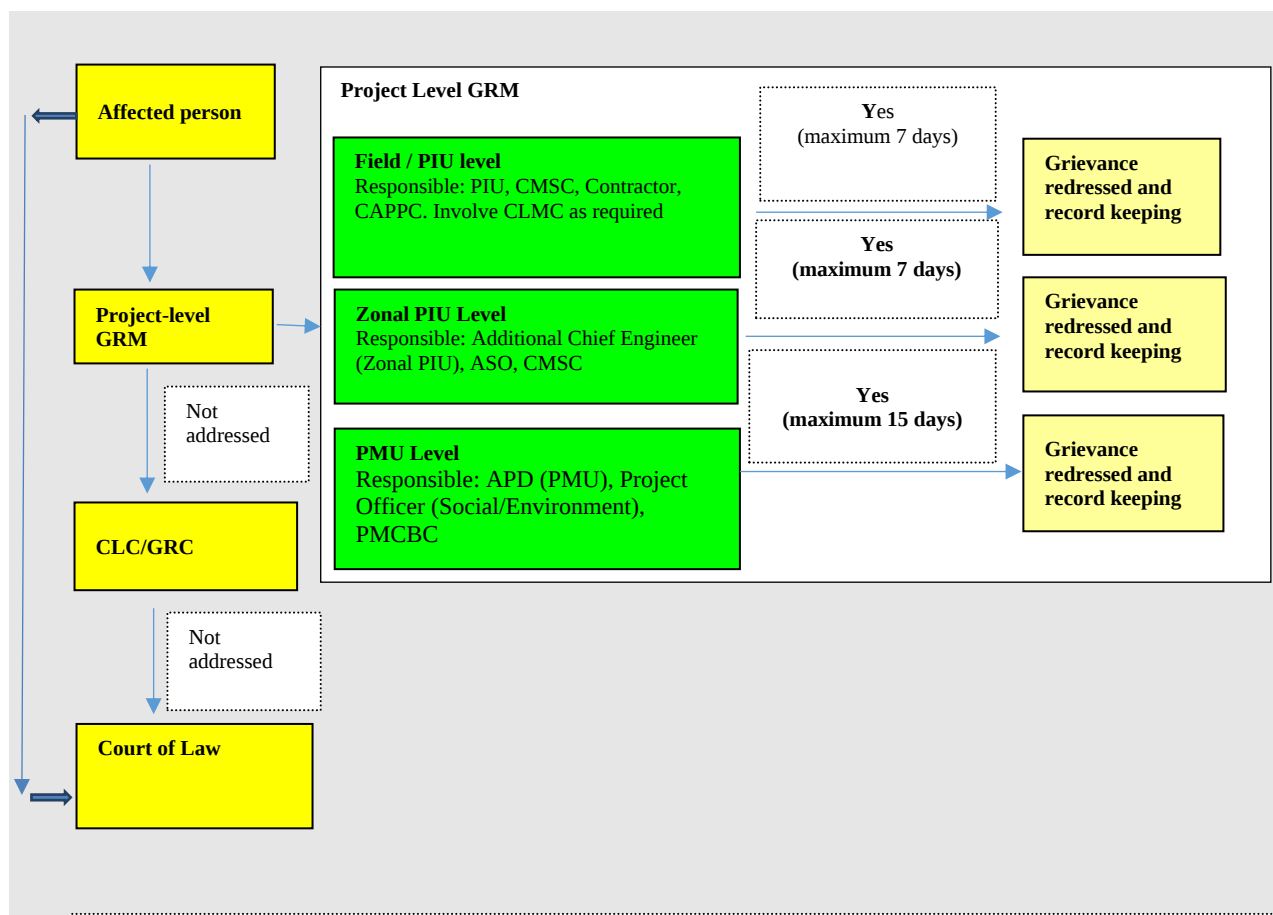
- grievance within 15 days of receipt of grievance with necessary coordination of Zonal PIU and CMSC and guidance/instruction of Additional Project Director (APD-PMU).
- (iv) Grievances not redressed through this process within/at the project level within stipulated time period will be referred to the CLC/GRC, which has been set up.³³ In its role as a GRC, the CLC will meet whenever there is an urgent, pending grievance. Other grievances can be discussed during its regular meetings. Zonal PIU will inform the CLC regarding any grievances required to be resolved urgently. The GRC will resolve the grievance within 15 days of receiving the complaint. In case of any indigenous peoples impacts in subprojects, the CLC/GRC must have representation of the affected indigenous people community, the chief of the tribe or a member of the tribal council as traditional arbitrator (to ensure that traditional grievance redress systems are integrated) and an NGO working with indigenous people groups.
 - (v) The multi-tier GRM for the project is outlined below (Figure 15), each tier having time-bound schedules and with responsible persons identified to address grievances and seek appropriate persons' advice at each stage, as required. The GRC will continue to function throughout the project duration.

220. The project GRM notwithstanding, an aggrieved person shall have access to the country's legal system at any stage and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM. In case of grievance related to land acquisition, resettlement and rehabilitation, the affected persons will have to approach a legal body/court specially proposed under the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (RFCTLARRA), 2013.³⁴

Figure 15: Grievance Redress Mechanism-RSTDSP

³³City Level Committee (CLC)/grievance redress committees (GRCs) has been constituted for each town/city under the Chairmanship of District Collector to provide overall subproject guidance and "to sort out issues and remove hindrances, if any". CLC formed at city-level/district level with members composed of: District Collector as Chairperson, and following as members: ULB Commissioner/Mayor/Chairman; Deputy Mayor/Vice Chairman ULB; Chairman / Secretary Urban Improvement Trust (UIT); Head of Zonal/field level PIU as Member Secretary; one representative each from relevant government departments as appropriate (PWD/PHED/Town Planning Department etc.). All CLCs in their role as GRCs will have at least one-woman member/chairperson. In addition, for project-related grievances, representatives of affected persons, community-based organizations (CBOs), and eminent citizens will be invited as observers in GRC meetings. The concerned Member of Parliament (MP) and Member of Legislative Assembly are also part of the CLC.

³⁴ The Authority admits grievance only with reference to the Land Acquisition and R&R issues under the RFCTLARRA, 2013.



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

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

222. **Record-keeping.** The PIU of each town/city will keep records of grievances received, including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions and the date these were affected and final outcome. The number of grievances recorded and resolved, and the outcomes will be displayed/disclosed in the PMU office, PIU offices, and on the web, as well as reported in monitoring reports submitted to ADB on a semi-annual basis. The sample grievance registration format is attached as Appendix 21.

223. **Periodic review and documentation of lessons learned.** The PMU Project Officers (Social and Environment) will periodically review the functioning of the GRM in each town and

record information on the effectiveness of the mechanism, especially on the project's ability to prevent and address grievances.

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

IX. ENVIRONMENTAL MANAGEMENT PLAN

A. Environmental Management Plan

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

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

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

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

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

230. The contractor will be required to submit to PIU, 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 can commence prior to approval of SEP.

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

Table 13: Design Stage Environmental Management Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Cost and Source of Funds
Sewage Treatment Plant (STP)	Odour nuisance and aesthetics	(i) Provide a green buffer zone of 10-20 m wide all around the STP with trees in multi-rows. This will act as a visual screen around the facility and will improve the aesthetic appearance. Treated wastewater shall be used for plantation. (ii) Develop layout plan of STP such that odour generating units (such as sludge / solids handling facilities) are located away from the surrounding area with future development potential.	DBO Contractor / PIU	Project costs
All work sites	Tree cutting	(i) Minimize removal of trees by adopting to site condition and with appropriate layout design of STP and CWR or any other site with trees (ii) Obtain prior permission for tree cutting at WTP or CWR site or at any other site that may require tree cutting finalized during detailed design (iii) Plant and maintain 3 trees for each tree that is removed	DBO Contractor / PIU	Project costs
Design of water supply and sewerage system	Non-compliance or non-adherence with the environmental considerations proposed in preliminary designs during detailed design:	Ensure compliance with the following during the detailed design: (i) Adopting conjunctive use approach water source; utilizing feasible surface water sources and groundwater source optimally thereby reducing the existing groundwater abstraction to the extent possible (ii) Locating components and facilities appropriately by avoiding sensitive locations like forests and protected areas (environmentally, socially, and archeologically). (iii) Recovering wash water from treatment process to optimise the water use (iv) Treatment and reuse of sludge from treatment process; providing a covered shed of adequate space to air dry the processed sludge for at least 15 days at STPs (v) Designing the entire system to maintain optimal flow and terminal pressure, and optimising the overall energy usage (vi) Avoiding usage of asbestos containing materials (vii) Reducing the incidence of water borne diseases by providing 100% population including urban poor with potable water supplies (viii) Reuse of treated wastewater from STP for non-potable uses thereby reducing the load in freshwater resources (ix) Adopting a combined approach of sewerage system and faecal sludge and septage management to cover 100% population of	DBO Contractor / PMU	Project costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Cost and Source of Funds
		the town with safe collection, conveyance and treatment of sewage generated in the town (x) Provision of appropriate personal protection equipment to the workers and staff		
Seismic sensitivity	Damage to infrastructure and potential risks: project area in moderate earthquake risk zone (Zone III)	(i) Designs of project component structures shall comply with relevant codes of design such as Bureau of Indian Standard (BIS) specifications for earthquake resistant design (IS: 1893: Criteria for earthquake resistant design of structures).	DBO Contractor/PIU	Project costs
Groundwater source	Source sustainability and over exploitation of groundwater	(i) Prepare a groundwater harvesting and artificial recharge plan; (ii) Creation of artificial recharge pits in public places / public buildings. Local body can issue a notification to this effect. (iii) Household level artificial recharge (like roof top rainwater harvesting) should be encouraged. (iv) Groundwater regulation – options to close / discontinue all the tube wells in houses used for domestic purposes in Banswara in a phased manner once the project is implemented.	DBO Contractor/PIU	Project costs
	Groundwater contamination	(i) Prepare a source protection plan for tube wells and open wells (ii) Prevent flow of untreated wastewater in the drains (iii) Ensure proper construction of tube wells including casing pipes to prevent water contamination from well spaces, and due to flooding (iv) Measures should be taken to control the open defecation, and to close all unsafe latrines (for example pit latrines). (v) Awareness programs shall be conducted regarding the sanitation practices and its effect on groundwater quality	DBO Contractor and ULB/PIU	Project costs and ULB costs
CWRs and STP	Hazardous / harmful chemicals	(i) Reduce the use of chemicals in the treatment process to the extent possible (water treatment); provide non-chemical alternatives or easily recoverable and/or reusable chemicals or biocompatible alternatives. (ii) Establish proper handling / storage / application system according to the relevant standards, safety precautions and prevent accidental release / spill (iii) Provide leak/spill detection, collection / capture and safe disposal facilities such as chlorine absorption and neutralization	DBO Contractor/PIU	Project costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Cost and Source of Funds														
		facility (iv) Provide ventilation, lighting, entry and exit facilities; visible and audible alarm facilities to alert chemical/chlorine leak (v) Facility for isolation in the event of major leakages (vi) Eye wash and shower facility (vii) Personal protection and safety equipment for the operators (masks, oxygen cylinders, gloves, etc.,) (viii) Provide training to the staff in safe handling and application of chemicals, material safety, and standard operating procedures and emergency responses (ix) Develop emergency response procedures																
Sewage Treatment Plant (STP)	Inefficient sewage treatment, treated effluent characteristics not satisfying the CPCB/RSPCB standards	(i) Ensure that the selected process is appropriate for the town and meets discharge standards and facilitate reuse (ii) Treated effluent should meet the criteria set by RSPCB/CPCB or the following bid specified parameters, whichever are stringent: <table><tr><th>Parameter</th><th>Standards</th></tr><tr><td>BOD, mg/l</td><td>10</td></tr><tr><td>TSS, mg/l</td><td>20</td></tr><tr><td>COD, mg/l</td><td>50</td></tr><tr><td>Nitrogen-Total, mg/l</td><td>10</td></tr><tr><td>Phosphorus- Total, mg/l</td><td>1</td></tr><tr><td>Faecal Coliform (MPN/ 100 ml)</td><td>100 (Desirable) 230 (Permissible)</td></tr></table>	Parameter	Standards	BOD, mg/l	10	TSS, mg/l	20	COD, mg/l	50	Nitrogen-Total, mg/l	10	Phosphorus- Total, mg/l	1	Faecal Coliform (MPN/ 100 ml)	100 (Desirable) 230 (Permissible)	DBO Contractor / PIU	Project costs
Parameter	Standards																	
BOD, mg/l	10																	
TSS, mg/l	20																	
COD, mg/l	50																	
Nitrogen-Total, mg/l	10																	
Phosphorus- Total, mg/l	1																	
Faecal Coliform (MPN/ 100 ml)	100 (Desirable) 230 (Permissible)																	
Change in raw sewage quality	Mixing of industrial effluent with sewage	(i) No industrial wastewater shall be allowed to dispose into municipal sewers (ii) As there is a risk of potential mixing of industrial waste, no domestic wastewater from industrial units shall be allowed into municipal sewers (iii) Ensure that there is no illegal discharge through manholes or inspection chambers (iv) Conduct public awareness programs; in coordination with RSPCB and CLC. , (v) Conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated wastewater quality	DBO Contractor and PIU / PMU	Project Costs														

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

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

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Cost and Source of Funds
	issues, and impact on STP process	type of septic tanks and their location in the houses (ii) Create awareness program on the FSSM from collection to treatment system that will be adopted (iii) Design the sewage treatment process duly considering mixing of septage (iv) Ensure that the FSSM system is completely mechanized no human touch, even accidentally, from collection at household to discharge into STP, and in periodic cleaning of tankers (v) Demarcate a proper area for cleaning of mobile tankers in STP premises, and ensure that the wastewater shall be discharged into STP (vi) Provide proper training to the workers, and staff in safe handling of FSSM tasks, provide all necessary personal protection equipment (vii) Ensure proper facilities for workers including showers, wash areas, toilets, drinking water, eating and resting places (viii) Conduct regular health checks (ix) Prepare Health and Safety Plan for FSSM		
Asbestos cement (AC) pipes in existing water supply system: clearing, transfer and disposal; work in narrow streets, and interventions in existing AC pipelines	Health impacts due to air borne asbestos if handled unsafely, cut, drilled or broken into pieces	(i) Develop ACM Management Plan (AMP) that includes identification of hazards, the use of proper safety gear and disposal methods. Sample AMP is provided in Appendix 14. Adhere to the workflow process suggested in Figure 20. (ii) Conduct awareness program on safety during the construction work (iii) Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day (iv) Provide barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches (v) Identify risk of intervention with existing AC pipes. If there is significant risk, implement the AMP strictly that includes identification of hazards, the use of proper safety gear and disposal methods. (vi) Appropriate actions as defined in the Asbestos Management Plan will have to be adhered to (vii) Maintain records of AC pipes as per the AMP	DBO Contractor/PMU	Project costs
Preparation of plans and	Various impacts	(i) Preparation of ACM Management Plan (ii) Prepare traffic management plan	DBO Contractor and PMCBC (for	Approval of plans

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Cost and Source of Funds
protocols		(iii) Prepare occupational health and safety plan (iv) Prepare spoils management plan	ACM plan)	by PIU

Table 14: Environmental Management Plan of Anticipated Impacts during Pre-Construction

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Compliance with environmental subproject selection criteria	Environmental impacts due to subproject	Compliance with environmental subproject selection criteria	DBO Contractor, PIU and Banswara Nagar Palika	PMU	No costs required
Environmental monitoring of baseline conditions of air, noise, water and soil	To establish base line environmental conditions	Environmental monitoring through NABL accredited laboratory	Construction contractor	Consultants/PIU	Contractor
Legal compliance	Environmental legal noncompliance may attract legal actions Failure to obtain necessary consents Permits, NOCs etc. can result to design revisions and /or stoppage of works	(i)Obtain all consents, clearances (CTE/CTO from RSPCB), permits NOCs etc. before start of construction works Ensure that all necessary approvals for construction to be obtained by contractor are in place before start of construction (ii)Following consents are required- Tree cutting-local authority Storage, handling and transport of hazardous materials- RSPCB Sand mining, quarries, borrow areas- Department of mines and Geology	PIU/Consultants in coordination of Nagar Parishad	PMU	Cost of obtaining all consents, permits, clearance, NOCs etc. prior to start of civil works responsibility of PIU.

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		Traffic diversion/road cutting-local authority, traffic police (iii)Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs etc. (intake works) (iv)Include in detailed design drawings and documents all conditions and provisions; if necessary			
Utilities	Telephone lines, electric poles and wires, water lines within proposed project area	(i) Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and (ii) Require construction contractors to prepare a contingency plan to include actions to be taken in case of unintentional interruption of services. (iii) Require contractors to prepare spoils management plan (Appendix15) and traffic management plan (Appendix 16)	DBO Contractor in collaboration with PIU and with approval of PMU	(i) List of affected utilities and operators; (ii) Bid document to include requirement for a contingency plan for service interruptions (example provision of water if disruption is more than 24 hours), spoil management plan (Appendix 15), and traffic management plan (Appendix 16)	No cost required. Mitigation measures are part of TOR of PMU, PIU and Consultant
Social and Cultural Resources	Ground disturbance can uncover and damage archaeological and historical remains	Develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognized,	DBO Contractor and PIU	Chance Finds Protocol	No cost required. Mitigation measures

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		and measures are taken to ensure they are protected and conserved.			are part of TOR of PIU and Consultant
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Disruption to traffic flow and sensitive receptors	(i) Prioritize areas within or nearest possible vacant space in the project location; (ii) If it is deemed necessary to locate elsewhere, consider sites that will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems; (iii) Do not consider residential areas; (iv) Take extreme care in selecting sites to avoid direct disposal to water body which will inconvenience the community. (v) For excess spoil disposal, ensure (a) site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, written consent from landowners (not lessees) will be obtained; (b) debris disposal site shall be at least 200 m away from surface water bodies; (c) no residential areas shall be located within 50 m downwind side of the site;	Contractor to finalize locations in consultation and approval of PIU	(i) List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas. (ii) Written consent of landowner/s (not lessee/s) for reuse of excess spoils to agricultural land	No cost required. Mitigation measures are part of TOR of PIU and Consultant and also part of contractual terms

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		and (d) site is minimum 250 m away from sensitive locations like settlements, ponds/lakes or other water bodies.			
Sources of Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution.	(i) Prioritize sites already permitted by the Department of Mines and Geology (ii) If other sites are necessary, inform construction contractor that it is their responsibility to verify the suitability of all material sources and to obtain the approval of PMU and (iii) If additional quarries will be required after construction is started, inform construction contractor to obtain a written approval from PIU.	DBO Contractor to prepare list of approved quarry sites and sources of materials with the approval of PIU	(i) List of approved quarry sites and sources of materials; (ii) Bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.	No cost required. Mitigation measures are part of TOR of PIU and Consultant and also part of contractual terms
Consents, permits, clearances, NOCs, etc.	Failure to obtain necessary consents, permits, NOCs, etc. can result to design revisions and/or stoppage of works	(i) Obtain all necessary consents (including CTE for STP from RSPCB), permits, clearance, NOCs, etc. prior to award of civil works. Following consents are required- Tree cutting- local authority Storage, handling and transport of hazardous materials- RSPCB Sand mining, quarries, borrow areas- Department of mines and Geology Traffic diversion/road cutting- local authority, traffic police	DBO Contractor and PIU and Consultant	Incorporated in final design and communicated to contractors.	No cost required. Cost of obtaining all consents, permits, clearance, NOCs, etc. prior to start of civil works responsibility of PIU. Mitigation measures are part of

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		(ii) Ensure that all necessary approvals for construction to be obtained by contractor are in place before start of construction (iii) Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc. (iv) Include in detailed design drawings and documents all conditions and provisions if necessary			TOR of PIU and Consultant
Asbestos cement (AC) pipes in existing water supply system: clearing, transfer and disposal; work in narrow streets, and interventions in existing AC pipelines	Health impacts due to air borne asbestos if handled unsafely, cut, drilled or broken into pieces	(i) Develop ACM Management Plan (AMP) that includes identification of hazards, the use of proper safety gear and disposal methods. Sample AMP is provided in Appendix 14. Adhere to the workflow process suggested in Figure 19. (ii) Conduct awareness program on safety during the construction work (iii) Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day (iv) Provide barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary	DBO Contractor/PMU	Project costs	Asbestos cement (AC) pipes in existing water supply system: clearing, transfer and disposal; work in narrow streets, and interventions in existing AC pipelines

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		entry and to avoid accidental fall into open trenches (v) Identify risk of intervention with existing AC pipes. If there is significant risk, implement the AMP strictly that includes identification of hazards, the use of proper safety gear and disposal methods. (vii) Maintain records of AC pipes as per the AMP (viii) Refer to the instructions of the Asbestos Expert			
Asbestos materials in existing PHED campus	Health impacts due to air borne asbestos if handled unsafely, cut, drilled or broken into pieces	(i) Conduct survey and inventory of existing asbestos materials on site (ii) Conduct risk assessment to determine extent of asbestos materials currently on-site (ii) Coordinate and provide support to the asbestos management service provider on the requirement of sampling, testing and disposing existing asbestos materials (iii) Ensure the selected area for temporary storage is suitable for safe storage of asbestos materials (iv) Incorporate international and national standards considered in designing the temporary storage	DBO Contractor/PMU	Project costs	Asbestos materials in existing PHED campus

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		(v) Ensure that handling and disposal of asbestos materials are carried out by specially trained service provider/s following Government of India requirements, or in their absence, internationally recognized procedures Refer to the requirements of the Asbestos Management Plan (Appendix 14) and instructions of the Asbestos Expert			
Preparation of plans and protocols	Various impacts	(i) Preparation of ACM Management Plan (ii) Prepare traffic management plan (iii) Prepare occupational health and safety plan (iv) Prepare spoils management plan	DBO Contractor and CMSC with the assistance of PMCBC (for ACM plan)	Project costs	Preparation of plans and protocols

Table 15: Environmental Management Plan of Anticipated Impacts during Construction

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

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

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		(vii) Obtain, CTE and CTO for batching plant, hot mix plant, crushers etc. if specifically established for this project. (viii) If contractor procures any material (such as ready mix concrete, asphalt/macadam, aggregates etc.,) from third party agencies, contractor shall ensure that such agencies have all necessary clearances / permissions as required under the law; these include CTE/CTO from RSPCB, environmental clearance, etc.,; contractor shall collect the copy of these certificates and submit to PIU; PIU will approve the source only after all the certificates are submitted (ix) Conduct air quality monitoring according to the Environmental Management Plan (EMP).			
Surface water quality	Works in rains/ Mobilization of settled silt materials, and chemical contamination from fuels and lubricants during installation of pipelines can contaminate nearby surface water quality.	(i) Prepare and implement a spoils management plan (ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets; (iii) Prioritize re-use of excess spoils and materials in the construction works. If spoils	Construction Contractor	(i) Areas for stockpiles, storage of fuels and lubricants and waste materials; (ii) Number of silt traps installed along trenches leading to water bodies; (iii) Records of surface water quality inspection; (iv) Effectiveness of water management measures;	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		will be disposed, consult with PIU on designated disposal areas; (iv) Inspect all the drainage at construction site/construction camp/labor camp etc. and clear all the drainage lines so that no water stagnation/flooding may occur during heavy rainfall (v) As for a possible avoid trench works and excavation works (pipe laying) during monsoon season to avoid any water logging and accident due to it (vi) If open trenches are not avoidable during monsoon, keep ready all the mitigations measures to avoid water logging such as dewatering pumps and sufficient pipes, traffic assistance, barricades etc. (vii) Inspect and verify all the emergency measures and emergency control system before start of monsoon, keep the emergency response committee on high alert during monsoon/heavy rain fall (ix) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; (x) Place storage areas for fuels and lubricants away from		(v) No visible degradation to nearby drainages, nallahs or water bodies due to civil works	

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		any drainage leading to water bodies; (xi) Dispose any wastes generated by construction activities in designated sites; and (xii) Conduct surface quality inspection according to the Environmental Management Plan (EMP).			
Noise Levels	Increase in noise level due to earth-moving and excavation equipment, and the transportation of equipment, materials, and people	(i) Plan activities in consultation with PIU/Consultant so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance; (ii) Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; (iii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and (iv) Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. (v) Periodical monitoring of noise quality as per EMP	Construction Contractor	(i) Complaints from sensitive receptors; (ii) Use of silencers in noise-producing equipment and sound barriers; (iii) Equivalent day and nighttime noise levels (see Appendix 9 of this IEE)	Cost for implementation of mitigation measures responsibility of contractor.
Landscape and	Impacts due to excess	(i) Prepare and implement	Construction	(i) Complaints from	Cost for

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
aesthetics	excavated earth, excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, and other similar items.	spoils management plan (Appendix 15); (ii) Avoid stockpiling of excess excavated soils; (iii) Coordinate with ULB/PIU for beneficial uses of excess excavated soils or immediately dispose to designated areas; (iv) Recover used oil and lubricants and reuse or remove from the sites; (v) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; (vi) Remove all wreckage, rubbish, or temporary structures which are no longer required; and (vii) Request PIU to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.	Contractor	sensitive receptors; (ii) Worksite clear of hazardous wastes such as oil/fuel (iii) Worksite clear of any excess excavated earth, excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers	implementation of mitigation measures responsibility of contractor.
Existing Infrastructure and Facilities	Disruption of service and damage to existing infrastructure at specified project location	(i) Obtain from PIU the list of affected utilities and operators if any; (ii) Prepare a contingency plan to include actions to be done in case of unintentional interruption of service	Construction Contractor	Existing Utilities Contingency Plan	Cost for implementation of mitigation measures responsibility of contractor.
Ecological Resources – Terrestrial	Loss of vegetation and tree cover	(i) Minimize removal of vegetation and disallow cutting of trees; (ii) If tree-removal will be	Construction Contractor	PIU to report in writing the no of trees cut and planted.	Cost for implementation of mitigation measures

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		required, obtain tree-cutting permit from the concerned department; and (iii) Plant three native trees for every one that is removed as per RUDSICO-EAP Circular.			responsibility of contractor.
Land use	Environmental Issues due to land use change	The impact due to change in land use will be negligible due to this project.	Not applicable	Not applicable	Not applicable
Accessibility	Traffic problems and conflicts near project locations and haul road	i) Plan water and sewer line works to minimize traffic disturbance / blockades; as the both water and sewer lines are to be laid in all the roads and streets in the town, work planning is crucial to minimize the inconvenience to public due to repeated excavations (ii) Prepare and implement a Traffic Management Plan (Appendix 16) (ii) Duly consider and select sections for trenchless method of pipelaying based on traffic conditions (iii) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites; (iv) Schedule transport and hauling activities during non-peak hours; (v) Locate entry and exit points in areas where there is low potential for traffic congestion; (vi) Keep the site free from all	Construction Contractor	(i) Traffic route during construction works including number of permanent signage, barricades and flagmen on worksite; (ii) Complaints from sensitive receptors; (iii) Number of signage placed at project location.	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		unnecessary obstructions; (vii) Drive vehicles in a considerate manner; (viii) Coordinate with Traffic Police for temporary road diversions and with for provision of traffic aids if transportation activities cannot be avoided during peak hours; (ix) Notify affected sensitive receptors 1-week in advance by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints. (x) Plan and execute the work in such a way that the period of disturbance/ loss of access is minimum. (xi) Provide pedestrian access in all the locations until normalcy is restored. Provide wooden/metal planks over the open trenches at each house to maintain the access.			
Socio-Economic – Income.	Impede the access of residents and customers to nearby shops	(i) Prepare and implement spoils management plan (Appendix 15). Contractor to Implement RP and to follow mitigation measures prescribed (ii) Leave spaces for access between mounds of soil; (ii) Provide walkways and metal sheets where required for people; (iii) Increase workforce in front	Construction Contractor	(i) Complaints from sensitive receptors; (ii) Spoils management plan (iii) Number of walkways, signage, and metal sheets placed at project location.	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		of critical areas such as institutions, place of worship, business establishment, hospitals, and schools; (iv) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and (v) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints. (vi) Notify community/ water users in advance about likely interruptions in water supply. (vii) Provide alternate sources of clean water until water supply is restored.			
Socio-Economic - Employment	Generation of temporary employment and increase in local revenue	(i) Employ local labour force, or to the maximum extent possible (ii) Comply with labor laws	Construction Contractor	(i) Employment records; (ii) Records of sources of materials (iii) Compliance to labor laws (see Appendix 11 of this IEE)	Cost for implementation of mitigation measures responsibility of contractor.
Occupational Health and Safety	Occupational hazards which can arise during work	(i) Comply with all national, state and local core labor laws (see Appendix 11 of this IEE); Following best practice health and safety guidelines: IFC's General EHS Guidelines³⁵ and Sector Specific (Water and	Construction Contractor	(i) Site-specific OH and S Plan; (ii) Equipped first-aid stations; (iii) Medical insurance coverage for workers; (iv) Number of accidents; (v) Supplies of potable drinking water;	Cost for implementation of mitigation measures responsibility of contractor.

³⁵<https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES>

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		Sanitation) Guidelines³⁶ (ii) Develop and implement site-specific occupational health and safety (OH andS) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use personal protective equipment like helmet, gumboot, safety belt, gloves, nose musk and ear plugs; (c) OH andS Training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents; (iii) Conduct work in confine spaces, trenches, and at height with suitable precautions and using standards and safe construction methods; do not adopt adhoc methods; all trenches deeper than 1.5 m shall be provided with safety shoring/braces; and avoid open cutting method for trenches deeper than 3.5 m by adopting trenchless technology (iv) Ensure that qualified first aid can be provided at all times. Equipped first-aid stations shall be easily		(vi) Clean eating areas where workers are not exposed to hazardous or noxious substances; (vii) record of H andS orientation trainings (viii) personal protective equipment; (ix) % of moving equipment outfitted with audible back-up alarms; (xi) permanent sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. (xii) Compliance to core labor laws (see Appendix 11of this IEE)	

³⁶ <https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B-%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES>

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		accessible throughout the site; (v) Provide medical insurance coverage for workers; (vi) Secure all installations from unauthorized intrusion and accident risks; (vii) The project area experiences extreme temperature during summer months of April and May, which may affect the health of workers engaged in construction work. Contractor should take necessary measures during summers including the following: (a) work schedule should be adjusted to avoid peak temperature hours (12 – 3 PM); (b) provide appropriate shade near the workplace; allow periodic resting and provide adequate water, and (c) provide necessary medicine and facilities to take care of dehydration related health issues (viii) Provide supplies of potable drinking water; (vi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances; (ix) Provide H andS orientation training to all new workers to ensure that they are apprised of the basic site rules of work			

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		at the site, personal protective protection, and preventing injuring to fellow workers; (x) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; (xi) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; (xii) Ensure moving equipment is outfitted with audible back-up alarms; (xiii) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; (xiv) Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of			

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		hearing protection shall be enforced actively. (xv) Conduct regular health check-ups for workers (xvi) Provide periodical awareness camps and special trainings for workers for health issues and risks in construction sites (xviii) Provide proper solid and liquid waste management system in workers' campsite, separate from spoils and debris disposal, as their presence can add to existing waste volume at the project sites.			
Occupational and community health and safety	Hazardous working conditions due to presence of asbestos containing material / AC Pipes in work sites: clearing, transfer and disposal; work in narrow streets, and interventions in existing AC pipelines Health impacts due to air borne asbestos if handled unsafely, cut, drilled or broken into pieces	(i) implement the ACM Management Plan (AMP) that includes identification of hazards, the use of proper safety gear and disposal methods. Sample AMP is provided in Appendix 14. Adhere to the workflow process suggested in Figure 16. (ii) Conduct awareness program on safety during the construction work (iii) Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day (iv) Provide barricades, and deploy security personnel to ensure safe movement of people and also to prevent	Construction Contractor	(i) Asbestos management plan preparation and implementation (iii) quantity and characteristics of asbestos containing material removed/handled and disposed safely	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		unnecessary entry and to avoid accidental fall into open trenches (v) Identify risk of intervention with existing AC pipes. If there is significant risk, implement the AMP strictly that includes identification of hazards, the use of proper safety gear and disposal methods. (vi) Appropriate actions as defined in the Asbestos Management Plan will have to be adhered to (vii) Maintain records of AC pipes as per the AMP			
Community Health and Safety.	Traffic accidents and vehicle collision with pedestrians during material and waste transportation	(i) Trench excavation and pipeline works shall be conducted in a safe manner; if the allowing public movement along the work sites (pedestrians or vehicles as the case may be) is likely to cause safety risks, movement should be blocked temporarily and work shall be conducted; in such areas, conducting night work or working in small stretches to avoid blockage of traffic/movement no more than few hours in due consultation with the local community and ULB shall be planned (ii) All trenches deeper than 1.5 m shall be provided with safety shoring/braces; and	Construction Contractor	(i) Traffic Management Plan; (ii) Complaints from sensitive receptors	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		avoid open cutting method for trenches deeper than 3.5 m by adopting trenchless technology (iii) Survey the surrounding vulnerable buildings for likely issues in structural stability / differential settlement during the excavation works (iv) Provide prior information to the local people about the (v) Plan routes to avoid times of peak-pedestrian activities. (vi) Liaise with PIU/ULB in identifying high-risk areas on route cards/maps. (vii) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure. (viii) Provide road signs and flag persons to warn of on-going trenching activities.			
Safety of sensitive groups (children, elders etc.) and other pedestrians in narrow streets	Trench excavation in narrow streets will pose high risk to children and elders in the locality	(i) Provide prior information to the local people about the nature and duration of work (ii) Conduct awareness program on safety during the construction work (iii) Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be	Construction Contractor	Complaints from neighborhood and monitoring of accidents	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		completed on the same day (iv) Provide barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches			
Night Works	Public inconvenience due to traffic diversion, disturbance due to excessive noise and access loss, occupational health and safety issues etc.	1. Prepare a night work protocol and obtain prior approval from PIU, and strictly implement and report on implementation of protocol during the workers; 2. Contractors should have handheld noise level meter for measurement of noise during night hours 3. Contractors should have handheld lux meter for the measurement of illumination during night hours 4. Preferably electrical connection is available for running equipment otherwise soundproof/super silent Diesel Generator set should be available 5. Sound level should not increase as prescribe by CPCB 6. Illumination should be as prescribed in protocol 7. As far as possible ready-mix concrete from batching plant to be used, otherwise the concrete should be prepared	Contractor	Night work plan / protocol submitted by contractor and approved by PIU/Consultant	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		away from residential areas and brought to the site 8. All the noisy activities like hammering, cutting, crushing, running of heavy equipment should be done in daytime and avoided in nighttime 9. Workers engaged in night works should have adequate rest/sleep in daytime before start of night works 10. Worker engaged for night works should have previous experience of night works and should be physically fit for such works including clear vision in night 11. All the necessary provisions of traffic aids such as traffic signals, road signage, barricades, cautions boards, traffic diversion boards etc. should be available with fluorescent/retro-reflective arrangements 12. Workers should be trained before start of night works about risks and hazards of night works and their mitigation measures and should be provided all the protective aids (PPEs) including fluorescent/retro-reflective vests 13. Horns should not be			

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		permitted by equipment and vehicles 14. Workers should not shout and create noise 15. First aid and emergency vehicles should be available at site 16. Emergency preparedness plan should be operative during night works 17. Old persons and pregnant women and women having small kids should not work in night-time 18. All the vehicles and equipment being used at night works should have adequate type of silencers/enclosures/mufflers to reduce noise 19. All the vehicles should be checked for working head lamps, tail lamps, inner lights etc. before start of night works 20. PIU/DSC site engineers and contractor's safety personnel should closely monitor the safety of works continuously and noise and illumination levels on hourly basis and maintain photographic and video graphic records as well as register the observations. 21. Night works should be			

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		stopped early in the morning at least one hour before start of pedestrian/traffic movement 22. After completion of night works all the site should be cleaned and maintained obstruction free for daytime movement of vehicles and pedestrians 23. Drivers and workers should be alert and responsive during night works 24. All the wages to workers working in night hours should be as per the applicable labour acts 25. Avoid any nuisance which may create problems to nearby habitants and work peacefully during night hours 26. Night works should not be conducted near hospitals and during peak seasons such as peak tourist season, students' exam times etc.			
Work in narrow streets	will pose high risk to children and elders in the locality	(i) Conduct awareness program on safety during the construction work (ii) Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day (iii) Provide barricades, and deploy security personnel			responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches (iv) Trench excavation and pipeline works shall be conducted in a safe manner; if the allowing public movement along the work sites (pedestrians or vehicles as the case may be) is likely to cause safety risks, movement should be blocked temporarily and work shall be conducted; in such areas, conducting night work or working in small stretches to avoid blockage of traffic/movement no more than few hours in due consultation with the local community and ULB shall be planned			
Construction camps and worker facilities	Temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants Unsanitary and poor living conditions for workers	(i) Consult with PIU before locating project offices, sheds, and construction plants; (ii) Minimize removal of vegetation and disallow cutting of trees; (iii) Provide drinking water, water for other uses, and sanitation facilities for employees; (iv) Provided temporary rest and eating area at all work sites (v) Ensure conditions of livability at work camps are	Construction Contractor	(i) Complaints from sensitive receptors; (ii) Drinking water and sanitation facilities for employees	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		always maintained at the highest standards possible; living quarters and construction camps shall be provided with standard materials (as far as possible to use portable ready to fit-in reusable cabins with proper ventilation); thatched huts, and facilities constructed with materials like GI sheets, tarpaulins, etc., shall not be used as accommodation for workers; accommodation shall meet the IFC standards for workers accommodation which include: provision of safe housing, availability of electricity, plumbing, water and sanitation, adequate fire protection and dormitory/room facilities; accommodation shall be in the range from 10 to 12.5 cubic meters (volume) or 4 to 5.5 square meters (surface) per worker, a minimum ceiling height of 2.10 meters; a reasonable number of workers are allowed to share the same room – (standards range from 2 to 8 workers); workers with accompanying families shall be provided with a proper and safe accommodation (vi) Train employees in the storage and handling of materials which can potentially			

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		cause soil contamination; (vii) Recover used oil and lubricants and reuse or remove from the site; (viii) Manage solid waste according to the preference hierarchy: reuse, recycling and disposal to designated areas; (ix) Ensure unauthorized persons specially children are not allowed in any worksite at any given time.			
Social and Cultural Resources	Risk of archaeological chance finds	(i) Strictly follow the protocol for chance finds in any excavation work; (ii) Create awareness among the workers, supervisors and engineers about the chance finds during excavation work (iii) Stop work immediately to allow further investigation if any finds are suspected; (iv) Inform local Archeological Department / Museum office if a find is suspected and take any action, they require to ensure its removal or protection in situ	Construction Contractor	Records of chance finds	Cost for implementation of mitigation measures responsibility of contractor.
Monsoon preparedness	Disruption of utilities and water logging in trenches	(i) As for a possible avoid trench works and excavation works (pipe laying) during monsoon season to avoid any water logging and accident due to it (ii) if open trenches are not avoidable during monsoon, keep ready all the mitigations	Construction Contractor	Monsoon preparedness plan	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		measures to avoid water logging such as dewatering pumps and sufficient pipes, traffic assistance, barricades etc. (iii) keep emergency response system ready before monsoon/heavy rain fall			
Submission of EMP implementation report	Unsatisfactory compliance to EMP	(i) Appointment of supervisor to ensure EMP implementation (ii) Timely submission of monitoring reports including pictures	Construction contractor	Availability and competency of appointed supervisor Monthly report	Cost for implementation of mitigation measures responsibility of contractor.
Post-construction clean-up	Damage due to debris, spoils, excess construction materials	(i) Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and (ii) All excavated roads shall be reinstated to original condition. (iii) All disrupted utilities restored (iv) All affected structures rehabilitated/compensated (v) The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up. (vi) All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be top soiled and re-grassed using the	Construction Contractor	PIU/Consultant report in writing that (i) worksite is restored to original conditions; (ii) camp has been vacated and restored to pre-project conditions; (iii) all construction related structures not relevant to O&M are removed; and (iv) worksite clean-up is satisfactory.	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		guidelines set out in the re-vegetation specification that forms part of this document. (vii) The contractor must arrange the cancellation of all temporary services. (viii) Request PIU to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.			

Table 16: Environmental Management Plan of Anticipated Impacts during Operation

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

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		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 (ix) Implement Emergency Response System (ERS) for the chlorine leakage; Guidelines and Emergency plan for handling and storing chlorine is attached as Appendix 18 (x) Ensure proper knowledge transfer, hands-on training to municipal staff engaged in STP operation has been provided by contractor prior to handover of facility; (xi) Operate and maintain the facility following standard operating procedures of operational manual; (xii) Undertake preventive and periodic maintenance activities as required; (xiii) Conduct periodic training to workers; ensure that all safety apparatus at STP including personal protection equipment are in good condition all times; and are at easily accessible and identifiable place; periodically check the equipment, and conduct mock drills to deal with emergency situations; (xiv) No wastewater from industrial premises (including domestic wastewater) shall be allowed to dispose into municipal sewers; monitor regularly and ensure that there is no illegal discharge through manholes or inspection chambers; conduct public awareness programs; in coordination with RSPCB:			

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		(xv) Conventional and centralized water treatment that use filtration and disinfection that inactivates disease-causing vectors (xvi) Final disinfection step considered if treatment plant technologies are not able to destroy pathogens and remove viruses (xvii) Workers should wear appropriate PPE which includes protective outerwear, gloves, boots, goggles or a face shield and a mask (xviii) Perform hand hygiene frequently, avoid touching eyes, nose, mouth with unwashed hands			
Sewerage system operation: collection and conveyance	Environmental and health issues due to operation of sewer network	(i) Establish regular maintenance program, including: • Regular cleaning of grit chambers and sewer lines to remove grease, grit, and other debris that may lead to sewer backups. Cleaning should be conducted more frequently for problem areas. • Inspection of the condition of sanitary sewer structures and identifying areas that need repair or maintenance. Items to note may include cracked/deteriorating pipes; leaking joints or seals at manhole; frequent line blockages; lines that generally flow at or near capacity; and suspected infiltration or exfiltration; and • Monitoring of sewer flow to identify potential inflows and outflows • Conduct repairs on priority based on the nature and severity of the problem. Immediate clearing of blockage or repair is warranted where an overflow is currently occurring or for urgent problems	O&M contractor for 10 years and then Nagar Palika	Sardarshahar Nagar Palika	O&M cost of contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		that may cause an imminent overflow (e.g. pump station failures, sewer line ruptures, or sewer line blockages); (ii) Review previous sewer maintenance records to help identify “hot spots” or areas with frequent maintenance problems and locations of potential system failure, and conduct preventative maintenance, rehabilitation, or replacement of lines as needed; (iii) When a spill, leak, and/or overflow occurs, keep sewage from entering the storm drain system by covering or blocking storm drain inlets or by containing and diverting the sewage away from open channels and other storm drain facilities (using sandbags, inflatable dams, etc.). Remove the sewage using vacuum equipment or use other measures to divert it back to the sanitary sewer system. (iv) Prohibit/prevent disposal of wastewater/effluent from industrial units in the sewers; ensure regular checking to ensure no illegal entry of industrial wastewater into sewers (v) Develop an Emergency Response System for the sewerage system leaks, burst and overflows, etc. (vi) Provide necessary health and safety training to the staff (vii) Provide all necessary personnel protection equipment (viii) During cleaning/clearing of manholes and sewer lines great precautions should be taken for the safety of workers conducting such works.			

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		• As far as possible use remote / CCTV mechanism to identify/detect the problems in sewers and do not engage persons for this purpose • As far as possible use mechanized cleaning of manholes and sewers by using modern techniques and machines and do not engage persons for this purpose • Ensure that maintenance staff and supervisors understand the risks; provide proper instructions, training and supervision. • Use gas detector to detect any hazardous or inflammable gas in confined areas like sewers /manholes prior to maintenance process • Provide suitable personal protective equipment that may include waterproof / abrasion-resistant gloves, footwear, eye and respiratory protection. Face visors are particularly effective against splashes. Equipment selection and a proper system for inspection and maintenance are important. • Provide adequate welfare facilities, including clean water, soap, nail brushes, disposable paper towels, and where heavy contamination is foreseeable, showers. • For remote locations portable welfare facilities should be provided. • Areas for storage of clean and contaminated equipment should be segregated and separate from eating facilities. • Provide adequate first-aid			

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		equipment, including clean water or sterile wipes for cleansing wounds, and a supply of sterile, waterproof, adhesive dressings. • Make effective arrangements for monitoring the health of staff. • Keep emergency preparedness plan ready before starting the work of sewage system cleaning			
Repair and maintenance activities of water supply and sewerage Construction disturbances, nuisances, public and worker safety,	All work sites	Implementation of dust control, noise control, traffic management, and safety measures. Site inspection checklist to review implementation is appended at Appendix 22.	O&M contractor for 10 years and then Nagar Palika	Banswara Nagar Palika	O&M cost of contractor
Asset management	Reduction in NRW Increased efficiency of the system	Preparation and implementation of O&M Manual	O&M contractor for 10 years and then Nagar Palika	Banswara Nagar Palika	O&M cost of contractor

Table 17: Environmental Monitoring Plan of Anticipated Impacts during Construction

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Construction disturbances, nuisances, public & worker safety,	All work sites	Implementation of dust control, noise control, traffic management, & safety measures. Site inspection checklist to review implementation is appended at Appendix 22	Weekly during construction	Supervising staff and safeguards specialist	No costs required
Tree cutting and plantation	STP, SPS, WTP and pipe laying sites	Obtain permission from concerned authority for any tree cutting and plant trees in the ratio of 1:3 as per RUIDP Circular	Weekly during construction	Supervising staff and safeguards specialist	Contractors cost

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Ambient air quality	6 locations (STP, SPS, WTP-PHED and Kagdi Pick up pipe laying, construction camps and workers camp)	PM ₁₀ , PM _{2.5} , NO ₂ , SO ₂ , CO	Quarterly except in Monsoon season	Contractor	Cost for implementation of monitoring measures responsibility of contractor (As per Table 22)
Ambient noise	6 locations (STP, SPS, WTP-PHED and Kagdi Pick Up, pipe laying, construction camps and workers camp)	Day time and night time noise levels	Quarterly except in Monsoon season	Contractor	Cost for implementation of monitoring measures responsibility of contractor (As per Table 22)
Soil quality	5 locations (STP, SPS, WTP PHED, construction camps, workers camps)	pH, Elect. Conductivity (at 250C), Moisture (at 1050C), Texture (silt, clay, sand), Calcium (as CaO), Magnesium (as Mg), Permeability, Nitrogen (as N), Sodium (as Na), Phosphate (as PO ₄), Potassium (as K), Organic Matter, oil and grease	Quarterly except in Monsoon season	Contractor	Cost for implementation of monitoring measures responsibility of contractor (As per Table 22)
Ground Water Quality	03 locations (STP, WTP & Construction camp/storage yards)	pH, TDS, Total Hardness, Zn, Chloride, Iron, Copper, DO, Manganese, Sulphate, Nitrate, Fluoride, Hg, Cadmium, Cr ⁺⁶ , Arsenic, Lead, Total Alkalinity, Phosphate, Phenolic compound	Quarterly	Contractor	Cost for implementation of monitoring measures responsibility of contractor (As per Table 22)
Surface water quality	02(intake sites, Kagdi Pick up)	pH, Turbidity, Total Hardness, DO, BOD, COD, Chloride, Hg, Iron, TDS, TSS, Calcium, Zn, Cr ⁺⁶ , Magnesium, Copper, Manganese, Sulphate, Cyanide, Nitrate,	Quarterly except in Monsoon season	Contractor	Cost for implementation of monitoring measures

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
		Sodium, Potassium, Fluoride, Cadmium, Arsenic, Lead, Boron, Selenium, Aluminium, Total residual Chlorine			responsibility of contractor (As per Table 22)

Table 18: Environmental Monitoring Plan of Anticipated Impacts during Operation

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Monitoring of raw wastewater quality	Inlet of the STP	Suspended solids, pH, Temperature Oil and grease, Total residual chlorine, Ammonical nitrogen (as N), BOD, COD, Nitrate Nitrogen The values should be within the limit specified by CPCB to discharge into municipal sewers (see Appendix 7)	Monthly once	O&M contractor for 10 years and then Nagar Parishad	Nagar Parishad, Banswara
Sewer network to sustain operational efficiency and avoid clogging and early occurrence of leakages	Sewer network	to be included in the O&M plan prepared under the project	as per O&M plan	O&M contractor for 10 years and then Nagar Parishad	Nagar Parishad, Banswara
Consent to operate (CTO) from RPCB	STP	CTO should be renewed before expired	5 yearly	Nagar Parishad, Banswara	Nagar Parishad, Banswara
Sludge quality (STP) and suitability as manure	Dried sludge	Analysis for concentration of heavy metals and confirm that value are within the following limits (all units are in mg/kg dry basis except pH) • Arsenic - 10.00 • Cadmium - 5.00 • Chromium - 50.00 • Copper- 300.00	Yearly twice	O&M contractor for 10 years and then Nagar Parishad	Nagar Parishad, Banswara

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
		• Lead - 100.00 • Mercury- 0.15 • Nickel - 50.00 • Zinc- 1000.00 • PH - 5.5-8.5			
De-sludging of sludge beds to avoid sedimentation and ensure efficient collection and storage of wastewater	Sludge beds	to be included in O&M plan prepared under the project	as per O&M plan	O&M contractor for 10 years and then Nagar Parishad	Nagar Parishad, Banswara
Monitoring of quality of water supplied to consumers	Consumer end-random sampling in all zones	pH, Nitrite, Nitrate, Turbidity BOD, Total Alkalinity, Total coliform and Faecal coliform	Monthly once	O&M contractor for 10 years and then Nagar Parishad	Nagar Parishad, Banswara

B. Institutional Arrangements

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

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

234. The PMU shall be supported by the Project Management and Capacity Building Consultants (PMCBC). The PMCBC shall manage preparation/vetting design documents, tendering of contracts, implementation of resettlement, environmental management and gender action plans; setting and managing project performance monitoring systems, planning and managing implementation of training and capacity building as well as institutional strengthening activities besides preparing reports as per ADB requirements. PMCBC shall engage a social safeguard specialist and environmental safeguard specialist at the PMU level for managing all social and environmental safeguard related support services as envisaged in its scope of work. They will be assisted by concerned field level safeguard support staffs of CMSCs and PIU.

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

- (i) **Environment Specialist Consultant.** Responsibilities include the review and refinement of the IEEs and the EMPs and ensure inclusion in the bid documents and during construction, monitor the implementation of the EMPs and support in the reporting and documentation requirements;
- (ii) **Asbestos Management Specialist.** Provides training and awareness on the risks and safe handling and management of asbestos-containing materials (ACMs) and to coordinate with the Asbestos Management Service Provider in the implementation of the Asbestos Management;
- (iii) **Heritage Management Specialist.** Provides guidance on the ADB SPS, 2009 requirement on Physical Cultural Resources in the RSTDSP towns including the conduct of Heritage Impact Assessment, provides support on the statutory clearances to be obtained and the documentation and reporting on the implementation of mitigation measures;
- (iv) **Biodiversity Expert.** Provides guidance on the ADB SPS, 2009 requirement on Biodiversity Conservation and Critical Habitat Assessment including the conduct preliminary screening (e.g. IBAT assessment reports), on-site verifications and consultations, recommend specific measures and provide supervisor support during the planning and construction periods; and

- (v) **Architect.** Assists the team leader and structural expert for review and approval of all drawings from architectural and heritage perspective; review and approve the detailed architectural drawings prepared by the contractor and promptly address ant site-specific issues regarding architectural and heritage aspects.

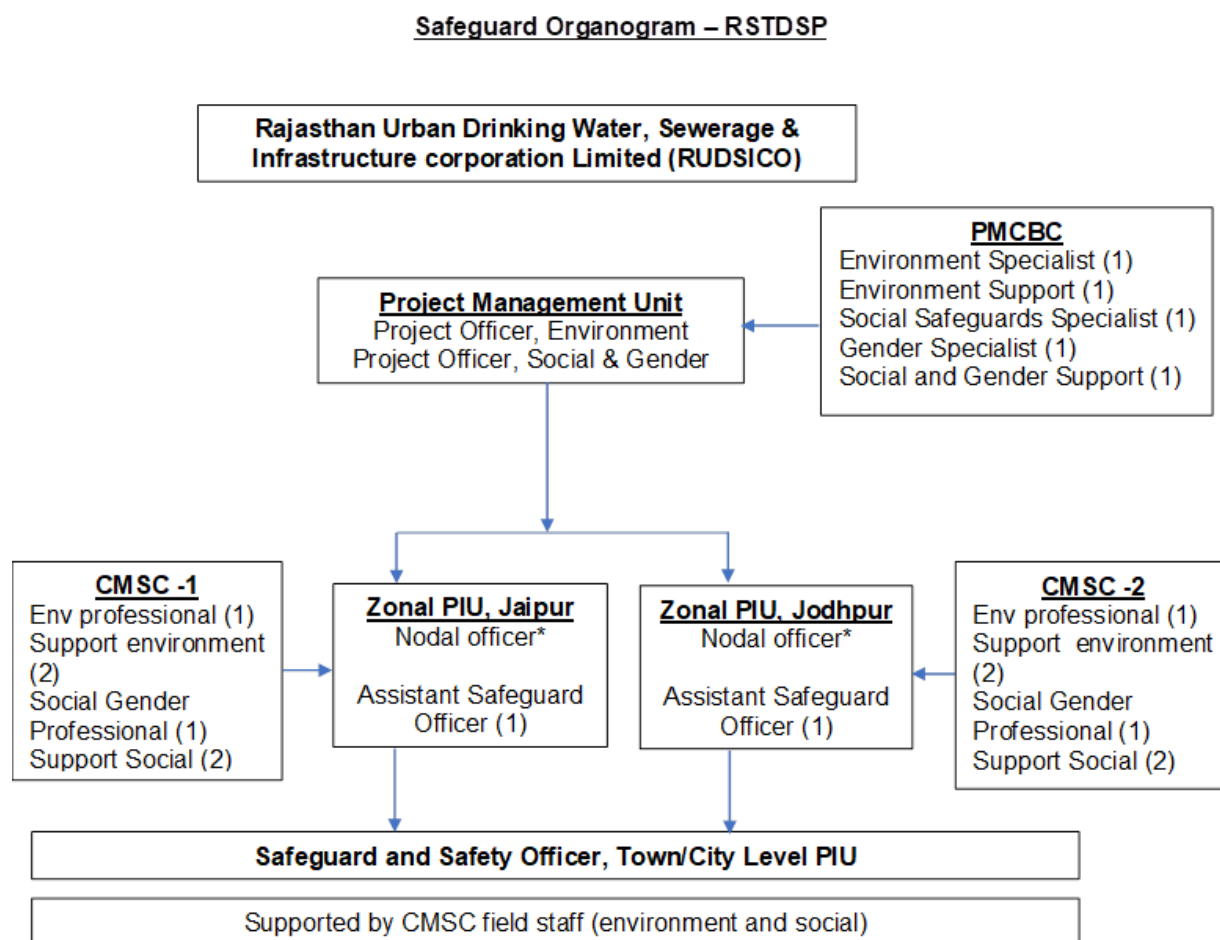
236. There will be two zonal PIUs and a PIU at every town. PIUs at the town-level shall be headed by a Superintending Engineer / Executive Engineer, who shall work as Project Manager and shall sign the contract documents, manage the contract and disburse payments as Drawing and Disbursing Officer.

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

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

239. Table 19 to 20 summarize the institutional responsibility of environmental safeguards implementation at all stages of the project.

Figure 16: Safeguards Implementation - RSTDSP



Zonal PIU will be led by a nodal officer of the rank of assistant chief engineer who will also be the nodal person for safeguards and gender compliances in project implementation by town level PIUs. S/he will be supported by ASO in execution of these responsibilities.

240. **Project Management Unit.** RUDSICO will establish a state-level PMU, headed by dedicated project director, and housed in EAP division of RUDSICO. For the purpose of project implementation, 2 Zonal project implementation units (Zonal PIUs), at Jaipur and Jodhpur, headed by additional chief engineers (ACE) will be established. At PMU, there will be two dedicated project officers (i) project officer (Environment) and (ii) project officer (Social and Gender), who will be responsible for compliance with the environmental, social safeguards and gender in program implementation. Key responsibilities of the project officer (Environment) are as follows:

- (i) Review REA checklists and assign categorization based on ADB SPS, 2009 and EARF;
- (ii) Submit IEE to ADB for approval and disclosure in ADB website;
- (iii) Ensure approved IEEs are disclosed in RSTDSP/PMU websites and summary posted in public areas accessible and understandable by local people;
- (iv) Ensure EMPs are included in the bid documents and contracts;

- (v) Organize an orientation workshop for PMU, PIU, ULB and all staff involved in the project implementation on (a) ADB SPS, 2009; (b) Government of India national, state and local environmental laws and regulations; (c) core labor standards; (d) OHS; and (e) EMP implementation especially spoil management, working in congested areas, public relations and ongoing consultations, grievance redress, etc.;
- (vi) Assist in addressing any grievances brought about through the GRM;
- (vii) Organize an induction course for the training of contractors preparing them on EMP implementation, environmental monitoring requirements related to mitigation measures; and taking immediate actions to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation;
- (viii) Ensure compliance with all government rules and regulations regarding site and environmental clearances as well as any other environmental requirements;
- (ix) Assist PMU, PIUs, and project consultants to document and develop good practice construction guidelines to assist the contractors in implementing the provisions of IEE and EMP;
- (x) Assist in the review of the contractors' implementation plans to ensure compliance with the IEE;
- (xi) Review monthly monitoring reports submitted by PIUs, and prepare and submit to ADB semi-annual monitoring reports;
- (xii) If necessary, prepare corrective action plan and ensure implementation of corrective actions to ensure no environmental impacts;
- (xiii) Review and submit corrective action plans to ADB;
- (xiv) Coordinate with national and state level government agencies; and
- (xv) Coordinate PIUs, consultants and contractors on mitigation measures involving the community and affected persons and ensure that environmental concerns and suggestions are incorporated and implemented.

241. The PMU will be supported by 3 institutional consultants under the supervision and control of PD, PMU: (i) the project management and capacity building consultants (PMCBC) will support the PMU; (ii) 2 CMSC will support the 2 zonal PIUs and town-level PIUs; and (iii) CAPPC, will support the zonal PIUs and town-level PIUs.

242. **Zonal Project implementation units (Zonal PIUs).** There will be 2 zonal level PIUs at Jaipur and Jodhpur. Under each zonal PIU, there will be city/town level PIUs, for ease of day-to-day monitoring and management at local level. The additional chief engineer at each Zonal PIU will serve as the Nodal Officer, Safeguards and Gender. Each Zonal PIU will be staffed with an assistant safeguardsofficer (ASO Environmental and SocialSafeguards) who will assist PMU project officer (environment/social) in implementation of the environmental/social safeguards and GESI action plan in PIUs under its jurisdiction. Zonal PIUs will undertake internal monitoring and supervision and record observations throughout the project period to ensure that the safeguards and mitigation measures are provided as intended.

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

- (i) Coordinate updating/revision of IEEs updated based on detailed design and technical studies (asbestos management, heritage impact assessment, and/or biodiversity assessment);

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

244. Town/City Level Project Implementation Unit. The town-level PIUs shall be responsible for the quality of works executed under the project and will be guided by the zonal PIUs. The city/town PIUs will be responsible for implementation of the IEE. The town-level PIUs will be headed by a project manager (executive engineer or assistant engineer) and supported by CMSC field staff. Environment specialist of CMSC will assist PIU in implementation of environmental safeguard. At each PIU, the Assistant Project Manager will be given additional responsibilities of safeguard tasks and will be designated as safeguard and safety officer (SSO). The SSO will be assisted by the social and gender specialist and environment specialist of CMSC in reviewing updated/revised IEEs, etc. They will also be responsible for coordination of field level activities related to safeguards conducted by the DBO contractor and CMSC. Key responsibilities of the town-level environment specialist are as follows:

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

- (xi) Issue clearance for contractor's post-construction activities as specified in the EMP.

245. Contractors. The contractor will be required to update the IEE and will be responsible for providing final design (including pipe alignments) to the supervision consultant for finalization/updating of resettlement plan. The contractor shall appoint an environment, health and safety (EHS) engineer who will be responsible on a day-to-day basis for (i) ensuring implementation of EMP, (ii) coordinating with the town-level PIUs and environment specialists of project consultant teams; (iii) community liaison,³⁷ consultations with interested/affected people, (iv) field-level grievance redress; and (iv) reporting.

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

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

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

Table 19: Safeguards Management Roles and Responsibilities

Implementation Arrangements	Roles and Responsibilities
Executing Agency: LSGD through RUDSICO	• Negotiate, sign, and execute the program. • Allocate and release government counterpart funds on time. • Facilitate obtaining timely Government-level approvals for smooth implementation of the program. • Monitor program implementation progress and ensure timely actions for completion of the project. • Plan, implement, and monitor public relations activities; gender mainstreaming initiatives and community participation activities, with the support of PIUs.

³⁷ Reasonable size social outreach team (SOT) to be appointed by contractor to facilitate community liaison, consultations and R&R implementation (including resolution of grievances). Requirement of SOT will be included in bid document.

Implementation Arrangements	Roles and Responsibilities
RUDSICO Board (like SLEC) Chairman: Minister of Urban Development Department, GOR Members: • Hon'ble Minister, LSGD • Secretary, LSGD – Vice Chairman • Principal Secretary, PHED -Director • Principal Secretary, PWD -Director • Secretary, Finance (Budget) Department - Director • Director, Department of Local Bodies • Executive Director, RUDSICO • Project Director, RUDSICO • Independent Director • Independent Director	• Provide strategic guidance. • Provide policy decisions to support smooth program implementation. • Facilitate inter-departmental coordination and cooperation. • Support RUDSICO with government/ministerial level approvals. • Overall project review (physical, financial, safeguards) • Approvals/Decisions as per approved SOP (Standard Operating Procedures – laying delegation of powers, Administrative and Financial Approval of works and services).
RUDSICO (with approval of RUDSICO board, as needed)	• Required support to review and monitor the physical and financial progress of the subprojects. • Provide additional technical support from RUDSICO Office (along with PMCBC) to PIUs for speedy resolution of implementation related issues such as variations, deviations, time and cost control, among others. • Provide backup technical support for review and finalization of DPRs, bid documents, bidding and award of contracts. • Review, appraise and put up matters to RUDSICO Board for approval, as described under “Delegation of Powers” • Overall Liaison, Monitoring and Reporting to DEA and ADB as per agreed requirements • Pursue GOR, through LSGD for approval of Policy, Rules, Guidelines, Government Orders for use in the state
Program Management Unit • Program Director: Project Director, RUDSICO • Additional Project Director, RUDSICO • PMU Staff • 2 Zonal Additional Chief Engineers (Jaipur and Jodhpur). The Office of ACE to have Two EE, Two AE, Computer Operator, Support staff • Dy. PD(T) (Procurement, Tendering, Contracts,	• Program and Financial Management • Overall responsibility of the investment program and financial management and administering program procedures and guidelines. • Oversee design of all projects (in individual tranches as needed). • Finalize the DPRs for ULBs/implementing agencies and obtain approval from ADB and government. • Establish project management and monitoring systems (Command and Control Center) • Undertake project appraisals based on technical, financial, economic and safeguards compliance as agreed by GOR/RUDSICO and ADB. • Provide overall technical and implementation guidance to the PIUs as required. • Facilitate approval of various implementation related requests from the Project Implementation management and Field Units

Implementation Arrangements	Roles and Responsibilities
Consultancies) at RUDSICO HQ • Dy. PD(A) (Administration, Institutional) at RUDSICO HQ • SE's (Asset Management, NRW, Safeguards, Resettlement) at RUDSICO HQ • Financial Advisor at RUDSICO, Jaipur HQ • Senior Accounts Officer at RUDSICO, Jaipur HQ PMU at HO supported by: • Project Officers (7 Nos. EE level with POs for Procurement and contracts; NRW Reduction; Contract Management and O&M, Social Safeguards, Environmental Safeguards, Capacity Building etc.) • Accounts officers • Assistant Project Officers – on each with PO – AE level, Assistant Account Officer • IT Cell (project Management and Monitoring, GIS, MIS etc.) with MIS Expert • Statistical Unit • Legal Unit • Administration and Establishment	• Sign key documents including withdrawal applications and audit reports. • Timely submission of any withdrawal applications. • Act as focal point for communication with the ADB. • Ensure compliance with loan covenants, ADB's guidelines, procedures and policies. • Facilitate ADB program review missions. • Represent the program at Tripartite Review Meetings. • Safeguards compliance • Review and monitor safeguards compliance by PIUs and support corrective actions as necessary. • Submit semi-annual safeguard monitoring reports to ADB • Guide PIUs as and when necessary on safeguards compliance, and arrange capacity building for PIUs Capacity Building and Institutional • Allocate funds for capacity building and arrange required disbursements • Approve and Monitor Capacity Building Plan • Pursue reforms with GOR • Supervise and Monitor PMCB Consultants and approve their invoices.
Project Implementation Units • 2 zonal PIUs (1 in Jaipur, 1 in Jodhpur) • PIU Staff • Project Manager (SE level) • Executive Engineer / Assistant Engineer (2 or 3) at each town for monitoring and supervision support • Assistant Accounts Officer • Computer Operator • Support Staff Supported by • Contract Management Officer (SE/EE of cluster shall invariably function as	Project Management • Responsible for implementation management of sub-projects. • Responsible for day-to-day implementation, monitoring and reporting. • Safeguards Compliance (with CAPPC) • Ensure compliance with safeguard frameworks and plans • Facilitate consultation with stakeholders and disclose program information in consultation with PMU. • Address grievances (may be through Grievance Redressal Mechanism) Coordinate land acquisition actions, if required. • Submit quarterly safeguard monitoring reports to PMU. • Advance Project Preparation • Prepare/supervise and monitor preparation of DPRs and bidding documents for future tranches.

Implementation Arrangements	Roles and Responsibilities
contract management officer) - No new position – • CMSC and CAPP Consultants (2 support engineers of CMSC at each town as per CMSC consultancy, 2 community mobilizers for each town – as per CAPP consultancy) besides required consultancy professionals reporting to EE)	
ULBs	• Nodal Officers to be a part of PIU and discharge the assigned functions and part of project planning and implementation • Establish liaison with local communities, resolve local grievances for smooth implementation of the project • Support CAPPC in awareness creation, connection modalities to household consumers etc.
Asian Development Bank	• Approve and monitor safeguards documents and implementation compliance. • Field review missions. • Facilitate knowledge sharing. • Provide training in program management and ADB procurement procedures to PMU/PIU staff. • Support LSGD, RUDSICO, PIUs etc. through various capacity building activities.

Table 20: Institutional Roles and Responsibilities for Environmental Safeguards Implementation

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

Responsible Agency	Responsibility		
	Pre-Construction Stage	Construction Stage	Post-Construction
	project implementation on (a) ADB SPS, (b) Government of India national, state, and local environmental laws and regulations, (c) core labor standards, (d) OH&S, (e) EMP implementation especially spoil management, working in congested areas, public relations and ongoing consultations, grievance redress, etc. (vii) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs (viii) Organize an induction course for the training of contractors preparing them on EMP implementation, environmental monitoring requirements related to mitigation measures; and taking immediate actions to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation. (ix) Ensure compliance with all government rules and regulations regarding site and environmental clearances as well as any other environmental requirements (x) Assist PMU, PIUs, and project NGOs to document and develop good practice construction guidelines to assist the contractors in implementing the provisions of IEE. (xi) Assist in the review of the contractors' implementation plans to ensure compliance with the IEE.	(iv) Organize capacity building programs on environmental safeguards (iv) Coordinate with national and state level government agencies (vi) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs (ix) Coordinate PIUs, consultants and contractors on mitigation measures involving the community and affected persons and ensure that environmental concerns and suggestions are incorporated and implemented	
PIU, Assistant Safeguard Officer	(i) Ensure IEE is included in bid documents and contract agreements. Ensure cost of	(i) oversee day-to-day implementation of EMPs by contractors, including compliance with all	(i) Conducting environmental monitoring, as specified in the EMP.

Responsible Agency	Responsibility		
	Pre-Construction Stage	Construction Stage	Post-Construction
	EMP implementation is provided. (iv) Disclose of approved EIAs/IEEs. (v) Obtain all necessary clearances, permits, consents, NOCs, etc. Ensure compliance to the provisions and conditions. (vi) EMP implementation regarding sites for disposal of wastes, camps, storage areas, quarry sites, etc. (vii) Organize an induction course for the training of contractors, preparing them on EMP implementation, environmental monitoring requirements related to mitigation measures, and on taking immediate action to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation.	government rules and regulations. (ii) take necessary action for obtaining rights of way; (iii) oversee implementation of EMPs, including environmental monitoring by contractors; (iv) take corrective actions when necessary to ensure no environmental impacts; (v) submit monthly environmental monitoring reports to PMU, (vi) conduct continuous public consultation and awareness; (vii) address any grievances brought about through the grievance redress mechanism in a timely manner as per the IEEs; and	(ii) Issuance of clearance for contractor's post-construction activities as specified in the EMP.
Consultant – 1.PMCBC-Environmental Safeguard Specialist – 1 no. Asbestos Expert – 1no. Heritage Expert – 1no. Biodiversity Expert – 1no.	(i) Review IEE/EMP submitted by CMSC and revise report to submit to PMU (ii) Assist PMU and PIU in obtaining all necessary clearances, permits, consents, NOCs, etc. Ensure provisions and conditions are incorporated in the IEE and detailed design documents. (iii) Assist in ensuring IEE is included in bid documents and contract agreements. (iv) Assist in determining adequacy of cost for EMP implementation. (v) Assist in addressing any concern related to IEE and EMP. (vi). Conduct specific assessment requirements	(i) Monitor EMP implementation (ii) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs.	
Consultant- 2. CMSC- 2 nos. Environmental safeguards professional	(i) Update initial environmental assessment for proposed project using REA checklists and submit to PIU/PMCBC	Monitoring of Implementation of EMP at site by contractor Recommend corrective action measures for non-compliance by contractors	(i) Assist in the inspection and verification of contractor's post-construction activities.

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

C. Capacity Building and Development

249. Executing and implementing agencies need to have a sustained capacity to manage and monitor environmental safeguards. Although specialist consultants support will be available to PMU and PIUs, it is necessary to mainstream safeguards in day-to-day working. Therefore, PMU and PIUs require capacity building measures for (i) a better understanding of the project-related environmental issues; and (ii) to strengthen their role in preparation of IEE, implementation of

mitigation measures, and subsequent monitoring. Trainings and awareness workshops are included in the project with the primary focus of enabling the PMU and PIU staff to understand impact assessments and carry out environmental monitoring and implement EMPs. After participating in such activities, the participants will be able to review environmental assessments, conduct monitoring of EMPs, understand government and ADB requirements for environmental assessment, management, and monitoring (short- and long-term), and incorporate environmental features into future project designs, specifications, and tender documents and carry out necessary checks and balances during project implementation.

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

251. Typical modules would be as follows: (i) sensitization; (ii) introduction to environment and environmental considerations in water supply and wastewater projects; (iii) review of IEEs and integration into the project detailed design; (iv) improved coordination within nodal departments; and (v) monitoring and reporting system. Specific modules customized for the available skill set will be devised after assessing the capabilities of the target participants and the requirements of the project. The contractors will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites. The proposed training project, along with the frequency of sessions, is presented in Table 21.

Table 21: Capacity Building Program on EMP Implementation

Sl. No.	Description	Target Participants and Venue	Cost and Source of Funds
1	Introduction and Sensitization to Environmental Issues (1 day) - ADB Safeguards Policy Statement -EARF of RSTDSP -Government of India and Rajasthan applicable safeguard laws, regulations and policies including but not limited to core labor standards, OH&S, etc. -Incorporation of EMP into the project design and contracts -Monitoring, reporting and corrective action planning	All staff, ULBs and consultants involved in the project At PMU, Jaipur	PMU cost
2	Treated Effluent Reuse Concepts, Design and Management	All staff at PMU and ULBs	PMU cost
3	Sludge Reuse Concept, Design and Management	All staff at PMU and ULBs	PMU cost
4	EMP implementation (2 days) -Roles and responsibilities -OH&S planning and implementation -Wastes management (water, hazardous, solid, excess construction materials, spoils, etc.) -Working in congested areas, - Public relations - Consultations - Grievance redress -Monitoring and corrective action planning -Reporting and disclosure -Post-construction planning	All staff and consultants involved in the subproject All contractors before start of construction works At PIU	PMU cost

Sl. No.	Description	Target Participants and Venue	Cost and Source of Funds
5	Plans and Protocols (1 day) -Construction site standard operating procedures (SOP) - Asbestos Management Plan -Heritage Impact Assessment -Biodiversity and Critical Habitat Assessment - Site-specific EMP -Traffic management plan -Spoils management plan -Waste management plan - Chance find protocol - O&M plans - Post-construction plan	All staff and consultants involved in the project All contractors before start of construction worksor during mobilization stage. At PIU	PMU cost Contractors cost as compliance to contract provisions on EMP implementation
6	Experiences and best practices sharing - Experiences on EMP implementation - Issues and challenges - Best practices followed	All staff and consultants involved in the project All contractors All NGOs At PMU Jaipur	PMU Cost
7	Contractors Orientation to Workers on EMP implementation (OH&S, core labor laws, spoils management, etc.)	All workers (including manual laborers) of the contractor prior to dispatch to worksite	Contractors cost as compliance to contract provisions on EMP implementation

D. Monitoring and Reporting

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

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

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

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

256. The PMU will include safeguards implementation status in the quarterly progress report (QPR) and separate semi-annual environmental and social safeguards monitoring reports to ADB, which will be reviewed and disclosed on ADB's website. The monitoring reports will be prepared by PMU with assistance from the PMU-consultant and inputs from the PIU's safeguard officers, contractors and NGOs, where relevant. The status of safeguard implementation, issues, and corrective actions including associated cost and schedule are to be clearly reported to ADB. The status of safeguards implementation will also be discussed at each ADB review mission and with necessary issues and agreed actions recorded in Aide Memoires. ADB will also carry out annual

environmental and/or social (including gender) reviews of the Project. The outline of the semi-annual environmental monitoring report is in Appendix 23. ADB's monitoring and supervision activities are carried out on an ongoing basis until a project completion report (PCR) is issued. Thus, semi-annual report, which may cover O&M of completed packages, will be submitted to ADB until PCR is issued.

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

E. EMP Implementation Cost

258. Most of the mitigation measures require the contractors to adopt good site practice, which are part of their normal procedures. Mitigation that is the responsibility of PIU/ULB will be provided as part of their management of the project. Cost for the capacity building program is included as part of the project. Cost of environmental management are given in Table 22.

Table 22: Cost Estimates to Implement the EMP

	Particulars	Stages	Unit	Total Number	Rate (INR)	Cost (INR)	Costs Covered By
A.	Mitigation Measures						
1	Compensatory plantation measures	Construction	Per tree	60*	1992	119520	Contractor
	Subtotal (A)					119520	
B.	Monitoring Measures**						
1	Air quality monitoring	Pre-construction	per sample	8	4920	39360	Contractor
2	Noise levels monitoring	Pre-Construction	Per sample	8	1980	15840	Contractor
3	Ground Water Quality	Pre-Construction	Per sample	5	6720	33600	Contractor
4	Surface Water Quality	Pre-Construction	Per sample	1	6720	6720	Contractor
5	Soil Quality	Pre-construction	Per sample	5	5880	29400	Contractor
6	Air quality monitoring	Construction (six monthly)	per sample	88	4920	432960	Contractor
7	Noise levels monitoring	Construction (six monthly)	Per sample	88	1980	174240	Contractor
8	Surface water quality	Construction (six monthly)	per sample	11	6720	73920	Contractor
9	Ground water quality	Construction (six monthly)	per sample	55	6720	369600	Contractor
10	Soil quality	Construction (six monthly)	per sample	55	5880	323400	Contractor
	Subtotal (B)					1499040	
C.	Capacity Building						

	Particulars	Stages	Unit	Total Number	Rate (INR)	Cost (INR)	Costs Covered By
1.	Introduction and sensitization to environment issues	Pre-construction	lump sum			100,000	PMU
2.	EMP implementation	Construction	lump sum			50,000	PMU
3.	Plans and Protocols	Construction	lump sum			25,000	PMU
			lump sum			25,000	Contractor
4.	Experiences and best practices sharing	Construction/ Post-Construction	lump sum			100,000	PMU
5.	Contractors Orientation to Workers on EMP implementation	Prior to dispatch to worksite	Lump sum			25,000	Contractor
	Subtotal (C)					325,000	
D	Civil Works						
1	Water Sprinkling for dust suppression	Construction	KL	15000	111	1665000.00	Contractor
2	Rain Water Harvesting for water conservation	Construction	Nos.	2	Lump Sum	2000000.00	Contractor
3	Barricading						Contractor
	Water Supply						
	Barricading with wooden railing	Construction	Mtr	248935	84	20910540	
	Sewerage						
	With wooden railing	Construction	Mtr	242555.6	84	20374670	
	MS Pole	Construction	Mtr	103952.4	38.5	4002167	
	Railing with nut and bolt	Construction	SQM	103952.4	96.50	10031406	
	Sub Total (D)					58983804	
E	Asbestos Management	Inventory Testing Overall Supervision for Asbestos Removal Storage Transportation Disposal / Treatment Documentation and Reporting			Lump sum	7,000,000	Civil works contract under DBO Contractor
	Sub Total (E)					7,000,000	
F	Grievance Redressal Mechanism				Lump sum	350,000	Civil works contract under DBO Contractor

	Particulars	Stages	Unit	Total Number	Rate (INR)	Cost (INR)	Costs Covered By
	Sub Total (F)					350,000	
	Total (A+B+C+D+E+F)				INR	67,927,345	

* In preliminary design about 20 trees are estimated to be cut for WTP work, for which 60 trees will required to be planted (as per Compensatory policy),being DBO contract, contractor will be required to revise above table. Tree cutting and utility shifting will be minimized through design alternatives for SPS. Contractor will revisit all sites including SPS& STP sites and ascertain the tree cutting/ utility shifting required.

**Monitoring for ambient air, noise, water and soil as per Appendix 24.

X. CONCLUSION AND RECOMMENDATION

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

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

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

of blockages in the sewers are included in the project. At STP, incoming sewage will be treated to meet standards and reused for agriculture and other gainful purposes by Municipal Council otherwise disposed into nearby nallah. Anticipated impacts during operation of STP will be related to drop in treatment efficiency. This may result from - change in incoming sewage quality, power supply outage or malfunction of units. These are, however, likely to be minimal, as sewer system will receive only domestic wastewater, there will be a backup power facility, and maintenance will be as per the standard procedures.

262. At the STP sewage sludge will be removed continuously from reactors, and solidified using decanter, and stored in sludge drying beds for a period of seven days. The treatment and drying processes kill enteric bacteria and pathogens. Because of its high content of nitrates, phosphates and other plant nutrients the sludge can be used as organic fertilizer.

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

264. The EMP will assist the PMU, PIU, Consultant and contractors in mitigating the environmental impacts, and guide them in the environmentally sound execution of the proposed project. The EMP will also ensure efficient lines of communication between PIU/ULB, PMU, consultants and contractor. A copy of the EMP shall be kept on-site during the construction period at all times. The EMP shall be made binding on all contractors operating on the site, and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document shall constitute a failure in compliance.

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

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

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

- (i) Obtain all statutory clearances at the earliest time possible and ensure conditions/provisions are incorporated in the detailed design;
- (ii) Include this IEE in bid and contract documents;
- (iii) Update and implement the asbestos management plan per site-specific conditions;
- (iv) Update and implement the recommendations from the biodiversity assessment report;
- (v) Secure permits for the abstraction of groundwater from additional wells;
- (vi) Update/revise this IEE based on detailed design and/or if there are unanticipated impacts, change in scope, alignment, or location;
- (vii) Conduct safeguards induction to the contractor upon award of contract;
- (viii) Ensure that sludge management protocols are compliant with environmental regulations (Solid Waste Management Rules, 2000 and amendment) and solid waste disposal should have a designated site (dumping on vacant lot is not allowed);

- (ix) Strictly supervise EMP implementation;
- (x) Ensure contractor appointed qualified EHS officers prior to start of works;
- (xi) Documentation and reporting on a regular basis as indicated in the IEE;
- (xii) Continuous consultations with stakeholders;
- (xiii) Timely disclosure of information and establishment of grievance redressal mechanism (GRM);
- (xiv) Involvement of contractors, including subcontractors, in first level GRM; and
- (xv) Commitment from PMU, PIUs, project consultants, and contractors to protect the environment and the people from any impact during project implementation.

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

Appendix 1: REA Check list

Sewerage Treatment

Instructions:

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

This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development.

Answer the questions assuming the “without mitigation” case. The purpose is to identify potential impacts. Use the “remarks” section to discuss any anticipated mitigation measures.

Country/Project Title: India/Water supply and Sewerage Project in Banswara Town, Rajasthan

Sector Division: Urban Development

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

SCREENING QUESTIONS	Yes	No	REMARKS
Impairment of historical/cultural monuments/areas and loss/damage to these sites?		√	Not applicable.
Interference with other utilities and blocking of access to buildings; nuisance to neighboring areas due to noise, smell, and influx of insects, rodents, etc.?	√		Anticipated during construction and operations but can be avoided and mitigated. Sewage treatment plants' design include considerations to minimize, if not reduce, the nuisance to the nearby communities and comply with noise and odor standards. During construction, sewers will be laid underground and may interfere temporarily with access and other utilities. Coordination with the concerned agencies will be conducted in finalizing alignment and shifting of utilities, if necessary.
dislocation or involuntary resettlement of people		√	Not anticipated. Project does not involve any land acquisition. A Resettlement Plan will be prepared if there are any involuntary resettlement.
disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	Not anticipated. Contractors shall prioritize hiring local labor force. Some of the skilled workers may be brought from outside but numbers should not be so large to have impacts on social services.
Impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage?		√	Not anticipated. Treated effluents from the STP will be utilized in agriculture or similar uses and comply with the State's Reuse policy.
Overflows and flooding of neighboring properties with raw sewage?		√	Not anticipated. Risks, climate change factors and forecasted demands are considered in the design and capacity of the sewerage systems.
Environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers?		√	Not anticipated. Designs include sludge collection, handling, treatment and disposal. Standards are provided for the use of sludge as manure. Sewerage system design ensure no industrial effluent will be allowed into the network.
Noise and vibration due to blasting and other civil works?	√		Anticipated but temporary, site-specific and can be mitigated. Blasting for underground works is prohibited in RUDSICO. Nuisance or disturbance due to noise may be experienced but minimized with mitigation measures specified in the EMPs. Scheduling of works and prior information with the affected people will be conducted.

SCREENING QUESTIONS	Yes	No	REMARKS
risks and vulnerabilities related to occupational health and safety due to physical, chemical, and biological hazards during project construction and operation?	√		Anticipated but temporary, site-specific and can be mitigated. EMPs and contract provisions include requirements for an Occupational Health and Safety (OHS) plan. The contractor's OHS plan shall be reviewed and cleared by the PIUs prior to commencement of works.
Discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers?		√	Not anticipated. Sewerage system only caters to domestic waters, no industrial wastewater is allowed into the system.
Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances, and protect facilities?		√	Not anticipated. STPs will be isolated through boundary walls and dense plantations to avoid/minimize nuisance.
Road blocking and temporary flooding due to land excavation during the rainy season?	√		Anticipated during construction but temporary, site-specific and can be mitigated. Road blocking for pipe laying works may be required and mitigation measures are required as per IEE/EMP. Underground construction works (sewer laying, foundations) should be carried out in non-monsoon period to avoid flooding.
Noise and dust from construction activities?	√		Anticipated during construction but temporary, site-specific and can be mitigated. No major noise-generating activities like rock blasting is anticipated. As the sewers will be laid on the road surface, cutting open of road surface using pneumatic drills will produce noise and dust. Temporary nuisance/disturbance due to noise and dust may be experienced by sensitive receptors. These impacts will be minimized with mitigation measures specified in the EMPs. During operations, noise may be experienced by sensitive receptors due to STP operations. This impact will be avoided by including noise barriers and enclosure of noise-producing components.

SCREENING QUESTIONS	Yes	No	REMARKS
traffic disturbances due to construction material transport and wastes?	√		Anticipated during construction but temporary, site-specific and can be mitigated. Linear activities like sewer laying along the roads is likely to disrupt traffic. Vehicle movement for construction purpose will increase the traffic. Identification of alternate routes, allowing limited - at least one-way traffic, prior information about the works and alternative arrangements, providing information/sign boards etc. will reduce the impact.
temporary silt runoff due to construction?	√		Anticipated during construction but temporary, site-specific and can be mitigated. EMPs and contract provisions include requirement for contractors to provide silt control measures.
hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?		√	Not anticipated. Adequately trained staff and necessary equipment will be in place for regular operation and maintenance of the system. Proposed treatment system will be efficient and appropriate repair and maintenance procedure will be developed. Sufficient funds for operation will be ensured. Backup power supply system is part of project.
deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?		√	Not anticipated. STP designs include sludge handling and treatment facilities to state policy standards.
contamination of surface and ground waters due to sludge disposal on land?		√	Not anticipated. STP designs include sludge handling and treatment facilities to state policy standards. O&M manual includes testing procedures and acceptable parameters for disposal on land.
Health and safety hazards to workers from toxic gases and hazardous materials which may be contained in sewage flow and exposure to pathogens in sewage and sludge?	√		Anticipated during operation but temporary, site-specific and can be mitigated. Workers may be exposed during cleaning of blockages in sewerage network. However, O&M Manuals will include standard operating procedures. All necessary health and safety training and personal protection equipment will be given to workers and staff during operation of sewerage system. Implementation of contractors' H&S will be strictly enforced by the PIUs.

SCREENING QUESTIONS	Yes	No	REMARKS
large population increase during project construction and operation that causes increased burden on social infrastructure (such as sanitation system)?		√	Not anticipated. Most of the unskilled workers will be hired from local labor force. Some skilled workers may be brought from outside, but numbers will not be so large to have impacts on social infrastructure.
Social conflicts between construction workers from other areas and community workers?		√	Not anticipated. Most of the unskilled workers will be hired from local labor force. Some skilled workers may be brought from outside, but numbers will not be so large to have impacts on social infrastructure. No conflicts envisaged.
risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	√		Anticipated but temporary, site-specific and can be mitigated. Construction will not involve use of explosives and chemicals. During operations, chemicals such as pH adjusters, flocculants, or coagulants may be used. The complete list of chemicals, quantities, and requirements for safe use and storage will be included in the final IEE for the STPs (these are design-build-operate packages). The EMPs in the current IEEs already include measures and monitoring requirements conforming with IFC EHS Guidelines. O&M Manuals will include health and safety requirements for managing chemicals.
community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	√		Anticipated but temporary, site-specific and can be mitigated. Work area will be clearly demarcated with security access for the workers and project-concerned members only. Community health and safety risks are present during construction such as risks from excavations for pipe laying, equipment and vehicle operations which should be identified and implemented in the site-specific EMPs.

A Checklist for Preliminary Climate Risk Screening

Country/Project Title: India/Rajasthan Secondary Towns Development Sector
Sector : Project(RSTDP), Banswara, Rajasthan
Subsector: Urban Development
Division/Department: Waste Water
 SARD/SAUW

Screening Questions		Score	Remarks ³⁸
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	1	Banswara received huge rains during rainy season, which may impact project execution during construction
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	0	
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	0	
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

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

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

Other Comments: None

³⁸ If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

Rapid Environmental Assessment (REA) Checklist

Water Supply

Instructions:

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

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: India/Water supply and Sewerage Project in Banswara Town, Rajasthan

Sector Division: Urban Development

Screening Questions	Yes	No	Remarks
A. Project siting Is the project area...			
Densely populated?	√		Subproject activities extend to the entire town including the densely populated areas. There are no major negative impacts envisaged, because pipeline will be located within ROW alongside the existing roads and can be constructed without causing any permanent impact to houses, and commercial establishments. STP site is sufficient away from habitations.
Heavy with development activities?	√		Banswara is a developing town; urban expansion is considerable
Adjacent to or within any environmentally sensitive areas ?		√	There are no any environmentally sensitive areas within or near to any proposed site
Cultural heritage site		√	
Protected area		√	
Wetland		√	
Mangrove		√	
Estuarine		√	
Buffer Zone of Protected Area		√	

Screening Questions	Yes	No	Remarks
Special area for Protecting Biodiversity		√	
Bay		√	
Potential Environmental Impacts Will the Project cause...			
Pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff ?		√	Not anticipated. There is no wastewater or effluent discharge into the upstream sources and are thus not expected to induce pollution of raw water supply.
Impairment of historical/cultural monuments/areas and loss/damage to these sites?		√	Not anticipated. No above-ground infrastructures will be built within or adjacent to PCRs. Only pipe laying will be done outside and around PCRs. The HIA specify the requirements before and during construction to ensure that no loss or damage will be done on these PCRs. Project will have no any effect on historical/cultural monuments as there are no such monuments within influence of proposed works. Chandrawati, a state government protected archeological protected area is outside Abu Road town, and nearest component is raw water main proposed along a road, about 1.3 km from the boundary
Hazard of land subsidence caused by excessive ground water pumping?		√	Not anticipated. Any groundwater source (e.g. tube wells), will require permission from Rajasthan Ground Water Board and conduct of feasibility/source sustainability studies prior to consideration as a source.
Social conflicts arising from displacement of communities?		√	Not anticipated. Project does not involve any land acquisition. A Resettlement Plan will be prepared if there are any involuntary resettlement.
Conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?		√	Not anticipated. Water allocation letters from the Public Health Engineering Department (PHED) and Rajasthan Groundwater Department are required, and only allocated water shall be used for the water supply subprojects.
Unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?		√	Not anticipated. Efficient treatment technology and water quality laboratories are included in scope of water supply subprojects.
Delivery of unsafe water to distribution system?		√	Not anticipated.
Inadequate protection of intake works or wells, leading to pollution of water supply?		√	Not anticipated. Design specifications include protection of intake works.

Screening Questions	Yes	No	Remarks
Over pumping of ground water, leading to salinization and ground subsidence?		√	Not anticipated. Groundwater extraction shall be limited to the sustainable levels as indicated in the permits provided by the Groundwater Department.
Excessive algal growth in storage reservoir?		√	Not anticipated. Design specifications confirm maintenance requirements to ensure no algal growth in tanks and reservoir.
Increase in production of sewage beyond capabilities of community facilities?		√	Not anticipated. Sewerage systems and demand requirements are accounted for. The project will include improvement of sewerage and sanitation systems.
Inadequate disposal of sludge from water treatment plants?		√	Not anticipated. Facilities to manage sludge and solid wastes (grit) are included in the design. The IEEs and Operations and Maintenance (O&M) manuals will include handling and disposal procedures.
Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?		√	Not anticipated. Low noise pumps and machineries will be used in pumping stations to alleviate noise to nearby areas.
Impairments associated with transmission lines and access roads?	√		Anticipated during construction only. Complete road closures are not expected, and traffic may be diverted with access ensured for pedestrians. Contractors are required to incorporate in the Traffic Management Plan as part of the site-specific EMP (SEMP).
Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.	√		Anticipated but can be mitigated. Potential hazards during O&M phase are identified and mitigation measures in place. Chlorine will be handled by qualified personnel with the proper handling techniques and proper PPE. No other hazardous chemical will be maintained.
health and safety hazards to workers from handling and management of chlorine used for disinfection, other contaminants, and biological and physical hazards during project construction and operation?	√		Anticipated but can be mitigated. Potential hazards during O&M phase are identified and mitigation measures in place. Chlorine will be handled by qualified personnel with the proper handling techniques and proper PPE. No other hazardous chemical will be maintained.
Dislocation or involuntary resettlement of people	√		Anticipated but can be mitigated. Any involuntary resettlement is addressed by the resettlement framework.
disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	Not anticipated. Contractor is encouraged to hire workers from the local labor force.
Noise and dust from construction activities?	√		Anticipated but temporary, site-specific and can be mitigated. No blasting activities envisaged. Nuisance or disturbance due to elevated noise may be experienced during

Screening Questions	Yes	No	Remarks
			construction. All the machineries employed will comply with the noise emission standards of the Central Pollution Control Board. Dust suppression measures such as water sprinkling will be employed. These requirements and monitoring of effectivity should be included in the site-specific EMP.
Increased road traffic due to interference of construction activities?	√		Anticipated but temporary, site-specific and can be mitigated. Complete road closures are not expected, and traffic may be diverted with access ensured for pedestrians. Contractors are required to incorporate in the Traffic Management Plan as part of the site-specific EMP (SEMP).
Continuing soil erosion/silt runoff from construction operations?	√		Anticipated but temporary, site-specific and can be mitigated. Construction work during monsoon shall be carried out such that silt run off is prevented. SEMP's include requirement for contractors to provide silt control measures.
Delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?		√	Not anticipated. Water treatment plans are designed with on-site and timely monitoring to ensure the quality of treated water prior delivery to the households. The drinking water quality parameters and acceptable levels are included in the contract.
Delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?		√	Not anticipated. Treated water will be tested prior distribution.
Accidental leakage of chlorine gas?		√	Not anticipated. Proper Occupational Health and Safety (OHS) handling and storage of chlorine is included in the requirements
Excessive abstraction of water affecting downstream water users?		√	Not anticipated. Only water allocated by the Government will be used for the water supply services.
Competing uses of water?		√	Not anticipated. Water used for the project are specifically allocated by the Government for the project's purpose. Only the water allocated will be used.
Increased sewage flow due to increased water supply		√	Not anticipated. Sewerage systems and demand requirements are accounted for in the analysis. The project will include improvement of sewerage and sanitation systems.
Increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant		√	Not anticipated. Sewerage systems and demand requirements are accounted for in the analysis. Some subprojects also include new sewerage systems.

Screening Questions	Yes	No	Remarks
large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	Not anticipated. Contractors shall prioritize hiring local labor force. Some of the skilled workers may be brought from outside but numbers should not be so large to have impacts on social services.
social conflicts if workers from other regions or countries are hired?		√	Not anticipated. Contractors shall prioritize hiring local labor force. Some of the skilled workers may be brought from outside but numbers should not be so large to have impacts on social services.
risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during operation and construction?	√		Anticipated but temporary, site-specific and can be mitigated. Construction does not involve use of explosives. EMPs include measures and monitoring requirements on occupational health and safety for chemical hazards.

A Checklist for Preliminary Climate Risk Screening

Country/Project Title: India/Rajasthan Secondary Towns Development Sector
 Project(RSTD), Banswara, Rajasthan
Sector : Urban Development
Subsector: Water Supply
Division/Department: SARD/SAUW

Screening Questions		Score	Remarks ³⁹
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	1	Banswara receives a large amount of rains and construction works may be impacted during rainy season
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	0	
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	0	
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

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

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

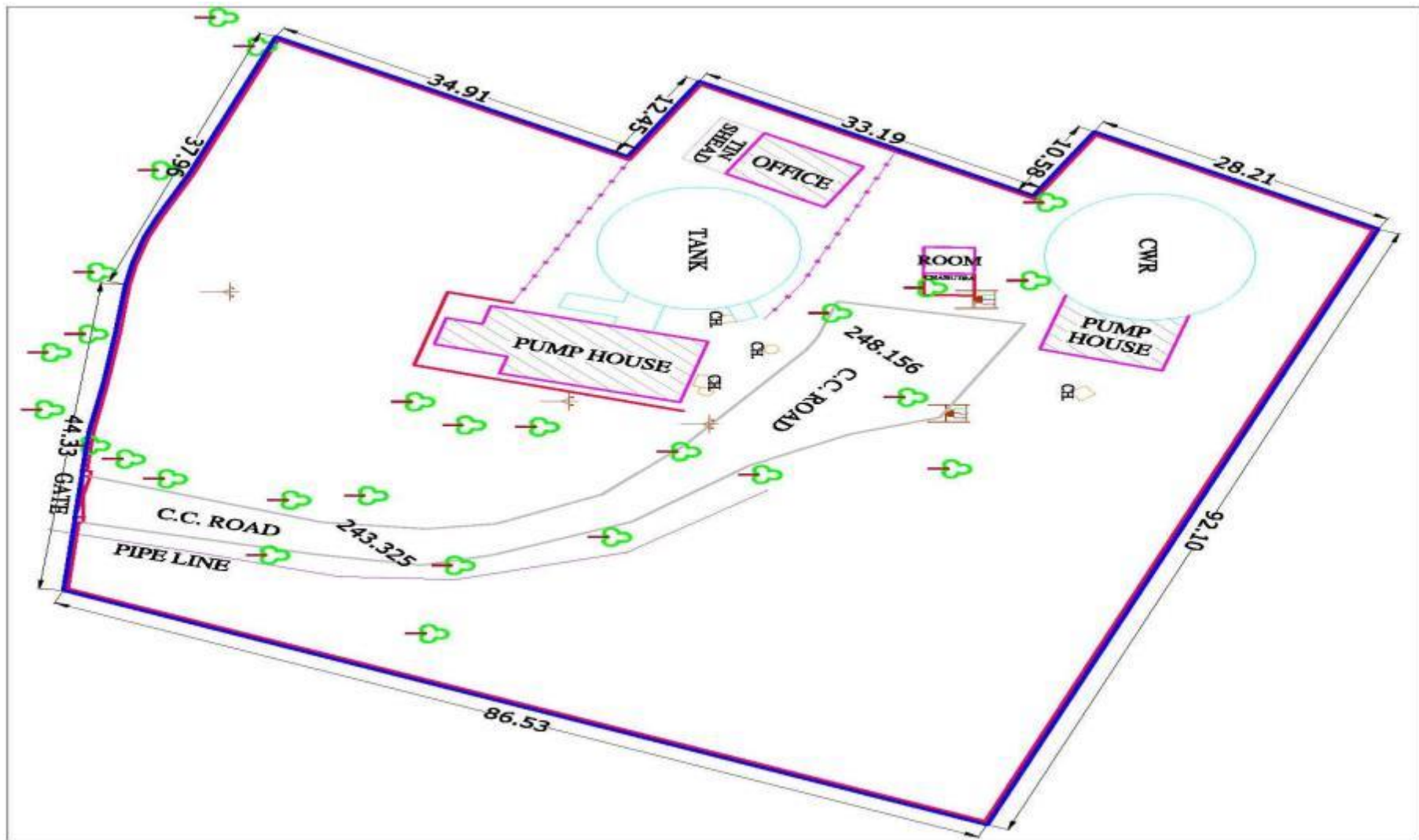
Other Comments: None

³⁹If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

Appendix 2
Audit Report of Existing Water Supply Components of Banswara

Sr. NO	PARTICULARS	Kagdi Pick Up Weir WTP	PHED AEn Campus WTP
1	Location of Plant:	Kagdi Pickup weir	PHED AEnOffice Campus
2	Capacity (MLD):	4.50 MLD WTP	10.50 MLD WTP
3	Technology:	Rapid sand filter.	Rapid sand filter.
4	Executing agency:	PHED	PHED
5	Implementing agency:	Rajasthan Govt. Fund(State Fund)	Rajasthan Govt. Fund(State Fund)
6	Project name under which WTP was constructed:	Augmentation of UWSS Banswara	Reorganisation of UWSS Banswara
7	Name of contractor:	M/s Rubi&Rubbur construction, New Delhi	M/s Vishnu Prakash R. Pungalia ,Jodhpur
8	Date of start of the construction of WTP:	1990-91	2006-07
9	Date of completion of construction works of WTP:	1995-96	2007-08
10	Estimated and final cost of WTP:	26 Lacs	180 Lacs
11	Status of work progress of WTP: (completed/uncompleted components with %)	Completed and commissioned	Completed and commissioned
12	Water Supply networks laid under the project (type, dia and length):	Separate details not available. Rising main and transmission mains are laid and about 250 kms of distribution networks is available in town covering both WTPs	
13	Nos., locations and capacities of Pumping Stations:	one in campus	one in campus
14	Units of WTP:	Clariflocculator, filter bed, Chemical store, Adm block, Laboratory	Clariflocculator, filter bed, Chemical store, Adm block, Laboratory
15	Areas of each WTP's unit (sq. mtrs):	1125 SQM approx.	1200 sqm approx.
16	Total Area of land used for WTP:	3000 SQM approx.	2000 SQM approx.
17	Land ownership details: (khasra nos. and title)	PHED Own Premises	PHED AEnOffice Campus
18	O&M period of contract:	At present O&M by PHED	At present O&M by PHED
19	Status of Consent to Establish (CTE) from Pollution Control Board: obtained/not obtained	Not obtained	Not obtained
20	Validity of CTE:	NA	NA
21	Status of Consent to Operate (CTO) from Pollution Control Board: obtained/not obtained	Not obtained	Not obtained

Sr. NO	PARTICULARS	Kagdi Pick Up Weir WTP	PHED AEn Campus WTP
22	Validity of CTO:	NA	NA
23	Total area of city water supplied from this WTP:	25%	70%
24	Details of water supplied areas with WTP: (ward nos./localities)	Ward nos. 10-13,22-30,32-36	Ward Nos. 01-09,14-21,3137-45
25	Total Population covered (number and %):	30%	70%
26	What are the parameters of treated water:	Turbidity, colour, residual chlorine, coliform	Turbidity, colour, residual chlorine, coliform
27	Filter media replacement done if any	One time	nil
28	How many times filter media replaced and last replacement detail:	One time	nil
29	What are the proposals/methods for reuse/disposal of back wash water from WTP:	Discharge into nearby drain	Discharge into nearby drain
30	Quantity of Sludge generated from WTP:	0.5 MLD	1.1 MLD
31	Sludge Dewatering and drying system:	Direct drainoff	Direct drainoff
32	What are the proposals/methods for reuse/disposal of generated sludge from WTP:	Discharge into nearby drain	Discharge into nearby drain
33	Is this plant anywhere related/dependent on proposed WTP under RUIDP Phase-4 project:	Will be used in RUIDP phase 4 (after refurbishment where required)	Will be used in RUIDP phase 4 (after refurbishment where required)
34	Status and type of electricity connection: (connection number and approved load, KW)	40 HP	150 HP
35	Whether DG set installed, if yes give capacity and type of DG set:	Not installed	Not installed
36	Whether consent from Pollution Control Board taken for DG set:	Not required	Not required
37	Numbers of employees for operation of plant (designation wise numbers of employees):	Fitter-0 Help-07 Existing engineering staff of PHED	Fitter-0 Help-06 Existing engineering staff of PHED
38	CWRs and OHSRs connected with WTP	CWR-02, OHSR-02	CWR-03, OHSR-14

Kagdi Pick up Weir WTP Campus Plan

Status of OHSRs

Sr.No.	Location Of OHSR	Capacity of OHSR(In KL)	Year of construction	Staging height (Mts)	Condition of OHSR	Proposal in Ph-IV
1.	Ambamata	540	2007-08	21	Good	All ESRs and GLSR proposed for refurbishment as per requirement after conditional assessment by contractor during SIP period
2.	Mahi Sarovar	112	1993-94	18	Moderate	
3.	Housing Board	300	1986-87	18	Good	
4.	New Civil Line	450	2007-08	18	Moderate	
5.	Hospital Campus	50	1982-83	12	Moderate	
6.	Collectrate Campus	50	1980-81	12	Good	
7.	New SR Collectrate	600	2007-08	18	Good	
8.	Muslim Colony	600	1987-88	18	Good	
9.	Kalika	225	1977-78	15	Moderate	
10.	Tripoliya	850	2007-08	18	Good	
11.	Vatenary Hospital	360	2007-08	18	Good	
12.	Khandu Colony	450	1982-83	21	Good	
13.	Exn Campus (Thikariya)	113	1983-84	18	Moderate	
14.	Zone 14	1044	1987-88	GLSR	Good	
15.	RSEB	112	1988-89	15	Moderate	
16.	New Housing Board	275	2009-10	18	Moderate	

Details of existing CWRs

Sr.No.	Name of CWR	Capacity of CWR (In KL)	Proposal in Ph-IV
1	Aen Office Campus	2080	proposed for refurbishment as per requirement
2	Exn Office Campus	540	
3	Kagdi Pickup Weir	1040	

Photographs of Existing components of Water Supply in Banswara



Existing Intake at Kagdi Pickup weir



Existing Intake at Mahi Dam



Existing WTP at AEN Campus



Clariflocculator at Existing WTP at AEN Campus



Existing WTP at AEN Campus



Existing building of WTP at AEN Campus

Appendix 3: Audit Report of Existing STP and Sewerage Component of Banswara

Sr. NO	PARTICULAR	DETAILS
1	Name of Plant: Capacity:	6.43MLD STP at banswaraudaipur road
2	Technology:	WSP with maturation pond.
3	Executing agency:	PHED
4	Implementing agency:	PHED
5	Project name under which this STP was constructed:	Rajasthan Govt. Fund(State Fund)
6	Name of contractor:	M/s Vishnu Praksh R. Pugalia
7	Date of start of the construction of STP:	30 years old STP
8	Status of work progress of STP: (completed/uncompleted components with %)	completed
9	Sewerage networks laid under the project (type, dia and length):	No, network laying done under separate project, work in progress
10	Nos., locations and capacities of SPS:	NILL
11	Cumulative Progress % (including STP/SPs/Network):	STP constructed about 30 years ago, but not commissioned due to sewerage network was not done, now sewerage network is under progress and will be completed up to Dec. 2018
12	Different units of plant:	Screen, Aerobic Pond, Waste Stabilization Pond, Mensuration Pond
13	Total Area of land used for STP:	75970 square meters
14	Land ownership details	Nagar Parishad
15	Estimated/Final cost of STP:	Not available
16	O&M period of contract:	Not started yet
17	Tree plantations done under this project (nos. and types of trees):	No.
18	Date of completion of construction works of STP:	Yet to commission
19	Reasons of delay, if any:	Sewer not functional
20	Status of Consent to Establish (CTE) from Pollution Control Board: obtained/not obtained	Not taken
21	Validity of CTE:	NA
22	Status of Consent to Operate (CTO) from Pollution Control Board: obtained/not obtained	Not taken
23	Validity of CTO:	NA
24	Status of sewerage networks:	Not included in original contract, now sewerage network under separate contract is under progress and will be completed up to Dec. 2018
25	Total area of city covered with this STP:	50% proposed to be covered
26	Details of total covered area with this STP: (ward nos.)	40 % population will be covered
27	Total Population covered (number and %):	40 % population will be covered

Sr. NO	PARTICULAR	DETAILS
28	Whether trial run completed, if yes give date, if no give tentative date:	NO
29	Estimated date of commissioning of this STP:	Dec-18
30	What are the parameters of discharge of treated effluent:	BOD<30
31	What are the proposals/methods for reuse/disposal of treated effluent from STP:	To be disposed in nearby nallah
32	What are the proposals/methods for reuse/disposal of treated sludge from STP:	WSP, no sludge will be generated
33	Is this plant anywhere related/dependent on proposed STP under RUIDP Phase-4 project:	No, this STP will work separately, not related/dependent with/on RUIDP Phase-4 project
34	Status and type of electricity connection: (connection number and approved load, KW)	Not taken yet
35	Whether DG set installed, if yes give capacity and type of DG set:	No
36	Whether consent from Pollution Control Board taken for DG set:	NA
37	Fresh water requirements/day (for domestic use) and type of water supply:	Not accessed
38	If tube well installed, provide number and capacity of tube well and status of clearance from Ground Water Board for tube well:	Not installed
39	Numbers of employees proposed for operation of plant (designation wise numbers of employees):	As per Norms of CPHEEO
40	Is rain water harvesting system established, if yes, details and cost of rain water harvesting :	No, Rock strata
41	Power generation system installed, if yes, give details:	Not applicable
42	O&M manual prepared by contractor (submitted/approved):	Not prepared
43	Emergency operating system prepared for O&M:	Not prepared
44	Whether provisions for odour control taken in design, if yes give details:	No
45	If provisions taken to protect inconvenience to nearby habitants, give details:	No

Photographs of Existing STP at Udaipur Road**WSP at Existing STP****Existing STP****Existing STP campus****Vacant Land for proposed STP under Ph-IV**

Appendix 4:NOCs

Water Allocation for Banswara Subproject

कामलप अतिशायी अलिपता, जन स्वा. अति. विलास, खोस-वांजवाडा

क्रमांक - 3145

दिनांक - 11/03/20

श्री मान् अति. पु. अलिपता

जन स्वा. अति. विलास

क्षेत्र - उद्यमपुर

~~विषय~~ विषय: - शहरी जल योजना, वांजवाडा हेतु जल उपलब्धता के जांचकथन

उपरोक्त विषयानुसार निवेदन है कि शहरी जल योजना कांठवाडा की वर्तमान जल मांग 18 MLD है तथा वर्तमान में मर जल शहर के क्षेत्रीय जल संसाधन विलास के कागरी पिक अप वियर द्वारा लिया जा रहा है जिससे पर्याप्त जल उपलब्ध रहता है। एवम् भविष्य में भी शहर कांठवाडा के पेसजल हेतु कागरी पिक अप वियर से ही जल उपलब्ध रहेगा।

अति. विलास.

अतिशायी अलिपता

जन स्वा. अति. विलास

खोस - वांजवाडा

Transcript in English

Office of Executive Engineer, PHED, Division Banswara

No; 3145

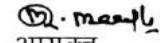
dtd. 17.03.2020

To,
Additional Chief Engineer,
PHED, Region Udaipur
Subject: regarding availability of water for water supply project of Banswar

This is to stage that demand of water for Banswara city water scheme is presently 18 MLD, which is currently being drawn from Kagdi Pick up weir which is under Water Resources Department, where sufficient water remains available and for future water supply required quantity of water will be available from Kagdi Pick up weir

Signed
Executive Engineer
PHED
Division Banswara

NOC for Treated Effluent Discharge in Banswara

	कार्यालय नगर परिषद बॉसवाडा(राज.)
क्रमांक:- जे.प.नं./SPL-01/2020-21	दिनांक:- 14/04/2020
अनापत्ति प्रमाण-पत्र	
यह प्रमाणित किया जाता है कि फेज-4 के अन्तर्गत किये जाने वाले सिवरेज कार्य बासवाडा का सिवरेज डिस्चार्ज एस.टी.पी के समीप से गुजरने वाले सरकारी नाले में किया जावेगा जिससे भविष्य में किसी भी प्रकार के भराव कि संभावना नहीं है।	
 आयुक्त नगर परिषद बॉसवाडा	

Transcript in English

Office of Municipal Council, Banswara

No: SPL-01.2020-21

Dtd. 14.04.2020

No Objection Certificate

It is certified that treated effluent from sewage treatment under Phase-4 shall be discharge in the government drain passing nearby the STP, there will be no any problem of impoundment or flooding due to this in future.

Signed by
 Commissioner
 Municipal Council, Banswara

NOC for Intake works at Kagdi Pickup Weir

NO-OBJECTION CERTIFICATE

836

27/7/2018

This is to confirm that during executing of proposed works of intake at Kagdi Pickup Weir, Mahi Dam in District-Banswara proposed activities will not have impact on the survival of the existing fishes and other aquatic animals proposed project interventions would not have negative impact on either and social and economic scenario of the existing community residing in the vicinity not would it impact environment. Sufficient quality of water is available in Kagdi Pickup Weir, Mahi Dam for proposed water supply demand.

This department has No-Objection for porposed works under ADB assisted RUIDP works.


सहायक अभियन्ता
बांध विभाग (A), राईस बण्ड ।
वाहो वटि, बांसवाडा (राज.)

Previous years data of dam water in Mahi Dam

राजस्थान सहायक अभियंता बांध उपखण्ड-IV
 क्रमांक: - सम/बांड/IV/2/2018/ 835
 श्रीमान अधीक्षण अभियन्ता
 भार. प्र. बांध - डी. पी.
 जयपुर।
 दिनांक: - 27/7/18

विषय: - अगदी पिक अप वीयर पर पिछले 10 वर्ष का
 रिकॉर्ड दिखाने कागत।
 संदर्भ: - आपका फा क्रमांक 5313-17 दिनांक 26-7-18
 के क्रम में।

उपरोक्त विषयान्तर्गत लेख है कि आपके सदर्भित पत्र का
 प्राप्त गया अगदी पिक अप वीयर व माही बांध पर पिछले 10 वर्ष
 का गेज का रिकॉर्ड, निम्नानुसार प्रस्तुत है:-

अगदी पिक अप वीयर का गेज 235-50 मी. है एवं इसकी
 पर्याप्तता 130-66 मी. है यह इशरूम वेशज है इसका लेवल
 235-50 मीटर तक ही रखा जाता है इसके से के केनाल निकलती
 है जिसे बांध से पानी छोड़े हुए केनालो के चला जाता
 है। एवं अधिक पानी कि शक्ति होने पर वर्षाकाल में नाले
 में छोड़ा जाता है। इस वेशज से बसवाड़ा एवं आस-पास के
 क्षेत्र को पानी पीने को दिया जाता है। इसलिए अगदी पिक अप
 वीयर का वर्ष भर लेवल 235-50 मीटर रखा है।
 अगदी पिक अप वीयर में मछली पालन नहीं किया जाता
 है।

संलग्न: - माही डैम 10 वर्ष
 कि गेज रिपोर्ट

सहायक अभियन्ता
 बांध उपखण्ड V, बांध खण्ड I
 माही वरि., बसवाड़ा (राज.)

Transcript in English

Office of Assistant Engineer, Dams sub Division IV

No. 2018/835

dtd. 27.07.19

To,
The Superintending Engineer
RUIDP,
Jaipur

Subject: Last 10 years record of water available in Kagdi Pickup weir

Reference: your letter no. 6313-17 dtd 26.07.2018

In the subject and reference as above regarding 10 years data of water available in Kagdi Pick up weir and Mahi dam, details are mentioned as below-

Gauge of Kagdi Pick Up Weir is 235.50 meters and its capacity is 130.66, this is a diversion barrage and its level is maintained at the level of 235.50 meters. Two canals emerge from this pick up wier though which water released from Mahi Dam flows ahead in to canals. In case of more water coming in rainy season, water is released in to nallah. This barrage is used to provide water for drinking in Banswara and nearby areas. Therefore level of Kagdi Pick Up Weir is kept at 235.50 meter through out the year. Fisheries is not practiced in Kagdi Pick Up Weir.

Enclosed: Gauge report of last 10 years of Mahi Dam

Signed

Assistant Engineer
Dams sub Division IV
Mahi Project, Banswara, Rajasthan

Gauge report of last 10 years of Mahi Dam

S. No.	Year	Date	Min. Level	Capacity (In TMC)	Date	Max. Level	Capacity (In TMC)	Carryover Storage (Col. 5-Dead Storage) (In TMC)	Water Release to Gujarat Through PH-2 (In TMC)	Overflow (In T.M.C.)	Period	Rain Fall at Damsite		
												On Date	Maximum Rainfall in 24 Hrs. (in M.M.)	Total Rainfall Season (In M.M.)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1975											12-09-1975	103.10	1055.50
2	1976											29-08-1976	137.10	1277.10
3	1977											29-06-1977	325.10	1529.00
4	1978											17-08-1978	188.40	1335.00
5	1979											04-08-1979	242.30	623.20
6	1980											30-08-1980	48.00	779.00
7	1981											11-08-1981	86.00	1203.30
8	1982	02-08-82	264.10	20.104	18-08-82	270.90	36.236	7.854	-	-	Nil	18-08-1982	170.40	892.80
9	1983	30-06-83	250.25	6.290	16-08-83	269.95	33.231	-5.960	-	-	Nil	20-07-1983	122.00	972.80
10	1984	15-06-84	243.75	2.330	06-10-84	277.70	59.092	-9.920	-	57.1283	12-08-84 to 22-08-84	11-08-1984	218.00	1004.90
11	1985	18-07-85	273.60	44.317	26-10-85	276.95	56.055	32.067	22.080	Nil	Nil	08-10-1985	140.80	717.70
12	1986	18-06-86	256.20	9.803	22-07-86	280.10	69.946	-2.447	42.850	32.645	19-07-86 to 20-08-86	24-07-1986	229.80	985.70
13	1987	18-08-87	262.80	17.714	03-09-87	280.00	69.470	5.464	43.820	Nil	Nil	26-08-1987	360.40	839.80
14	1988	10-07-88	263.10	18.216	07-10-88	280.75	72.931	5.966	5.430	14.640	04-10-88 to 05-10-88	05-08-1988	224.60	843.10
15	1989	09-08-89	262.90	17.894	30-09-89	276.65	59.892	5.644	24.790	Nil	Nil	20-08-1989	100.80	776.78
16	1990	29-05-90	262.35	16.975	11-09-90	280.75	72.931	4.725	26.950	67.5014	04-08-90 to 03-10-90	01-09-1990	138.40	1281.60
17	1991	29-05-91	260.90	14.791	05-08-91	280.75	72.931	2.541	27.790	36.168	01-08-91 to 05-09-91	31-07-1991	240.00	966.40
18	1992	13-07-92	259.80	13.341	02-11-92	275.40	50.599	1.091	13.810	Nil	Nil	07-09-1992	127.00	848.60
19	1993	15-06-93	261.65	15.988	13-08-93	280.75	72.931	3.738	34.580	6.253	08-08-93 to 25-08-93	25-09-1993	98.00	1271.00
20	1994	12-06-94	261.75	16.168	02-08-94	280.75	72.931	3.918	35.910	125.689	02-08-94 to 24-09-94	02-08-1994	258.80	1429.00
21	1995	12-07-95	259.80	13.341	08-09-95	280.75	72.931	1.091	28.860	Nil	Nil	16-07-1995	155.20	752.40
22	1996	16-07-96	260.30	14.051	20-08-96	280.75	72.931	1.801	33.680	72.4539	07-08-96 to 22-09-96	28-07-1996	181.80	966.20
23	1997	15-06-97	263.70	19.287	23-08-97	280.75	72.931	7.037	32.280	34.882	08-08-97 to 14-08-97	26-07-1997	113.60	927.60
24	1998	15-06-98	264.10	20.104	17-09-98	280.75	72.931	7.854	26.170	31.9549	24-08-97 to 03-09-97	09-08-1998	108.20	947.60
25	1999	20-07-99	264.00	19.858	15-10-99	270.15	33.839	7.608	4.020	Nil		21-07-1999	112.00	732.80

Over flow data of Dam

सहायक अभियन्ता
राष्ट्रिय प्रकल्प V, बांध प्रकल्प I
माहिती बॉट, बांध प्रकल्प (राज्य)

S. No.	Year	Date	Min. Level	Capacity (In TMC)	Date	Max. Level	Capacity (In TMC)	Carryover Storage (Col. 5-Dead Storage) (In TMC)	Water Release to Gujarat Through PH-2 (In TMC)	Overflow (In T.M.C.)	Period	Rain Fall at Dam Site			
												On Date	Maximum Rainfall in 24 Hrs. (in M.M.)	Total Rainfall Season (In M.M.)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
26	2000	28-06-00	259.35	12.903	15-09-00	266.05	23.785	0.653	3.530	Nil		18-07-2000	155.40	359.80	
27	2001	13-06-01	258.00	11.000	01-09-01	271.15	36.890	-1.250	8.000	Nil		11-07-2001	145.40	780.00	
28	2002	17-06-02	254.50	7.750	28-09-02	266.90	25.610	-4.500	3.500	Nil		29-06-2002	71.00	509.00	
29	2003	13-06-03	255.10	8.325	02-10-03	281.50	77.000	-3.925	14.560	13.6898	24-09-03 to 01-10-03	28-07-2003	120.00	850.00	
30	2004	07-06-04	268.70	29.951	13-10-04	281.50	77.000	17.701	11.800	33.6628	15-08-04 to 29-08-04	12-08-2004	235.00	1260.00	
31	2005	25-06-05	266.45	24.576	08-10-05	280.50	72.012	12.326	8.302	Nil	Nil	28-07-2005	170.00	690.00	
32	2006	12-06-06	268.50	29.417	28-08-06	281.50	77.000	17.167	30.175	198.4156		19-08-2006	177.00	2690.00	
33	2007	02-07-07	264.10	20.104	23-08-07	281.50	77.000	7.854	11.790	46.9184		09-07-2007	320.00	1354.00	
34	2008	04-06-08	266.65	25.035	16-10-08	273.75	44.893	12.785	9.875	Nil		12-08-2008	55.00	535.00	
35	2009	03-07-09	258.95	12.225	09-11-09	275.00	49.233	-0.025	3.635	Nil	Nil	23-07-2009	151.00	888.80	
36	2010	13-06-10	261.00	14.954	20-10-11	274.15	46.337	2.704	4.020	-	-	31-08-2010	90.00	598.00	
37	2011	30-06-11	260.05	13.601	20-11-11	281.50	77.000	1.351	1.800	-	-	10-08-2011	172.00	964.20	
38	2012	30-06-12	269.90	33.075	18-08-12	281.50	77.000	20.825	20.491	54.335	18-08-12 to 17-09-12	10-07-2012	121.00	1245.30	
39	2013	15-06-13	270.30	34.282	04-09-13	281.50	77.000	22.032	24.325	84.199	04-09-13 to 13-10-13	27-07-2013	120.00	1220.00	
40	2014	15-07-14	270.70	35.449	12-09-14	281.50	77.000	23.199	1.935	Dam	2.114	12-09-14 to 17-09-14	03-09-2014	77.20	710.00
										Kagdi	5.097	09-09-14 to 12-10-14			
										Total :-	7.211				
41	2015	15-06-15	268.85	30.317	21-08-15	281.50	77.000	18.067	2.638	Dam	45.485	27-07-15 to 24-08-15	26-07-2014	116.00	634.00
										Kagdi	6.468	26-06-15 to 04-09-15			
										Total :-	51.953				
42	2016	03-06-16	266.20	24.066	04-09-16	281.50	77.00	11.816	5.606	Dam	66.366	09-08-16 to 09-10-16	21-08-2016	250.00	1241.00
										Kagdi	19.435	15-06-16 to 25-10-16			
										Total :-	85.801				
43	2017	27-06-17	269.45	31.665	06-09-16	281.50	77.00	19.415	4.467	Dam	13.121	28-08-17 to 22-09-17	14-07-2017	213.00	848.40
										Kagdi	10.029	05-07-17 to 29-09-17			
										Total :-	23.150				

Over flow data of Dam

सहायक अभियन्ता
 तहसील : ...
 भा.सू.प्रां. व.सू.प्रां. (प.सू.)

NOC for proposed SPS land at Pratapgarh Road

कार्यालय नगर परिषद, बांसवाड़ा (राज.)

फोन : 02962-243714, फैक्स : 02962-243714 Email Id: palika.bsw@gmail.com

क्रमांक- २६८२

दिनांक- ८/७/१९

श्रीमान परियोजना निर्देशक,
आरयूआईडीपी कार्यालय,
जयपुर।

विषय- सीवररेज एवं वाटर सप्लाई के आरयूआईडीपी फेज IV के अंतर्गत भूमि आवंटन
बाबत।

प्रसंग- श्रीमान जिला कलेक्टर महोदय के पत्रांक एक (32) विकास/2019/304
दिनांक 03/05/2019 के क्रम में।

महोदय,

उपरोक्त विषयान्तर्गत प्रारंभिक पत्र के सन्दर्भ में निवेदन है की नगर परिषद बांसवाड़ा क्षेत्र में सीवररेज एवं वाटर सप्लाई के आरयूआईडीपी फेज IV में पंप हाउस के लिए भूमि चाहिए गई है जो राजस्थान ग्राम बांसवाड़ा में परिषद स्वाधिकत्व की भूमि में से खादू रणम जी मंदिर के उत्तर दिशा में प्रतापगढ़ रोड पर 12x15 = 180 वर्गमीटर भूमि का आपको पंप हाउस बनाने के लिए सहमति दी जाती है। इस भूमि का स्वामित्व नगर परिषद बांसवाड़ा को रहेगा।

उक्त भूमि का नजरी नक्शा निम्नानुसार है:-

अतः उक्त भूमि पर पंप हाउस बनाया जाता है तो परिषद को कोई आपत्ति नहीं है।

क्रमांक-
प्रतिरिपि सूचनाई-

1. श्रीमान जिला कलेक्टर महोदय, बांसवाड़ा

आयुक्त
नगर परिषद, बांसवाड़ा
दिनांक-

आयुक्त
नगर परिषद, बांसवाड़ा

Transcript in English

To,

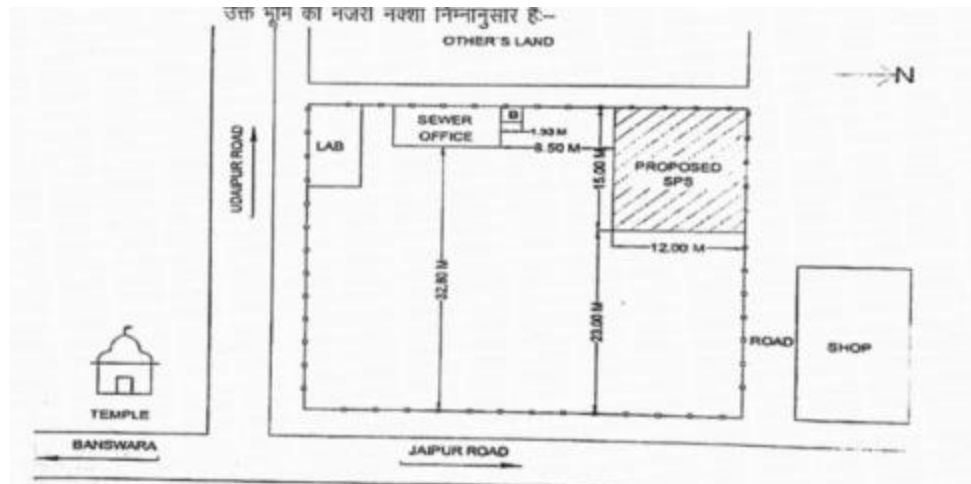
Project Director,
RUIDP Jaipur

Subject- regarding allotment of land for sewerage and water supply for RUIDP Phase-4

Reference- District Collector's letter no. F(32) Development/2019/304 dtd. 03.05.2019

Sir,

In reference to the subject as above, it is informed that RUIDP has demanded for land for proposed SPS under RUIDP Phase-4 , this land belongs to Municipal Council, Banswara situated in the North of KhatuShamji Ji temple at Pratapgarh Road, out of which $12 \times 15 = 180$ square meter land can be used for proposed pumping station. Owner of this land will be Municipal Council, Banswara. The map of the land is given below-



There is no objection from Municipal Council, Banswara for construction of pump house on this land.

Signed by
Commissioner,

Municipal Council, Banswara

Appendix 5: Excerpts from Rajasthan State Sewerage and Wastewater Policy

STATE SEWERAGE AND WASTE WATER POLICY- 2016

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

5.4. On Reuse of Treated Effluent and Sludge

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

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

Industrial uses for reclaimed water include:

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

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

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

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

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

5.5. On Pricing, Financing and Investment

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

Guidelines for Reuse of Treated Effluent and Sludge from STP for Beneficial Purposes

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

Health Hazards during Sewage Operations

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

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

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

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

Mitigation measures to avoid Health Hazards

Personal Hygiene against Pathogen

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

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

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

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

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

- Examine medical history.
- Examine subjective symptoms and other objective symptoms.
- Check height, weight, vision and hearing ability.

- Chest X-ray examination.
- Blood pressure measurement.
- Check for anaemia.
- Check for liver functions.
- Check for lipids in blood.
- Check blood sugar level
- Urine analysis.
- Electrocardiogram analysis

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

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

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

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

Risks in use of treated effluent and sludge in agriculture practices

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

Risks of Nutrient Loading in Agriculture

Crops receiving excessive dosage of nitrogen show superfluous vegetative growth and decrease in grain or fruit yield. The phosphate deficit of sewage, therefore, should be made good by supplementing with phosphate fertilizers, the extent of phosphate fortification depending upon the nature of crop and its phosphate requirements. As the availability of phosphate is low in the irrigation water it would be desirable to apply the required quantity of phosphatic fertilizer at the

time or even (about a fortnight) before the sowing or planting of the crop. Even when sewage nutrients are balanced by fortification, irrigation with such sewage may supply excessive amount of nutrients resulting in waste or unbalanced growth of plants with adverse effects on yields. It may therefore be necessary to dilute the sewage. Dilution also helps in reducing the concentration of dissolved salts and decomposable organic matter in the sewage thus, decreasing hazards to the fertility of the soil. It is desirable to limit the BOD and total suspended solids of sewage to be disposed on land for irrigation, as per relevant standards. There is a need to take caution on describing nutrient supply capacity of sewage particularly in the case of availability of phosphorus because there is a possible conversion of available phosphorus in unavailable mode in the presence of heavy metals present in the sewerage. This happens commonly in high as well as low pH soils.

Alternative Arrangement during Non-irrigating Periods

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

Treated Sewage into Perennial Rivers

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

Treated Sewage into Non-Perennial / Dry River Courses

There are locations where the rivers are not perennial or almost dry throughout the year except some monsoon runoff. In this case the discharged treated sewage sinks into the aquifer zone and is extracted by infiltration wells or galleries. The advantage of direct dilution from surface water is lost, but the additional purification in the soil and dilution from the aquifer water are happening. An example is the case of the Palar river course in Tamilnadu. The surface water flow in this occurs only for about a week if the monsoon is normal and if the water spills beyond the upstream

impoundments. The aquifer however supports the public water supply of over 30 habitations along its dry tract of nearly 80 km before the sea. The partly treated sewage of the en-route habitations does reach this river course as intervals. So far, no epidemics have been met with. This may be due to the above said additional purification in the soil and dilution by aquifer water. However, if these are exceeded by the contamination load, there can be immediate health problems. The guiding principle in such cases for the ULBs will be (a) to keep a check on the raw water quality from the infiltration wells to detect sudden increase in contaminants and (b) at least intercept the sewage outfalls and provide adequate STPs.

Appendix 6 Applicable Ambient Air Quality Standards for ADB funded projects in India

Parameter	Location ^a	India Ambient Air Quality Standard ($\mu\text{g}/\text{m}^3$) ^b	WHO Air Quality Guidelines ($\mu\text{g}/\text{m}^3$)		Applicable Per ADB SPS ^e ($\mu\text{g}/\text{m}^3$)
			Global Update ^c 2005	Second Edition2000	
PM ₁₀	Industrial Residential, Rural and Other Areas	60 (Annual) 100 (24-hr)	20 (Annual) 50 (24-hr)	-	20 (Annual) 50 (24-hr)
	Sensitive Area	60 (Annual) 100 (24-hr)	20 (Annual) 50 (24-hr)	-	20 (Annual) 50 (24-hr)
PM ₂₅	Industrial Residential, Rural and Other Areas	40 (Annual) 60 (24-hr)	10 (Annual) 25 (24-hr)	-	10 (Annual) 25 (24-hr)
	Sensitive Area	40 (Annual) 60 (24-hr)	10 (Annual) 25 (24-hr)		10 (Annual) 25 (24-hr)
SO ₂	Industrial Residential, Rural and Other Areas	50 (Annual) 80 (24-hr)	20 (24-hr) 500 (10-min)	-	50 (Annual) 20 (24-hr) 500 (10-min)
	Sensitive Area	20 (Annual) 80 (24-hr)	20 (24-hr) 500 (10-min)	-	20 (Annual) 20 (24-hr) 500 (10-min)
NO ₂	Industrial Residential, Rural and Other Areas	40 (Annual) 80 (24-hr)	40 (Annual) 200 (1-hr)	-	40 (Annual) 80 (24-hr) 200 (1-hr)
	Sensitive Area	30 (Annual) 80 (24-hr)	40 (Annual) 200 (1-hr)	-	30 (Annual) 80 (24-hr) 200 (1-hr)
CO	Industrial Residential, Rural and Other Areas	2,000 (8-hr) 4,000 (1-hr)	-	10,000 (8-hr) 100,000 (15-min)	2,000 (8-hr) 4,000 (1-hr) 100,000 (15-min)
	Sensitive Area	2,000 (8-hr) 4,000 (1-hr)	-	10,000 (8-hr) 100,000 (15-min)	2,000 (8-hr) 4,000 (1-hr) 100,000 (15-min)
Ozone (O ₃)	Industrial Residential, Rural and Other Areas	100 (8-hr) 180 (1-hr)	100 (8-hr)		100 (8-hr) 180 (1-hr)
	Sensitive Area	100 (8-hr) 180 (1-hr)	100 (8-hr)		100 (8-hr) 180 (1-hr)
Lead (Pb)	Industrial, Residential, Rural and Other Areas	0.5 (Annual) 1.0 (24-hr)		0.5 (Annual)	0.5 (Annual) 1.0 (24-hr)
	Sensitive Area	0.5 (Annual) 1.0 (24-hr)		0.5 (Annual)	0.5 (Annual) 1.0 (24-hr)
Ammonia (NH ₃)	Industrial Residential, Rural and Other Areas	100 (Annual) 400 (24-hr)			100 (Annual) 400 (24-hr)

Parameter	Location ^a	India Ambient Air Quality Standard ($\mu\text{g}/\text{m}^3$) ^b	WHO Air Quality Guidelines ($\mu\text{g}/\text{m}^3$)		Applicable Per ADB SPS ^e ($\mu\text{g}/\text{m}^3$)
			Global Update ^c 2005	Second Edition2000	
	Sensitive Area	100 (Annual) 400 (24-hr)			100 (Annual) 400 (24-hr)
Benzene (C ₆ H ₆)	Industrial Residential, Rural and Other Areas	5 (Annual)			5 (Annual)
	Sensitive Area	5 (Annual)			5 (Annual)
Benzo(o)pyrene (BaP) particulate phase only	Industrial Residential, Rural and Other Areas	0.001 (Annual)			0.001 (Annual)
	Sensitive Area	0.001 (Annual)			0.001 (Annual)
Arsenic (As)	Industrial Residential, Rural and Other Areas	0.006 (Annual)			0.006 (Annual)
	Sensitive Area	0.006 (Annual)			0.006 (Annual)
Nickel (Ni)	Industrial Residential, Rural and Other Areas	0.02 (Annual)			0.02 (Annual)
	Sensitive Area	0.02 (Annual)			0.02 (Annual)

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

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

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

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

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

Appendix 7: Discharge Standards (Waste Water & Effluent)

a. Discharge Standards to be achieved as per NGT order dtd. 30.04.2019

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

**Appendix 8:Emission limits for New DG sets up to 800 KW
(As per Environment (Protection) (Third Amendment) Rules, 2013)**

TABLE

Power Category	Emission Limits (g/kW-hr)			Smoke Limit (light absorption coefficient, m ⁻¹)
	NO _x +HC	CO	PM	
Upto 19 KW	≤ 7.5	≤ 3.5	≤ 0.3	≤ 0.7
More than 19 KW upto 75 KW	≤ 4.7	≤ 3.5	≤ 0.3	≤ 0.7
More than 75 KW upto 800 KW	≤ 4.0	≤ 3.5	≤ 0.2	≤ 0.7

Note:

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

Appendix 8B:Stack Height Requirement of DG sets

DIESEL GENERATOR SETS : STACK HEIGHT

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

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

H = Total height of stack in metre

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

KVA = Total generator capacity of the set in KVA

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

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

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

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

Appendix 9:Applicable Ambient Noise Level Standards for ADB funded projects in India

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

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

^b Guidelines for Community Noise. WHO. 1999

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

Appendix 10: Drinking Water Standards

Applicable Drinking Water Quality Standards for ADB funded projects in India

Group	National Standards for Drinking Water ^a			WHO Guidelines for Drinking-Water Quality, 4 th Edition, 2011 ^b	Applicable Per ADB SPS ^{c, d}
	Parameter	Unit	Max. Concentration Limits ^d		
Physical	Turbidity	NTU	1 (5)	-	1 (5)
	pH		6.5 – 8.5	none	6.5 – 8.5
	Color	Hazen units	5 (15)	none	5 (15)
	Taste and Odor		Agreeable	-	Agreeable
	TDS	mg/l	500 (2,000)	-	500 (2,000)
	Iron	mg/l	0.3	-	0.3
	Manganese	mg/l	0.1 (0.3)	-	0.1 (0.3)
	Arsenic	mg/l	0.01 (0.05)	0.01	0.01
	Cadmium	mg/l	0.003	0.003	0.003
	Chromium	mg/l	0.05	0.05	0.05
	Cyanide	mg/l	0.05	none	0.05
	Fluoride	mg/l	1 (1.5)	1.5	1 (1.5)
	Lead	mg/l	0.01	0.01	0.01
	Ammonia	mg/l	0.5	none established	0.5
Chemical	Chloride	mg/l	250 (1,000)	none established	250 (1,000)
	Sulphate	mg/l	200 (400)	none	200 (400)
	Nitrate	mg/l	45	50	45
	Copper	mg/l	0.05 (1.5)	2	0.05 (1.5)
	Total Hardness	mg/l	200 (600)	-	200 (600)
	Calcium	mg/l	75 (200)	-	75 (200)
	Zinc	mg/l	5 (15)	none established	5 (15)
	Mercury	mg/l	0.001	0.006	0.001
	Aluminum	mg/l	0.1 (0.3)	none established	0.1 (0.3)
	Residual Chlorine	mg/l	0.2	5	0.2
Micro Germs	E-coli	MPN/100ml	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample
	Total Coliform	MPN/100ml			

^a Bureau of India Standard 10200: 2012.

^b Health-based guideline values.

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

^d Figures in parenthesis are maximum limits allowed in the absence of alternate source. IS10500:2012 indicates these values in parenthesis may still be tolerated only if there are no other sources that could meet the base acceptable limit.

Appendix 11: Salient Features of Major Laws Applicable to Establishments Engaged in Construction of Civil Works

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

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

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

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

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

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

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

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

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

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

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

Employer shall-

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

For safety of workers employer shall provide-

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

Appendix 12- Aquatic Ecology of Mahi Dam

Mahi-Bajajsagar is the main water body in the district. The baseline status of the planktons (phyto and zoo) present in the lentic water body (Mahi-Bajajsagar Reservoir).

Phyto-planktons

Phytoplankton groups as observed are members of Chlorophyceae, Bacillariophyceae (diatoms), Dinophyceae, Cyanophyceae, Chrysophyceae and Xanthophyceae. About 21 genera of phytoplankton from Mahi- Bajajsagar Reservoir were observed. The average density of phytoplanktons was 86 organisms/ml. Dominance of members of Chlorophyceae and Bacillariophyceae and absence of euglenophyceae members indicated the oligotrophic status of the water body. Details are given in Table 1.

Table 1 : Phyto-Plankton Density & Species Diversity in Mahi-Bajajsagar Reservoir

Phytoplankton	Density (Nos. / ml)	% Composition	Species Diversity
Bacillariophyceae			3.743
<i>Cymbella sp.</i>	3	3.5	
<i>Melosira sp.</i>	2	2.3	
<i>Naviculasp</i>	16	18.6	
<i>Nitzschiasp</i>	4	4.7	
<i>Synedra sp.</i>	2	2.3	
Total	27	31.4	
Chlorophyceae			
<i>Pediastrum sp</i>	4	4.7	
<i>Scenedesmus sp</i>	20	23.3	
<i>Closterium sp.</i>	3	3.5	
<i>Cosmarium sp.</i>	2	2.3	
<i>Ulothrix sp.</i>	2	2.3	
<i>Ankistrodurmus sp.</i>	3	3.5	
<i>Volvox sp.</i>	1	1.2	
<i>Oedogonium sp.</i>	1	1.2	
<i>Spirogyra sp.</i>	1	1.2	
Total	37	43.0	
Cyanophyceae			
<i>Oscillatoria sp.</i>	3	3.5	
<i>Nostoc sp.</i>	7	8.1	
<i>Anabaena sp.</i>	2	2.3	
Total	12	14.0	
Dinophyceae			
<i>Ceratium sp.</i>	5	5.8	
<i>Gymnodium sp.</i>	1	1.2	
Total	6	7.0	
Chrysophyceae			
<i>Chromulina sp.</i>	2	2.3	
Total	2	2.3	
Xanthophyceae			
<i>Botryococcus sp.</i>	2	2.3	

Total	2	2.3	
	86	100.0	

Zoo-planktons

Zoo-plankton groups as observed are members of Rotifera, Cladocera, Copepoda, and Ostrachoda. About 15 species of zooplankton from Mahi-Bajajsagar Reservoir were observed. The average density of zooplanktons was 28 organisms / 10 ml. Among the groups Cladocera members were maximum followed by members of Rotifera, Copepoda and ostracoda.

Table 2 : Zoo-Plankton Density & Species Diversity in Mahi-Bajajsagar Reservoir

Zooplanktons	Density (Nos. / 10ml)	% Composition	Species Diversity
Rotifera			3.651
<i>Brachionus sp.</i>	2	7.14	
<i>Keratella sp.</i>	4	14.29	
<i>Filiniasp</i>	1	3.57	
<i>Mytilina sp.</i>	1	3.57	
<i>Monostyla sp.</i>	1	3.57	
Total	9	32.14	
Crustacea			
<i>Cladocera</i>			
<i>Daphnia sp</i>	5	17.86	
<i>Moina sp.</i>	2	7.14	
<i>Ceriodaphnia sp.</i>	2	7.14	
<i>Diaphanosomasp</i>	1	3.57	
<i>Pleurocus sp.</i>	1	3.57	
Total	11	39.29	
Copepoda			
<i>Cyclops sp</i>	3	10.71	
<i>Mesocyclops sp.</i>	1	3.57	
<i>Rhinodiaptomus sp.</i>	1	3.57	
Total	5	17.86	
Ostrachoda			
<i>Cypris sp</i>	2	7.14	
<i>Centrocypris sp.</i>	1	3.57	
Total	3	10.71	
	28	100.00	

[Source: EIA/EMP Report of 4 X 700 MW PHWR MAHI BANSWARA RAJASTHAN ATOMIC POWER PROJECT (MBRAPP) at Banswara, Rajasthan, 2018]

Appendix 13: Biodiversity Assessment Report of Banswara

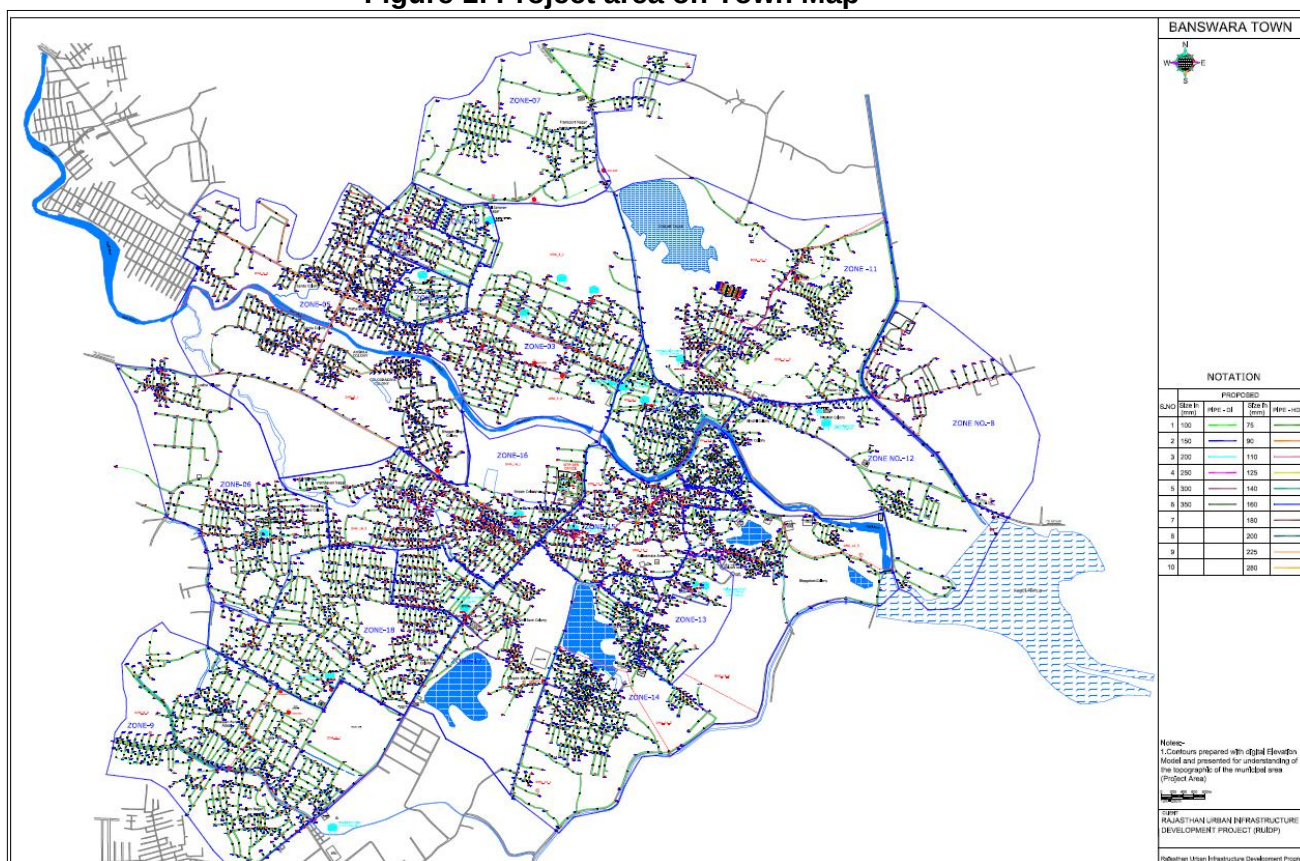
Biodiversity Assessment –Banswara Water Supply and Sewerage Subproject

A. INTRODUCTION

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

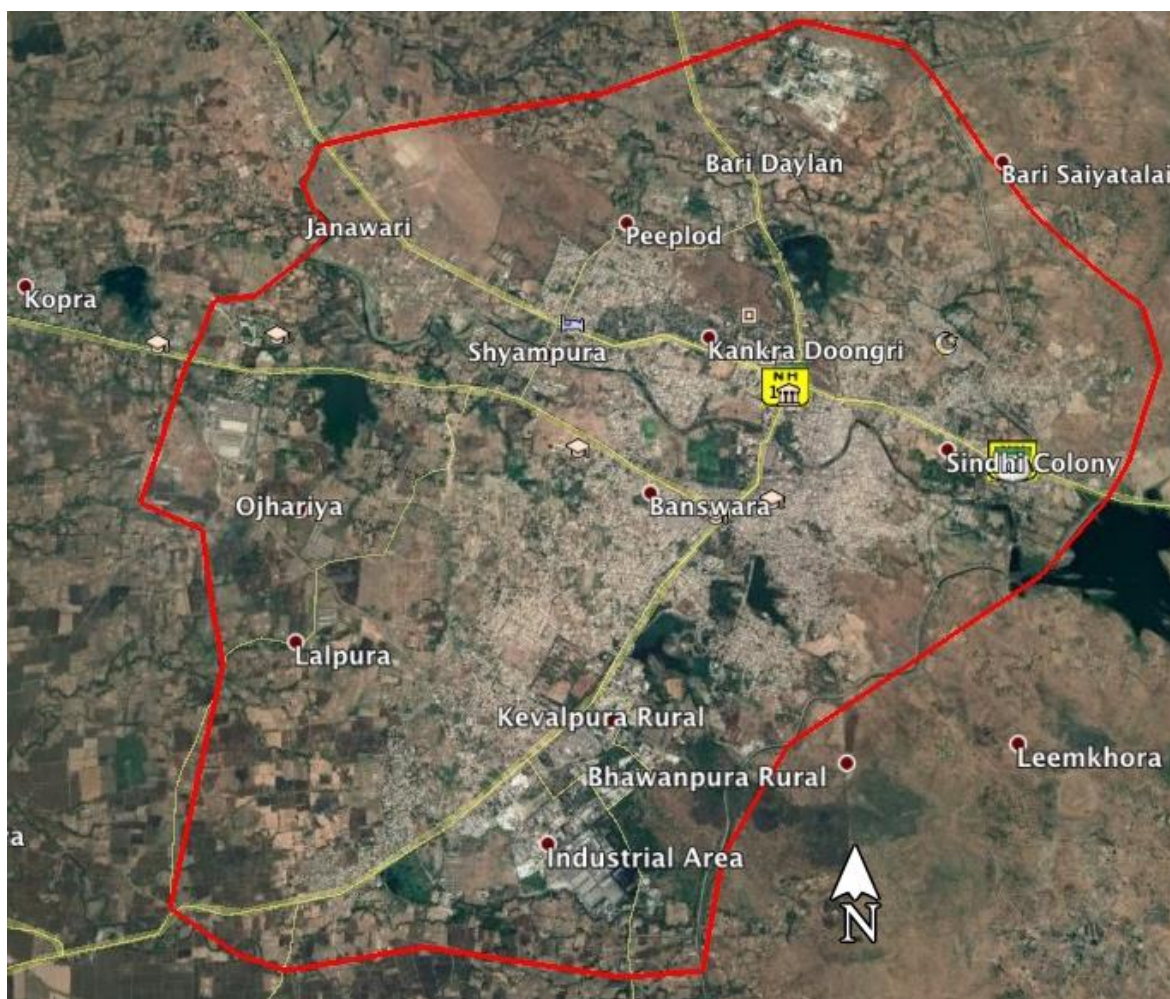
B. PROJECT DESCRIPTION

The project is located in Banswara city of Banswara District of Rajasthan State. The project components are planned and will be located inside the municipality limits on land owned by the government. The water supply system is proposed to expansion with construction of new water treatment plant of 9.25MLD capacity at AEN campus and raw water pumping system at Kagdi Pickup Weir and at AEN PHED campus. Clear water reservoir of 1550 KL capacity and 15.80 km length water transmission main of various diameter DI pipes. For collection and treatment of sewage of the city a collection network of 89 km length including house connections with 2 nos. of sewage pumping stations. One STP of capacity of 9.60 MLD will be based on SBR technology is proposed within existing STP campus at Udaipur road. The location of project component on town map is given in Figure-1.

Figure 1: Project area on Town Map**C. ESTABLISHING PROJECT AREA OF INFLUENCE (PAI)**

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

Figure 2: Map showing boundary of PAI Banswara subproject



The boundaries of PAI for subproject has been established on the basis of physical/topographical features surrounding the Town area. The national highway -113 is passing though the town from south to north on east direction, limit for study area are established covering developed area with a buffer of 2 to 3 km. On north direction of the town a seasonal tributary of Mahi river is taken a limit for PAI boundary. The newly constructed bypass road for town on West direction is boundary for study area. While on the south of the town limits there is a rural road connecting NH-113 to Nawa village road is used to mark the boundary. There is a water reservoir named Kagdi Pichup Lake located on east direction at NH-927A. This reservoir is also included in PAI boundary.

D. BIODIVERSITY ASSESSMENT

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

D.1 KEY BIODIVERSITY AREA

The project areas have been screened to determine presence of Key Biodiversity Areas (KBAs) using the Integrated Biodiversity Assessment Tool (IBAT)⁴⁰. As per the Proximity report generated by IBAT, there are three protected area and five key biodiversity areas within the buffer of 10km and 50km radius of the subproject components. There is no national protected area within 50 km radius of the subproject location and no Key Biodiversity Area is located. The nearest notified area to Banswara Town is Sita Mata Forest Reserve; which is also an IBA site is located at an aerial distance of 55km on north direction.

D.2 PROTECTED AREAS (SITA MATA WILDLIFE SANCTUARY)

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

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

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

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

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

⁴⁰ IBAT is a multi-institutional programme of work involving BirdLife International, Conservation International, IUCN and UNEP-WCMC. IBAT provides a basic risk screening on biodiversity. It draws together information on globally recognized biodiversity information drawn from a number of IUCN's Knowledge Products: IUCN Red List of Threatened Species, Key Biodiversity Areas (priority sites for conservation) and Protected Planet/The World Database on Protected Areas (covering nationally and internationally recognized sites, including IUCN management categories I–VI, Ramsar Wetlands of International Importance and World Heritage sites).

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

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

A4) Congregations

- i) This applies to 'waterbird' species as defined by Delaney and Scott⁴¹ and is modelled on criterion 6 of the Ramsar Convention for identifying wetlands of international importance. Depending upon how species are distributed, the 1% thresholds for the biogeographic populations may be taken directly from Delaney & Scott, they may be generated by combining flyway populations within a biogeographic region or, for those for which no quantitative thresholds are given, they are determined regionally or inter-regionally, as appropriate, using the best available information.
- li) This includes those seabird species not covered by Delaney and Scott (2002). Quantitative data are taken from a variety of published and unpublished sources.
- lii) This is modelled on criterion 5 of the Ramsar Convention for identifying wetlands of international importance. The use of this criterion is discouraged where quantitative data are good enough to permit the application of A4i and A4ii.
- Iv) The site is known or thought to exceed thresholds set for migratory species at bottleneck sites.

⁴¹Delaney and Scott(2002) Waterbird Population Estimates Third Edition, Wetlands International, Wagenigen, The Netherlands

Figure 3: Map showing Protected area in subproject surrounding



D.3 CRITICALLY ENDANGERED / ENDANGERED SPECIES

A total of 30 IUCN red list (CR, EN & VU) species reported within 50km radius. Out of these 30 IUCN red list species, 13 species are classified as Critically Endangered (CR) and Endangered (EN). Birds are common species which includes 19 species (CR-4, EN-7& VU-8), 6 mammals (EN-1, VU-5), 2 reptiles (VU-2), 1 Fish (EN-1) and 2 plants (VU-2). Table-1 lists the species designated by the International Union for the Conservation of Nature (IUCN) as Critically Endangered (CR), Endangered (EN) and Vulnerable (VU) having recorded ranges that include the study area.

Table 1: List of species designated by IUCN threatened species as CR, EN& VU

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

E. CRITICAL HABITAT ASSESSMENT PROCESS

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

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

Criterion 1: Critically Endangered and Endangered Species

Criterion 2: Endemic and Restricted range Species

Criterion 3: Migratory and Congregatory Species

Criterion 4: Highly Threatened or Unique Ecosystems

Criterion 5: Key Evolutionary Processes

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

E.1 CRITERION 1: CRITICALLY ENDANGERED AND ENDANGERED SPECIES

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

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

Thresholds for Criterion 1 are the following:

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

E.2 CRITERION 2: ENDEMIC AND RESTRICTED RANGE SPECIES

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

- For terrestrial vertebrates and plants, restricted range species are defined as those species that have an EOO less than 50,000 km².
- For marine systems, restricted range species are provisionally being considered those with an EOO of less than 100,000 km².
- For coastal, riverine, and other aquatic species in habitats that do not exceed 200 km width at any point (for example, rivers), restricted range is defined as having a global range of less than or equal to 500 km linear geographic span (i.e., the distance between occupied locations furthest apart).

The threshold for Criterion 2 is the following:

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

E.3 CRITERION 3: MIGRATORY AND CONGREGATORY SPECIES

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

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

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

Thresholds for Criterion 3 are the following:

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

E.4 CRITERION 4: HIGHLY THREATENED OR UNIQUE ECOSYSTEMS

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

relevant qualified organizations (including internationally recognized Non-Government Organizations (NGOs)).

The thresholds for Criterion 4 are the following:

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

E.5 CRITERION 5: KEY EVOLUTIONARY PROCESSES

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

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

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

XI. CRITICAL HABITAT ASSESSMENT IN PAI

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

E.6 IBAT STUDY OUTPUT FOR HABITAT ANALYSIS (CRITERIA 1-3)

A habitat analysis carried out for the Critically Endangered (CR) and Endangered species reported in the project area of influence (50km) shows that it is likely that the 35 species

identified in IBAT are mostly located inside the ecological areas and not within the project area of influence (PAI). Details of the habitat analysis in the PAI is presented in Table-2.

Table 2: Habitat Analysis in PAI – Banswara Subproject

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

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

S. No.	Common Name (Species Name)	IUCN Category	Habitat Preferences	Likelihood of Occurrence in PAI
16	Asian woollyneck (<i>Ciconia episcopus</i>)	VU	Marine Intertidal, Forest, Artificial/Terrestrial, Artificial/Aquatic & Marine, Grassland, Wetlands (inland), Marine Neritic	None; the species is found patchily across South Asia and South East Asia, range extends throughout India https://www.iucnredlist.org/species/22727255/110064997
17	Greater spotted eagle (<i>Clanga clanga</i>)	VU	Forest, Wetlands (inland), Shrubland, Artificial/Aquatic & Marine, Grassland	Yes; the species non-breeding habitat is found across South Asia and South East Asia, range extends throughout northeast and Northern India https://www.iucnredlist.org/species/22696027/110443604
18	Indian spotted eagle (<i>Clanga hastata</i>)	VU	Forest, Wetlands (inland), Artificial/Terrestrial	Yes; The species is widespread habitat and recorded at very low densities in the lowlands of the Indian subcontinent (Robson 2000, Parry et al. 2002, Rasmussen and Anderton 2005, Tordoff et al. in press) https://www.iucnredlist.org/species/22729779/95021573
19	Yellow-eyed pigeon (<i>Columba eversmanni</i>)	VU	Desert, Caves and Subterranean Habitats (non-aquatic), Wetlands (inland), Shrubland, Artificial/Terrestrial	None; in India species non-breeding habitat extend is limited in north-west parts including parts of Rajasthan State. https://www.iucnredlist.org/species/22690097/110099638
Mammals				
20	Indian Pangolin (<i>Manis crassicaudata</i>)	EN	Forest, Savanna, Shrubland, Artificial/Terrestrial, Grassland	Yes; species is distributed in South Asia through much of India including Rajasthan https://www.iucnredlist.org/species/12761/123583998
21	Smooth-coated otter (<i>Lutrogale perspicillata</i>)	VU	Artificial/Aquatic & Marine, Wetlands (inland), Forest, Grassland, Marine Coastal/Supratidal, Marine Neritic, Marine Intertidal, Shrubland	Yes; species is distributed in South Asia through much of India including Rajasthan https://www.iucnredlist.org/species/12427/21934884
22	Sloth bear (<i>Melursus ursinus</i>)	VU	Forest, Savanna, Shrubland, Grassland, Artificial/Terrestrial	None; the species habitat is limited between Alwar and Jaipur stretch as per IUCN species distribution map. https://www.iucnredlist.org/species/13143/166519315

S. No.	Common Name (Species Name)	IUCN Category	Habitat Preferences	Likelihood of Occurrence in PAI
23	Leopard (<i>Panthera pardus</i>)	VU	Forest, Desert, Rocky areas (eg. inland cliffs, mountain peaks), Grassland, Savanna, Shrubland	None; Leopard range widespread in inside and outside Protected Areas of India. https://www.iucnredlist.org/species/15954/160698029
24	Four-horned antelope (<i>Tetracerus quadricornis</i>)	VU	Forest, Shrubland	None; species habitat is extended most parts of India including Rajasthan https://www.iucnredlist.org/species/21661/50195368
25	Sambar (<i>Rusa unicolor</i>)	VU	Forest, Artificial/Terrestrial, Savanna, Shrubland, Grassland, Wetlands (inland)	None; the habitat extend is throughout India except North India and western parts of Rajasthan and Gujarat state. https://www.iucnredlist.org/species/41790/85628124
Reptile				
26	Mugger (<i>Crocodylus palustris</i>)	VU	Wetlands (inland), Marine Neritic, Artificial/Aquatic & Marine	None; the species habitat extends in India to waterbodies including rivers, in Rajasthan State mainly in River Chambal. https://www.iucnredlist.org/species/5667/3046723
27	Indian star tortoise (<i>Geochelone elegans</i>)	VU	Forest, Shrubland, Grassland, Artificial/Terrestrial	None; as per study by Gaur during 2006 the species habitat is found in three broadly disjunct areas of geographic occurrence: northwestern India (Gujarat, Rajasthan) and adjoining southeastern Pakistan; eastern and southern areas from Tamil Nadu, Andhra Pradesh and eastern Karnataka to Odisha (Orissa). https://www.iucnredlist.org/species/39430/115173155
Fish				
28	<i>Tor putitora</i>	EN	Wetlands (inland), Artificial/Aquatic & Marine	None; the natural habitat of the species is throughout the rivers (and associated reservoirs) of the South Himalayan drainage (namely the Indus, Ganges-Yamuna and Bramaputra)(Kolkolo 1996) https://www.iucnredlist.org/species/126319882/126322226
Plant				

S. No.	Common Name (Species Name)	IUCN Category	Habitat Preferences	Likelihood of Occurrence in PAI
29	Atlas daisy (<i>Anacyclus pyrethrum</i>)	VU	Rocky areas (eg. inland cliffs, mountain peaks), Forest, Grassland, Shrubland	None; the plant species is native to India and extend of occurrence in Rajasthan State. https://www.iucnredlist.org/species/202924/121743450
30	Asian Rice (<i>Oryza malampuzhaensis</i>)	VU	Particularly found in forest reserves either in marshy fields or along the margins of streams or rivulets in the forest interiors	None; the species is endemic to the Kerala region in India. https://www.iucnredlist.org/species/112680709/113899465

E.7 ASSESSMENT OUTPUT BASED ON CRITERIA 4&5

The ecosystem within the project area of influence has not been assessed to date under IUCN assessment for the extinction threat to species. The ecosystem within the PAI is not considered to be highly threatened, as main land use is of residential & commercial in urban or agricultural in the surrounding locality. Further, there is no key evolutionary processes⁴² within the PAI, as key indicator for evolutionary process areas is presence of a high number of endemic or range restricted species. Therefore, the project area of influence does not meet the thresholds set out in Criterion 4 & 5.

E.8 PROTECTED AREAS

As per ADB's SPS 2009; the designated⁴³ or proposed protected areas at national and international level should be considered as Critical Habitat. In the PAI for subproject in Banswara Town there is no national protected area and no international designated site or proposed and notified protected area. The nearest national protected area and Key Biodiversity Area is Seeta Mata Forest Reserve, which is approx. 60 km away from the PAI boundary established for critical habitat assessment study.

F. IMPACTS & MITIGATION MEASURES

The project components are proposed to be implemented within the developed areas of Banswara Town and on land under municipal limits. The project area is approx. 60km away from the boundary of nearest protected area of Seeta Mata Wildlife Sanctuary. The sanctuary area is located at where ancient mountain ranges of The Aravallis, The Vindhya and Malva Plateau meet together forming the Northwestern limits of Teak Forest. The nearest Key Biodiversity Areas and national protected areas are located more than 60km aerial distance from the project town. There is water body on east direction of town area that may attract migratory birds and other wildlife in the area.

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

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

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

⁴²The evolutionary processes often occur in an isolated habitat and ecosystem due to physical or biological barriers, for example habitat on islands or valley.

⁴³As per ADB's SPS the sites which are of international designation, such as Ramsar and UNESCO sites should be considered as Critical Habitat.

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

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

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

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

Table 3: Impact-mitigation measures for EMP

Field	Anticipated Impact	Mitigation Measure	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Design					
Site selection for project component implementation	Disruption of biodiversity & damage to habitat due to project infrastructure at specified location	(i) Avoid or no land acquisition in forest area or in notified wildlife area	PIU/PMU	PMU	No cost required Mitigation measures are part of project design
Water in wastewater drain and tree cutting	Sources of food and water for birds in the area	(i) Green belt and landscaping development plan at location of proposed STP	PIU/PMU	PMU	No cost required mitigation measures are part of project design
Permission	Failure to obtain necessary permits for tree cutting can result to design revisions and/or stoppage of works	(i) Ensure all permission before start of construction in place (ii) Removal of trees after verification and approval from concerned agency (iii) Plantation of three trees against every single tree removed	PIU/PMU	PMU	No cost required mitigation measures are part of project design
Construction					
Construction camp location	Impacts on forest resources for establishing construction camp and plants.	(i) Prior approvals for establishing construction facilities from PMU with submission of location details (ii) Construction facilities such as workers camp, construction camp, batching plant should be located at least 1 km away from the forest stretches	Construction Contractor	PMU	Cost for implementation of mitigation measures responsibility of contractor
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	(i) Impact due to noise generated from project activities (ii) Contamination of water and soil due to construction waste disposal in forest area	(i) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers to reduce impact to surrounding sensitive receptor; and (ii) Prepare and implement construction waste management plan (iii) Disposal of waste at designated sites and	Construction Contractor	PMU	Cost for implementation of mitigation measures responsibility of contractor

Field	Anticipated Impact	Mitigation Measure	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		approval from local authorities (iv) Conduct surface quality monitoring according to the EMP.			
Construction Workers	Involvement in illegal hunting, trapping and wildlife trading	(i) Awareness training to workers on wildlife presence in the project area and protection of wildlife. (ii) Reporting to PMU on slighting of wild animals in the project area. (iii) Employment agreements should specify heavy penalties for illegal hunting, trapping and wildlife trading – all other ancillary works should also agree not to participate in such activities. (iv) Strict anti-poaching surveillance measures need to be implemented, especially during project construction phase	Construction Contractor	PMU	Cost for implementation of mitigation measures responsibility of contractor
Operational Stage					
Project area development	Failure of STP for wastewater treatment, plantation of non-fruit bearing trees, contamination of water source or agriculture fields due to inadequately treated wastewater	(i) Regular monitoring of treated effluent quality before discharge or reuse for plantation and irrigation purposes (ii) Tree plantation and landscaping in the project area as per approved plan with preference to local species	O&M Contractor	Banswara Nagar Parishad	Contractor's O&M cost

G. CONCLUSION

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

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

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

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

H. RECOMMENDATION

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

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

Appendix 14: Sample Asbestos containing material (ACM) Management Plan

BACKGROUND OF ASBESTOS

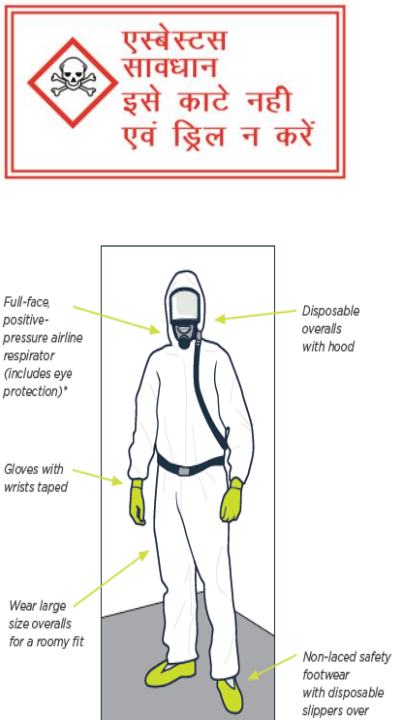
1. The purpose of this Asbestos Management Plan (AMP) is to identify, use appropriate methodology and scientifically handling /disposal of the Asbestos Containing Materials (ACM) in order to comply with the applicable National legislation and International standards in sync with norms of ADB's SPS 2009. ADB has mandated as per Appendix 5 - prohibit the investment activities list - production of, trade in, or use of un-bonded asbestos fibers is deliberated. As per SPS 2009 Safeguard Requirement 1, it is emphasized "that the borrower/client will provide workers with a safe and healthy working environment" in the work areas with accounted risks inherent to the work zone and defined safety instructions and standard operating procedures identifying roles and responsibilities.

2. Asbestos is a collective name given to a group of minerals that occur naturally as fiber bundles and possess high tensile strength, flexibility, heat resistance, non-biodegradability with chemical and physical durability. Asbestos is hydrated silicates with complex crystal structures. It is found in two configurations: chrysotile (derived from serpentine minerals) and amphibole is a naturally occurring mineral with long thin fibers. The most abundant asbestos used in the world is chrysotile. The use of ACM propagated due to its economic viability.

3. The purpose of this AMP is to identify, use appropriate methodology and scientifically handling /disposal of the Asbestos Containing Materials (ACM) in order to comply with the applicable National legislation and International standards in sync with norms of ADB's SPS 2009.. As per SPS 2009 Safeguard Requirement 1, it is emphasized "that the borrower/client will provide workers with a safe and healthy working environment" in the work areas with accounted risks inherent to the sector and defined safety instructions and standard operating procedures identifying roles and responsibilities.

Table.1
REGULATORY FRAMEWORK, STANDARDS AND PROTOCOL

Government of India Laws, Regulations and standards on Asbestos Applicable to the projects	Requirements for the project
IS 11768: 1986/2005: Recommendations for disposal of asbestos waste material	The standard emphasis that every employer who undertakes work which is liable to generates asbestos containing waste, shall undertake adequate steps to prevent and /or reduce the generation of airborne dust during handling, storing, transportation and final disposal of final disposal of asbestos and asbestos containing products. • The crux is waste avoidance: the practice inculcated should focus the on minimal waste generation. • Waste Collection: In the project circumstance, the waste is referred to

	the damaged powered asbestos which will be collected in the Permissible plastic bags to be disposed off to the nearest TSDF facilities.
IS 12081: Pictorial Warning to be implemented on equipment containing Asbestos Contaminated Products.	The objective of the caution is to make the person handling to take all pre-cautionary measures and make them aware of all the possible risk. 
IS 11451: Safety and Health Requirements related to Occupational Exposure to Asbestos contaminated Products.	In the project the norms pertaining to limiting number of hours working with ACM will be 8.0 hrs/48 hrs a week and the medical examination has to be periodic, the environmental monitoring has to be done as per the protocol. The safety at work place shall be enforced.
IS 11768: Waste Disposal Procedure for Asbestos Containing Products.	The protocol pertaining to disposal of the waste is emphasized, the collection of ACM powered will be in permissible plastic bags, which will be twisted tight at the neck so that the wear and tear due to abrasion will be minimum and the transportation of the asbestos waste has to be done by the authorized vendor to the approved landfill site that in the project case id TSDF.
Sampling of asbestos fiber (as per BIS-11450) has to be done regularly using personal sampler and determined using	The Sampling and analysis protocol is emphasized. Details are given as above.

phase contrast microscope.	
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Further, there are several legislations that regulate the use and handling of asbestos as applicable, namely:

- a. The Supreme Court of India – Banned ACM use in January 21 2011.
- b. National Green Tribunal - In pursuant to the above order, in 2015, NGT issued an order- “that there is no asbestos mining presently operational anywhere in the country and the operations of the mines of associated minerals with asbestos has also been halted.”
- c. Environmental (Protection) Act (1986)-Environmental monitoring.

RISK ASSESSMENT:

4. The process of evaluation of risk at all the working sites was evaluated with the inventorization of the unscientific storage pipes-in case of worst scenario. The site identified and evaluated was Sardarshar. Site visit was conducted to evaluate the risk associated with the ACM handling and re- handling. Working with or handling AC pipes in manner that produces dust, fibers, air borne particles etc., is very harmful and hazardous to the workers and general public in and around the work sites. The condition of existing underground AC pipes are not known, however, as these are old certain pipes will be in deteriorated conditions. So the Conditions were presumed if it is in friable form or in a condition in which it can release fibers before it is subjected any disturbance or removal, all safeguard measures needs to be adopted. There were certain areas where the AC pipes were subjected to shear and are powered, and AC Pipe ends were damaged these were the high risk zones in the campus. The probability of the air borne asbestos fibers in the areas cannot be over ruled.

5. Thus it is necessitated to draft standard operating procedure for disposal of ACM. The purpose of this standard operating procedure (SOP) is to ensure the safe handling of AMC including protection from hazards associated with uncontrolled distribution, encounter and removal of Asbestos Cement (AC) Pipes and pipe fittings. The scope of this SOP encompasses all aspects of safe AC pipe handling including identification of site, re-handling and encountering of ACM, site selection and proper identification for storage, inventorization, monitoring, final disposal, training and maintenance of records.

6. The fatal health hazard with inhalation of air borne asbestos fibers and its adverse health impact are known and needs a proper attention and planning with defined roles and responsibilities to ensure the work zone is at minimal risk and safe for the workers. It is also necessary to mandate the standard operating procedures with implementation of all requisite safety gears.

7. The assessment of the ACM disposal will be vested with the DOB Operator. The undamaged pipe-where the pipe ends are intact that there is no damaged on the entire length of pipe-to be stored in isolated storage with secured pipe ends either by wrapping the ends with permissible plastic bags. The damaged/broken pipes/powered pipes will be disposed off, by bagging the same in permissible plastic bags. All the records pertaining to the inventorization has to be kept by the DBO Contractor. The same shall be cross verified by RUIDP.

EMERGENCY RESPONSE PLAN & CHANCE FIND PROTOCOL

8. The emergency procedures should include managing an uncontrolled release of asbestos

materials into the workplace. The onus of the same shall be ensured with immediate action of the field staff-DOB Operator/ HSE Staff. Steps should be taken to:

- Warn anybody who may be affected.
- Exclude from the area anyone not needed to deal with the release.
- Identify the cause of the uncontrolled release.
- Regain adequate control as soon as possible.
- Make sure anyone in the work area affected, who is not wearing personal protective equipments (PPEs), including respiratory protective equipment (RPE), leaves the affected area immediately.
- Minimize the spread of asbestos by ensuring they are suitably decontaminated.
- Clean up dust and debris.
- Decontaminate anyone who is contaminated with dust and debris.
- Ensure rags, clothing or PPE is decontaminated or disposed of as contaminated waste.
- Consider alone and/or remote workers to ensure they can alert someone if necessary.

Check what you're working on before you start:

- Avoid using a sweeping brush as this can spread asbestos.
- Make sure no unauthorised personnel enter the area.
- The clean-up of any accidental release of higher risk materials, eg asbestos cuttings, powered asbestos that may release the asbestos fibers, to be done by authorized person

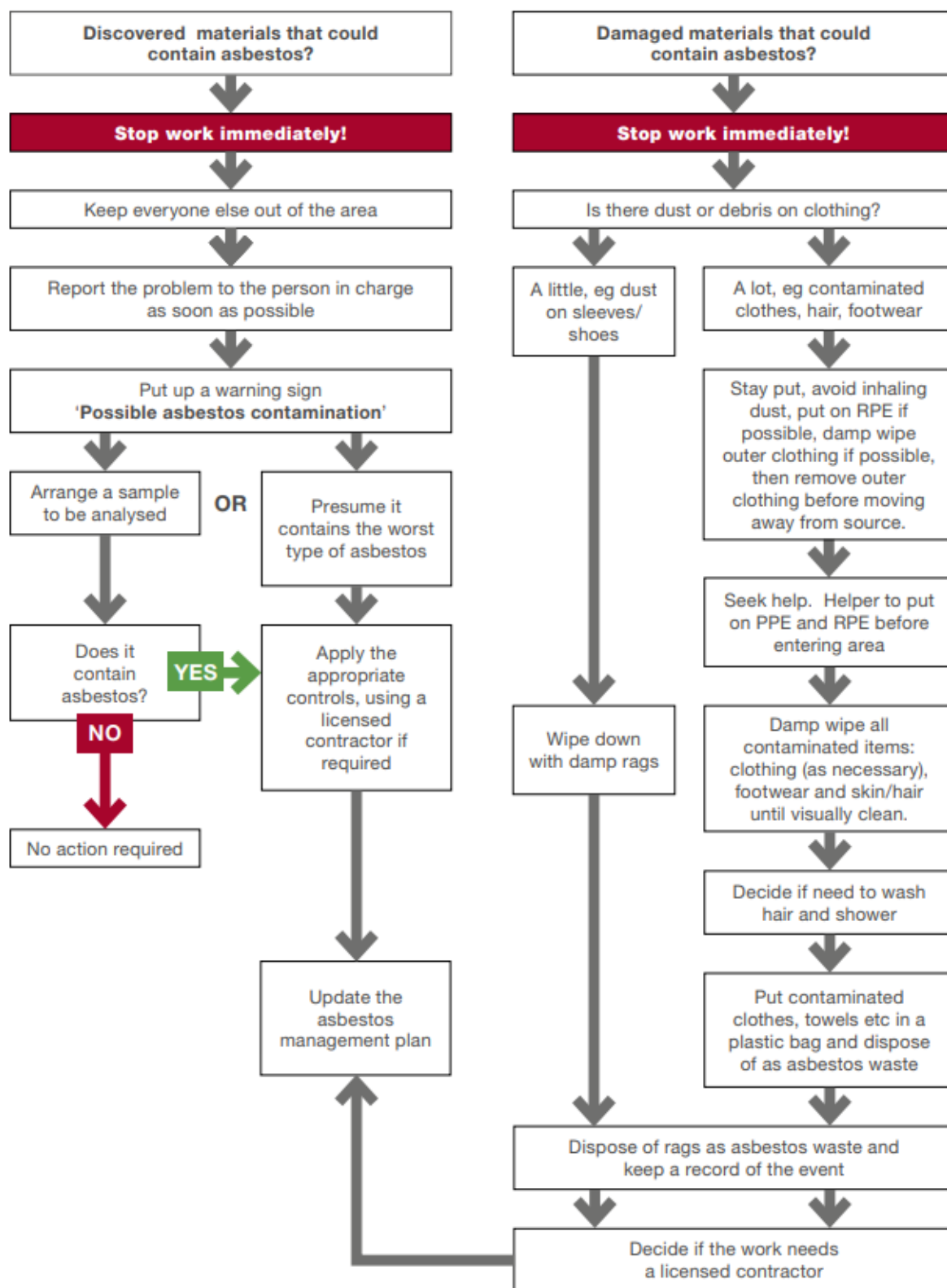


Fig.No.1-Showing Flow chart of ERP

Table.no.2-Roles and Responsibilities

PRE-CONSTRUCTION				
Activities	Responsibilities	Associated Documents	Estimated Cost	Remark
Design to encounter minimal ACM, and then Identification &Inventorization ACM - AC pipes & fittings	RUIDP &DBO CONTRACTOR	Form-I	Rs.100/km	The onus of the minimal encounter of ACM is vested upon the RUIDP and inventory will be with the DOB Operator and has to be annually verified by RUIDP.
Define & confine ACM storage area-in-situ			Rs.65/Sq.m	The storage area made available will be confined and fenced.
Warning signage near the ACM work site, storage and on AC pipes in local language**			Rs.500/label	The signage labels can be printed, sticker pamphlets or painted.
Training of personals handling the AC pipes and fittings	DBO CONTRACTOR	Form-II	Rs.1000/Person	All requisite safety gears should be made available at all sites.
Use of safety Gears			Rs.6000/Person	All the safety gears should be silicon based and suitable for Asbestos protection.
Briefing of Emergency Response Plan			Rs.500/Person	All the risk zones with respect to white card has to be briefed.
Confined storage with access control plan			Rs.5000/site	Inward and outward movement of authorized person must be allowed and has to be guarded or should be under key control.
Pre-history medical records of the ACM handling team			Rs.3000/Person	All requisite medical test, Respiratory test, lungs /Chest X-ray/CT Scan, Blood Test, Lower Abdomen examination etc
CONSTRUCTION PHASE				
Monthly Inspection & Annual Environmental Monitoring.	DBO CONTRACTOR	Form-III	Rs.40,000/sample	The sampling zone should be 500 m from the storage site and personal sampling has to be as per SOP-2
Reporting in SEMR	RUIDP/ DBO CONTRACTOR	None	Nil	As per ADB Format
Collection of Health records in compliance to the local laws	DBO CONTRACTOR/R UIDP/PHED/LSG	Form-IV	Nil	For regular evaluation & identification of any aboronmality.

Ensure adoption of all standard operating procedure		SOP-1&2	Nil	As revision desired on basis of Site specific information may be upgraded in the SOP 1&2 if required
Collection, Segregation, Reception and Disposal as per National norms of ACM		Form-V	Nil	Standard Regulatory format has to be filled and disposed off within 90 days.
Use of safety gears prior to handling of ACM based on White Card.		White Card-Page-11	Nil	Periodic training can be site specific
Disposal of ACM to the identified TSDF Facility to be done as per procedure within or prior to 90 days		SOP-2	1500/ton of waste plus freight as per actual.	Within 90 days from the generation of waste, in case of existing waste it has to be disposed off within 90 days from the Project Start.
To inform and fill the returns in the prescribed manifest as per HWMR.		Form-V(Form-10 of the Rule HWMR	Nil	90 days from the start of work
To facilitated a restricted confined storage space with access control with proper inventorization.		Form-II	Nil	Site Specific
In-situ storage of ACM.	DBO CONTRACTOR	Form-VI		The storage of existing and encountered ACM pipes (more than 4.0 ft) will be stacked end to end at 90 deg. With vertical stacks, 8 inches above the ground, covered with permissible plastic sheet. The campus custodian-viz PHED etc should also be informed about the In-situ storage of ACM and its impact.
ACM removal	DBO CONTRACTOR	--	--	Follow ACM Removal
Record maintenance of ACM in-situ and disposed off to TSDF	DBO CONTRACTOR	Form-I & Form-IV	Nil	The copies of inventory generated and collected will have to be shared with Land Custodian (LC), RUIDP and DOB Operator. To distinguish the forms they can be

				numbered. FORM-I(LC),Form-IV(LC)
Transits ACM storage of waste to be disposed off to TSDF	DBO Contractor	Form-IV	50,000/room	An isolated storage room should be constructed with 10x10 with height of 3.5 ft roofed properly for transit disposal of ACM to TSDF. DISPOSABLE ASBESTOS WASTE STORAGE ROOM HAZARDOUS WASTE CATEGORY-15.2 (as per Hazardous waste management & Handling Rules 2015).
POST CONSTRUCTION PHASE				
Compliance of AAQM, Asbestos Fiber monitoring and Soil Quality monitoring and Periodic Work zone monitoring(Asbestos fiber count) records to be maintained	DBO Contractor	SOP-2	Rs.40,000/sample	The Asbestos Fiber count monitoring has to be conducted prior to ACM handling operation and after ACM Handling operation by an Accredited Laboratory. List of accredited laboratory will be available at Rajasthan State Pollution Control Board website- rspcb.nic.in
Health records & Periodic Medical Checkup of the personals handling ACM to be maintained.	PHED/LSG/DBO CONTRACTOR	Form-II	Rs.3000/Person	All the concerned employees deputed to handle or deal with ACM has to have Pre medical history and periodic medical examination done

Permissible Levels

9. Permissible Exposure Limit (PEL) for asbestos is 0.1 fibers per cubic centimeter of air as an eight hour time weighted average (TWA), with an excursion limit (EL) of 1.0 asbestos fiber per cubic centimeter over a 30 minutes period.

ACM REMOVAL

ACM Removal has to be checked in sync with the design and emphasis has to be laid to avoid the removal of ACM, in case it is unavoidable, then all the requisite safety gears are to be adopted:

- Inform the Asbestos Expert/HSE Expert prior to removal.
- Isolate the area with access to only trained staff/employees under supervision of Asbestos /HSE Expert.
- Exhibit all warnings

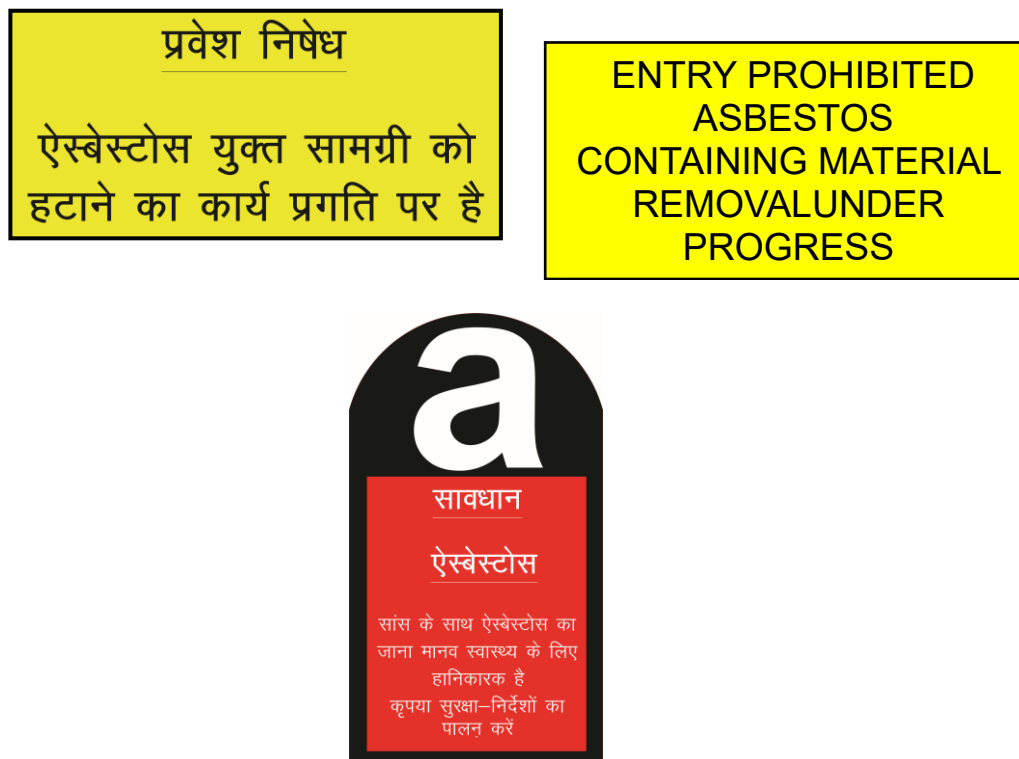


Fig.No.2 Asbestos warning signage

- Undertaken Asbestos fiber Monitoring
- The trained Employees have to be deputed for removal of ACM.
- The removal ACM material has to be check with the status and extent of damage.
- Efforts should be made to remove the ACM as minimal as possible.
- The ACM removal has to be manual; it should neither be cut nor drilled.
- All removal operation should be undertaken with ACM in wet condition.
- The removed ACM will then be labeled and placed on permissible plastic sheet. It should not be put on ground directly.
- The dimension of plastic sheet should be larger than the ACM placed.
- If the ACM pipe is not damaged as about 4.0 ft and above, the ACM will be subjected for in-situ disposal.
- If the ACM is damaged and broken then it has to be packed in permissible plastic bags and disposed off to TSDF.
- Prior to disposal it can be stored in isolated room-showing board of –Hazardous waste storage room.
- The hazardous waste to be disposed off to TSDF should not be stored over 90 days after the removal date of ACM at site.
- All the safety procedures and safety gears should be worn by all the employees engaged in the ACM Removal operation.
- The Asbestos fiber monitoring, soil monitoring has to be undertaken during the operation as well.
- The process of removal of ACM will be completed after the removed ACM and its suitably disposed off either in -situ or to the isolated room prior to disposal at TSDF.
- Post ACM Removal asbestos fiber monitoring has to be undertaken to ensure the work zone

is safe to resume further operations.

Safe Practices in Handling ACM

10. Proper handling and PPE:

- a. Cover up and wear PPE (Personal Protection Equipment). including respirator or dust mask
- b. Make sure the mask has two straps to hold it firmly in place. Don't use masks that only have one
- c. Also wear a Hard hat, gloves, disposable coveralls with a hood, and safety glasses or goggles to protect eyes
- d. Do not eat, drink or smoke in the work area as you may inhale or eat dust. Wash your hands and face with soap and water before meal breaks and when finished work for the day.
- e. Do not use power tools Asbestos fibers can be released if power tools are used for anything other than the removal of screws.
- f. Do not water blast or scrub with a stiff broom or brush. It is illegal to water blast asbestos cement sheets. If the material has been accidentally water blasted or has suddenly deteriorated in some way, you should call a licensed asbestos removal DOB Operator
- g. Wet gently with water when removing asbestos cement pipes, use a pump spray to lightly dampen the pipes and keep the dust down. Remember: Not to waterblast asbestos cement materials.
- h. Avoid drilling and cutting into asbestos products.
- i. Do not drill holes through and never cut Instead remove the entire product and replace it with a non-asbestos product
- j. Don't drop fiber pipes remove them carefully, Lower them to the ground, don't drop them, to minimize breakage.
- k. Lay plastic sheeting under the work area to prevent any dust contaminating the ground. Use 200 micron thick plastic sheeting or bags or as permissble these must not be made from recycled materials or re-used for any other purpose.
- l. The work area has to be barricaded and there should be no un-authorized person allowed. Only Trained ACM expert should be allowed to handle the ACM along with EHS Expert.
- m. Close windows and doors and seal vents to stop dust getting into the house; ask neighbors' to do the same.
- n. Seal off other places where dust can get in.
- o. Remove soft furnishings like rugs, clothes, jute bags from the work area, and seal anything with plastics if it cannot be moved.

- p. All the AC broken pipes have to collected and stacked properly with 200micron plastic wrapping with warning signage.
 - q. Do not leave plastic sheet lying about where they may be further broken or crushed by people or traffic.
 - r. Remove all ACM by the trained handler.
 - s. Since we are amidst of dry climatic conditions due care must be taken to see that no waste broken pipes or fittings are left loose and outside the confined area and may be dampened as required.
 - t. Mark and add signage.
11. Due care has to be taken to collect the dampened waste in a permissible standard bags with proper warning signage's.
12. The wastages packed have to be disposed off to Treatment, Storage or Disposal Facility(TSDF).The plastic bags must have legible note:
- d. Waste Type:
 - e. Date of packing:
 - f. Qty/Numbers:
 - g. Packed by:
 - h. Warning Signage:
 - i. Disposal

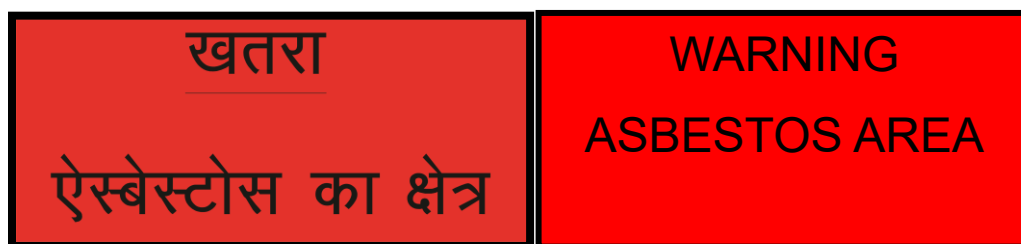


Fig.No.3- ACM: In-situ storage warning

13. The AMP procedures-**Standard Operating Procedure-01-** are as follows and are summarized as above
- a. Objectives – to keep the work zone safe and secured.
 - b. Requirements – identify all the requirements needed for handling AC in the specific site and project
 - c. Conduct and ensure awareness and vocational training to ACM handlers
 - d. Conduct a comprehensive identification and risk assessment of ACMs
 - e. Apply restriction / re-handling of ACM on ground-use of PPE. Ensure that workers handling ACM have the right PPEs as follows:
 - i. Hard helmet
 - ii. Overall suit
 - iii. Gloves
 - iv. Mask to be strapped tight
 - v. Safety goggles

- vi. Safety shoes
- vii. Ear plugs
- f. Avoid underground encountering of ACM
- viii. Ensure that an authorized person (HSE) are supervising the work
- ix. Barricade the area with signage
- x. Damp ACM
- xi. Use safety gears
- xii. Dismantle ACM to be labeled, kept on plastic grounding and packed in permissible bags
- xiii. Label the bags properly
- xiv. Ensure shipping to proper disposal sites
- g. Site selection – the disposal site should be ready to handle ACM and protect the nearby people as well The site selection criteria are as follows:
 - xv. Away from habitation
 - xvi. Avoid low lying areas
 - xvii. Away from water storage
 - xviii. To be enveloped with minimum of 8-feet height enclosure
 - xix. Avoid high vertical stacks
 - xx. Access controlled
 - xxi. Proper signage enclosure
- h. Proper re-handling of AMC, labeling and packing
- i. Control access and ensure proper monitoring of records, specifically:
 - xxii. Environment
 - xxiii. Health
 - xxiv. Reporting to regulators

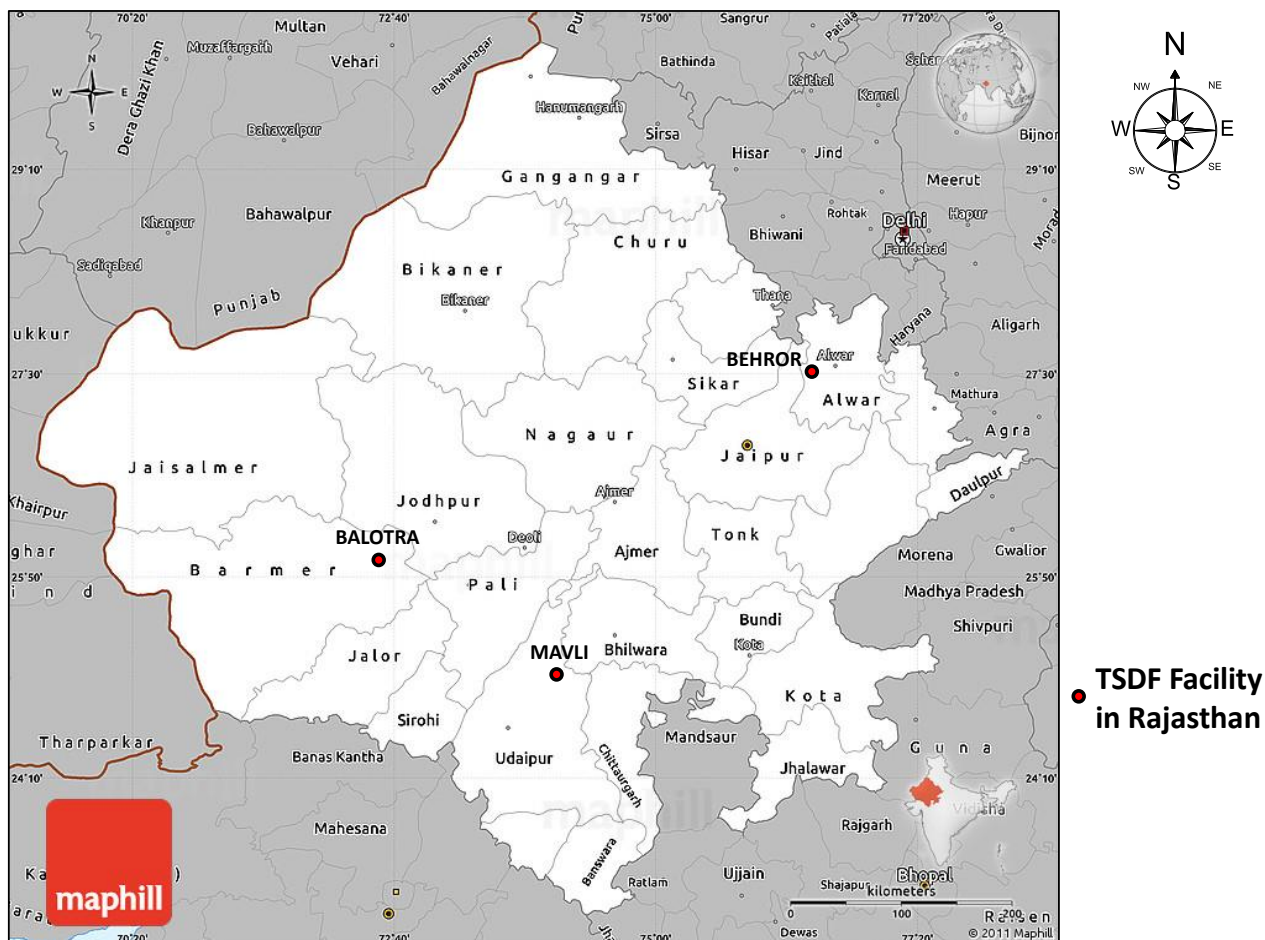
Dispose the ACM through qualified DOB Operators up to the Total Sanitary Disposal Facility (TSDF)

LIST OF APPROVED TSDF OPERATORS IN RAJASTHAN

S.No	Operator	Address	Remark
1.	Rajasthan Waste Management Project (M/s Ramky Enviro Engineers Ltd)	Survey 1018/13, Vill-Gudli, Tehsil-Mavli, Zinc Choraha to Debari Railway Station Road, Dist Udaipur (Rajasthan).	This TSDF is for all kind of hazardous waste as listed in the hazardous waste (Management & Handling) Rules.
2.	Ramky Enviro Engineers Ltd, Balotra	Ramky BWMP Rd, Rajasthan 344032.	This TSDF is for all kind of hazardous waste as listed in the hazardous waste (Management & Handling) Rules

3.	Continental Petroleum Ltd	Bheror, Distt- Alwar	Only for Incineration
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Label/display for TSDF disposal bags has to have clear display of the content in both English and local language as displayed under:



The above map clearly depicts the location of approved TSDF in Rajasthan.

IN-SITU STORAGE ACM PIPES AREA

The removed undamaged ACM pipes have to be stacked properly as shown below to avoid any rolling of the pipes and eventual damage. The existing ACM Pipe stacking has to be re-handled to stack the ACM pipes properly. If the removed ACM Pipes is less than the full length of the ACM pipes, then separate stack of the same should be done with proper pre-caution and safety measures and gears.

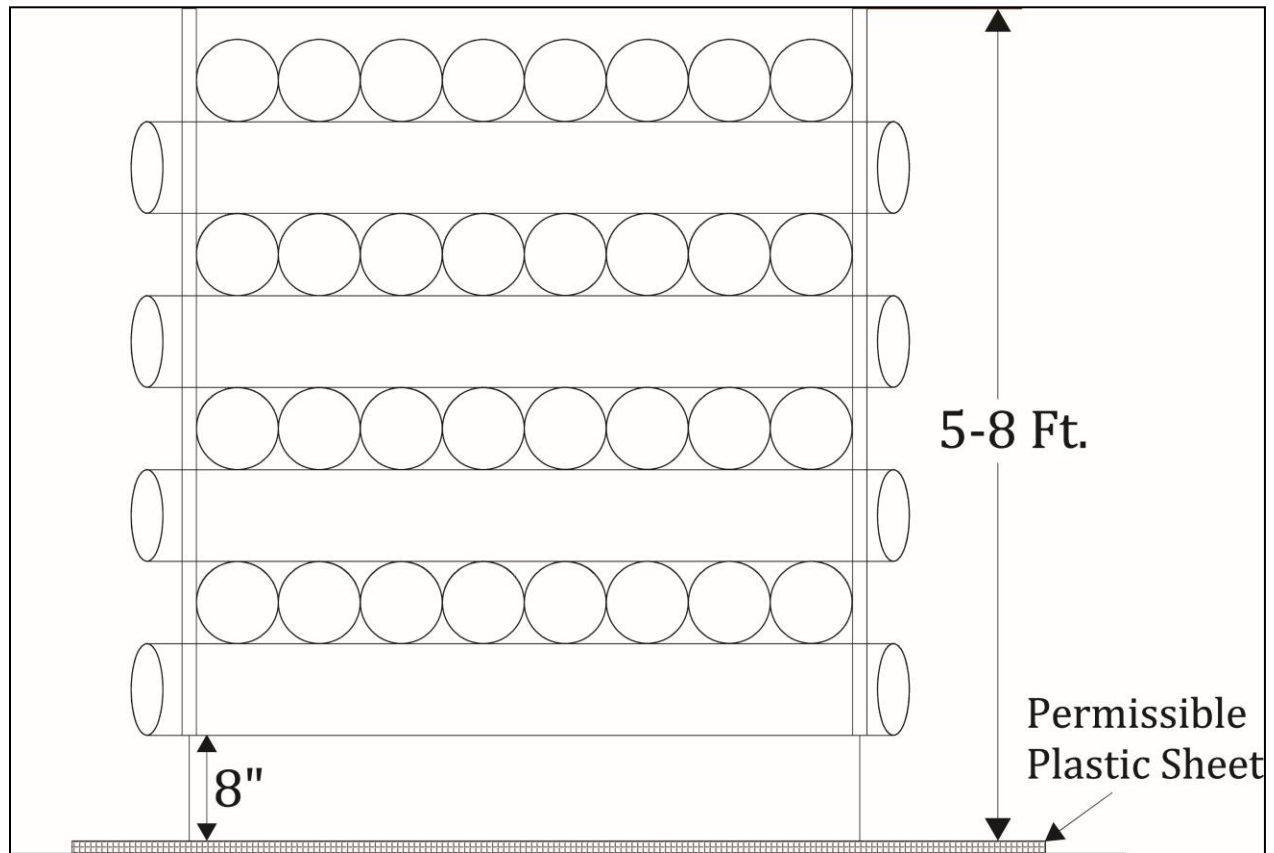


Fig.No.5: Schematic diagram showing ACM Pipes stacking

The ACM stack has to be enveloped with proper fencing showing internal movement of person with 4.0ft corridor all around the stack. The Storage area will have display of all requisite warning and access control of the authorized person's entry and exit.

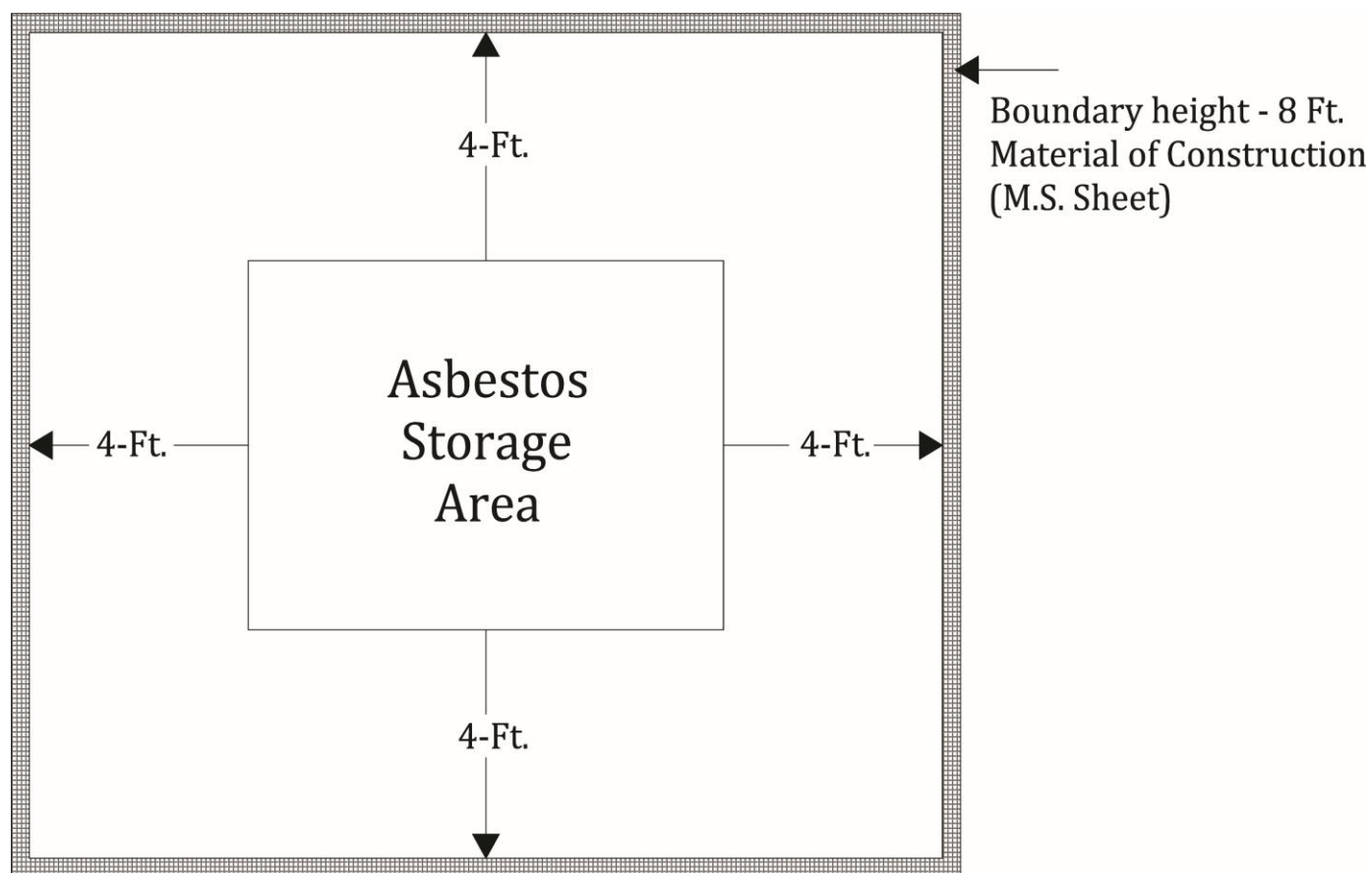


Fig.No.6: Schematic diagram showing ACM Pipes storage area

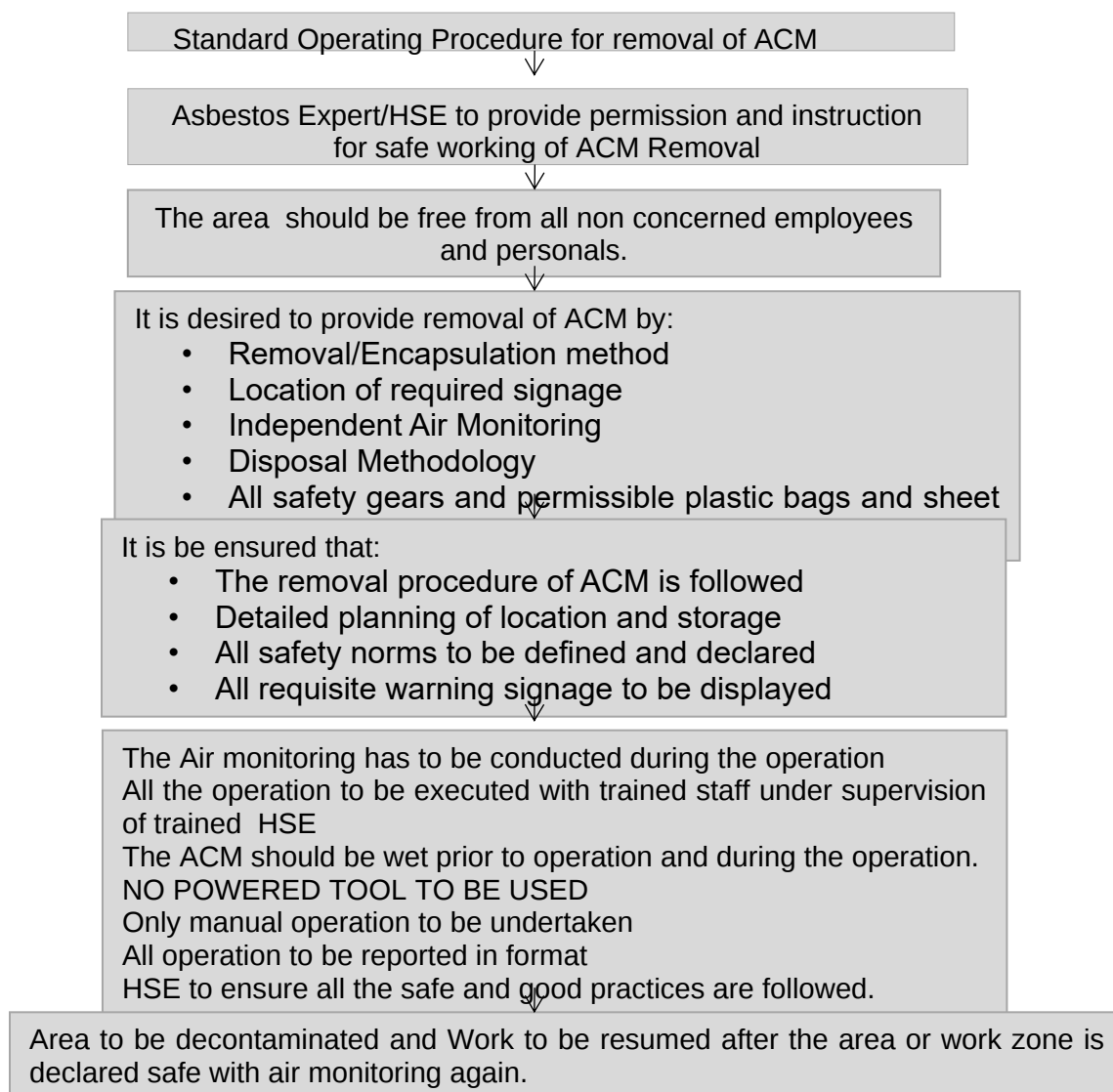


Fig.no.2-Standard Operating Procedure Flow Sheet

14. All the records in the pre-determined format are to be maintained and the disposal as stated in the applicable National legislation is to be followed. Any innovative use of the discarded ACM with the permissible law frame must be approved by respective Regulators prior to practice.

15. The format of Inventorization & records at all locations must be maintained irrespective of generation of ACM waste. The format of documentation must be uniform in order to track and trace the details as desired.

16. Based on the outcome of the workshop it was essential to enumerate the standard operating procedure & define the roles and responsibilities (already discussed as above) and the re-handling cost of the ACM as stated below:

Table.03- Suggestive Protective measures & Estimation of the cost of Re-Handling of ACM

1	Re-Handling			
	Re-handling of AC Pipes scattered/used in the premises.	- Re-Handling of the old AC Pipes in the premises needs to be quantified and a proper inventorization has to be prepared. - The isolated enveloped storage sites should be away from the habitation, the pipes used for fencing, tree guard needs to be re-handled & stored in the nearest isolated storage site and the damaged pipes/broken pipes have to be disposed off to the TSDF with all pre-cautionary measures. NOTE: Only powered/ grounded ACM will have to be disposed off to TSDF.	Manpower engaged: Trained labor, Supervisor, HSE Experts/Asbestos Expert	The re-handling cost will be part of the laying program. The disposal cost is Rs.1500/MT plus freight as per actual
	Removal of encountered AC Pipes	The damaged / broken AC Pipes have to be cautiously handled with prior moistening and packed in plastic bags (permissible plastic bags) and sent for re-use in road making or to TSDF with all signage and precautionary measures as suggested above.	Manpower engaged: Trained labor, Supervisor, HSE Experts/Asbestos Expert	As stated above
	Storage	The existing storage stacks have to be shielded with 8.0 ft height and above ground (min1.0 ft) The Pipes shall be stored in stacks with stoppers provided at the bottom layer to keep the pipe stack stable. The stack, particularly of smaller diameter pipes, shall be in pyramid shape. Pipes shall not be stacked more than 1.5 m high. Each stack shall have pipes of the same type and size only. Removal of pipes shall start from the top layer and by	Manpower engaged: Trained labor, Supervisor, HSE Experts/Asbestos Expert	As on daily wages

		pulling from one end, if required, with all safety precautions. A pipe shall not be stored inside another pipe. The pipes may also be placed alternately length and crosswise. They shall be stored on horizontal racks supported throughout their lengths on a reasonably flat surface free from stones and sharp projections. They should not be stacked in large piles, especially under warm conditions. Open ends of pipes to be sealed with permissible polythene.		
	Transportation	• Full length pipes • Damaged/Broken Pipes	Authorised agency	As per actual.
	Disposal			
	Isolated storage	The storage area should be twice the area required for storage of ACM	Manpower engaged: Trained labor, Supervisor, HSE Experts/Asbestos Expert. Authorised vendor. Boundary, signage, safety aspects etc	As stated in Table1.1.
	Sent to TSDF	The damaged/broken pipes will be packed in permissible Poly bags and has to be stored in defined location within the isolated storage. The records pertaining to the disposal (within 90 days of generation) have to be made systematic. Possibilities of using the broken pipes in wet conditions in road making in order to bind the asbestos fibers can be explored.	Authorised agency	Freight as per actual.
	Estimation of suggestive protective and preventive measures			
	Air Quality sampling & Analysis- Asbestos fiber count	Personal sampler, phase contrast microscope, In case of asbestos dust, the same shall not exceed 2 mg/Nm ³ . Per the OSHA standards for asbestos, exposure monitoring and medical surveillance of	Approved/accredited laboratory	As stated above.

		workers is required when the Workers are or will be exposed to airborne concentrations of fibers of asbestos at or above OSHA's exposure limits for a combined total of 30 or more days per year; Workers perform work that disturbs asbestos-containing material (ACM) or presumed asbestos-containing material (PACM) for a combined total of 30 or more days per year. Minimum 3 locations (@120deg from each location) at min 500 m from the isolated storage of ACM and one sampling near the encountered site. The frequency of monitoring should be bi-annually.		
	PPE's	Hard helmet, double strapped mask, safety tapes, boots(non laced), gloves, safety suits, goggles, ear plugs,	Standard make, minimum-4 sets at each site	As stated Above
	Education & Training	Awareness, New induction training and inspections	Asbestos expert/HSE Experts	As stated Above
	Medical Check up	As per norms or in consultation with Medical Practitioner.	Medical Doctor	As stated Above
Note: • Efforts should be made to minimize the existing AC water pipes. In areas where ACM are stored, it is required to have induction training of AMP, complete the formats and maintain the records. • Removals of used AC Pipes for fencing, boundary wall etc have to be carefully removed from use and stored in isolated storage. • At certain locations, it was observed that the discarded pipes was used as tree guard, when the sapling was planted as on date the tree is fully grown, in that case the removal of ACM has to be done with all precautions and use of total safety gears. Hand tools or slow-running tools producing coarse dust or chips should be used where practicable rather than high-speed machines or those which cut by abrading the material after wetting. Alternatively, the same can also be bounded properly by bitumen paint. • The coarse dust and pieces in wet conditions will have to be collected in permissible plastic bags with use of all safety gears. • The collected wastes are to be labeled as stated above and disposed off to TSDF. The records of the same will have to be kept on daily basis and summarized to monthly basis.				

FORM I – ASBETOS INVENTORY, INSPECTION AND ACTION FORM		
Format: RUIDP/IIA/ LOCATION/NAME OF DBO CONTRACTOR/HSE 002/YEAR		
Location:		
Site co-ordinates:		
Elevation:	Team:	
Date of visit	Sign:	
Present Status		Indicate if installed, operational, in storage, etc.
Original age		Months or years since installation
Diameter		mm or inches
Length		meters
Volume		
Total packet		
Packing date		
Disposal date		
Existing Site (Photo or illustrations):		
Illustration/ Design of Activities On-site with respect to existing asbestos (include details such as size of new pipes, distance from existing AC pipes, other notable observations)		
DBO Contractor Handling Asbestos:		
Number of persons handling waste		
Medical Records		
Safety Gears		
Vocational Training Last Conducted: Number of attendees: Conducted by Schedule:		
Required Actions:		
Remarks		
Conclusion/Remark		
HSE Signatory		

FORM-II – MATRIX FOR TRAINING & RECORDS

Format: RUIDP/INSP.MATRIX/LOCATION/NAME OF DBO CONTRACTOR/HSE 001/YEAR			
S. No.	Aspects of ACM	Check points	Remarks
Training Schedule:			
Trainer Details:			
Date/Location of Training:			
Number of attendees:			
Training Schedule, Training Materials & Attendance Sheet, Feedback of Trainees.			
Understanding of:			
A. DOCUMENTS AND RECORDS			
1.	Site Inventory		
2.	List of ACM storage and installation points		
3.	Structure of ACM management committee		
B. INVENTORY			
1.	Inventorization of ACM		
	Number of ACM/ pipes		
	Dimensions of ACM/ pipes		
	Total volume of ACM/ pipes		
2.	Storage facility/ installation location:		
A.	In-use	Location	
		Condition	Intact/ damaged
		Purpose	
		Accessibility by the workers	
		Evidence of physical damage and approximate size (length, width, volume) without coming into contact with The damaged ACM	
		Impacts on the environment (Based on Asbestos fiber Monitoring)	
3.	LABELING AND SIGNAGE		
	Notification to workplace safety and health		
	Working instruction		
	The risks associated with exposure to asbestos fibers		
	Cautionary statement to not disturb materials containing asbestos		
4.	PERSONAL PROTECTIVE EQUIPMENT (PEP)		
	Record of pep		
	Mask		
	Eye glasses		

	Gloves	
	Ear muffs	
	Others	
	Training	
	On occupational risks of asbestos to the workers	Date: Time: In-house/ external: Faculty: No of workers attended:
	Training for maintenance, repair and renovation	Date: Time: In-house/ external: Faculty: No of workers attended:
	Training for workers working with asbestos	Date: Time: In-house/ external: Faculty: No of workers attended:
	Periodic air quality monitoring records	• Within the permissible limits • Not within the permissible limits (specify the reason)
	Workers medical check-up records	Date: In-house/ external: Performed by: Remarks: No of workers attended:
Conclusion/Remark HSE Signatory		

The all the data required in Form-II will be filled by the DOB Operator (HSE-Officer), the records of this document has to be maintained for a pre-decided life. Details of training imparted have to be file with appropriate evidence like photographs, feedback form, videos etc. There has to be a proper documentation of the records kept with highest level of transparency to retrieve, trace and track the records as necessary. The records maintained by the DOB Operator, has to be audited regularly by the ACM-Expert.

Form-I has to be accompanied with Form-II. Defined period of Air Quality monitoring and health will have to be minimum twice a year. Where ever the fiber counts are found/ recorded beyond the permissible norms, corrective action, like:

- ☐ Cordon off the area of ACM
- ☐ HSE team with trained experts to be deputed for the task
- ☐ Moisten the ACM prior to handling
- ☐ Storage area of the ACM stacks to be covered
- ☐ The damaged/deteriorated ACM to be re-handled in presence of Asbestos Expert/ HSE (Trained) with all defined norms and safety gears.
- ☐ Disposal of damaged/deteriorated ACM to be done as per the Norms.
- ☐ Records of disposal to be maintained.
- ☐ Keep all requisite evidence in form of documentation, geo-tagged photographs etc
- ☐ Frequency of health monitoring at such locations to be increased.

Form-III-Air Quality Monitoring and Results

Format: RUIDP/AQMR/ LOCATION/NAME OF DBO CONTRACTOR/HSE 003/YEAR				
Vendor details				
Approvals				
S.No	Location	Agency	Results& Norms	Permissible
Conclusion/Remark				
HSE Signatory				

FORM-IV-Medical History

Format: RUIDP/MH/ LOCATION/NAME OF DBO CONTRACTOR/HSE 004/YEAR							
Employee code:							
Employer Details:							
PPE Used:							
Insurance/ESI							
S.No	Name	Age/Sex/ DOB	Address / Contact details:	Period of Employment/ Job Title	Pre-History	Doctor's comments	HSE Remarks
					Height Weight/ BMI Blood group X-Ray CT Scan others Smoker: Tobacco: Alcohol Consumption: Family History: Medication if any: Eye sight: Hearing: Others:		

FORM -V

[FORM-10- as per rule 19 (1) of Hazardous waste Handling & Management Rules-2016]
MANIFEST FOR HAZARDOUS AND OTHER WASTE

1.	Sender's name and mailing address (including Phone No. and e-mail)			
2.	Sender's authorisation No.		•	
3.	Manifest Document No.		•	
4.	Transporter's name and address: (including Phone No. and e-mail)			
5.	Type of vehicle		• (Truck/Tanker/Special Vehicle)	
6.	Transporter's registration No.		•	
7.	Vehicle registration No.		•	
8.	Receiver's name and mailing address (including Phone No. and e-mail)			
9.	Receiver's	Authorisation	No.	
10.	Waste description		•	
11.	Total quantity No. of Containers		•m ³ or MT •Nos.	
12.	Physical form		(Solid/Semi-Solid/Sludge/Oily/Tarry/Slurry/Liquid)	
13.	Special handling instructions and additional information			
14.	Sender's Certificate		I hereby declare that the contents of the consignment are fully and accurately described above by proper shipping name and are categorised, packed, marked, and labeled, and are in all respects in proper conditions for transport by road according to applicable National Government regulations.	
	Name and stamp:	Signature:	Month	Day
15.	Transporter acknowledgement of receipt of Wastes			
	Name and stamp:	Signature:	Month	Day
16.	Receiver's certification for receipt of hazardous and other waste			
	Name and stamp:	Signature:	Month	Day

FORM –VI
In-situ Storage of ACM

S.No	Activity	Number of Stacks	Area occupied	Details of ACM Pipes		Day/month/year Of storage
Site History						
For existing Stacks, details of re-handling of pipes in number or volume to be mentioned under supervision of Authorized Experts.						
Details of Location of re-handled ACM storage, new area should be - Minimum 10-15 ft away from campus habituation. 250m away from the water sources 500-800m away from Children play area - The area should be isolated and covered from all the sides with restricted Access for Authorised Experts Only. - Register to be maintained for Entry& Exit of personals. - Register to be maintained for Entry & Exit of ACM - Labels to be displayed in legible format - Specific training of ACM to be inducted in the ACM storage area for residing population in the campus.						
Details of transit storage of ACM to be maintained as per norms in an isolated storage room full covered						

Standard Operating Procedure-02

Asbestos Fiber Monitoring, Analysis and Identification

Principle

1. The collection of environmental samples including air must follow an appropriate sampling procedure. A review of method for sampling of asbestos fibers has been published (IPCS, 1986). The most commonly used analytical method involves phase contrast optical microscopy (PCOM) in the work place and transmission electron microscopy (TEM) in the general environment. The phase contrast optical microscopy (POCM) is universally recommended for asbestos analysis (Eache and Groff, 1997; Dion and Perrault, 1994) including Bureau of Indian Standard. POCM coupled with polarized light is largely used for asbestos analysis in solid samples (USEPA, 1993). The fiber monitoring has to be done by any NABL/MOEF&CC accredited laboratory either in-house or by third party.

Monitoring of Asbestos Fiber in Air

2. A general survey of inside and outside the storage sites of the work zone has to be conducted to choose the sampling sites. Sampling is to be carried out at visually selected locations appeared more prone to emission or possibility of release of asbestos fiber. The sample collected by drawing a measured quantity of air through cellulose ester a membrane filter by a battery operated sampling pump that was fully charged to operate continuously over the chosen sampling time. The exposed filters will then be placed into plastic petri dishes and transferred carefully to the laboratory.

3. Two types of samples are to be taken, one within the workers breathing zone that is 300 mm radius extending in front of the face, and measured from the midpoint of a line bisecting the ears called personal samples. The samples taken at a fixed location mostly near to the source point called area or static samples. Personal sampler model "XX 5700000" and low volume vacuum/pressure pump model "XX5622050" attached with monitor or cowl model "MAWP025AC" of Millipore Corporation, USA are to be used for the collection of personal and area samples, respectively. The flow rate of pump is to be adjusted to 1litre per minute. The flow rate checked before and after in each monitoring, those samples showing the difference by >10 percent from the initial flow rate are to be rejected. In both the samples filter holder (Cowl) always pointed downward position to avoid the deposition of heavy particles. An ester cellulose membrane filters "AAWP02500" having 0.8 µm-1.2 µm pore size diameter are to be used throughout the sampling for asbestos counts at work environment.

Mounting Procedure

4. Complete filter is to be placed on clean microscopic slide, dust side up at room temperature. Electrostatic force keeps the filter usually on the slide. Filters are to be exposed to acetone fumes and triacetin (Glycerol triacetate, Sigma). In this procedure a small quantity of acetone in round bottom flask (500-1000ml) heated at the boiling point underwater bath, the vapors condensed in a simple condensing column. When the sufficient fumes of acetone become ready then pass it throughout on the filter for 3-5 seconds at a distance of 15-25 mm. put the 1-3 drops of Glycerol Triacetate (Triacetin) on the acetone-cleared filter. Place a cover slip on cleared filter by avoiding the air bubbles. Heat the cleared filter at 50°C for 15 minutes and leave it at room temperature for 24 hours under the action of triacetin to clear entire filter. Alternatively, membrane filter can also be made transparent with immersion oil (Leica Microsystems Wetzlar GmbH, Wetzlar). Using a phase contrast microscope with polarized light, Laborlux S (of M/s Leica, Germany) and then counting has to be done at magnification 400X-500x

$$C = A/a \times N/n \times 1/r \times 1/t$$

Where:

C= concentration in fibers per cubic centimeter rounded to first place of decimal,

N = total no. of fiber counted,

n = number of graticule areas observed,

A= effective filter area in mm²

a= graticule counting area in mm²,

r= flow rate of air through filter in cm³/min., and

t= single sample duration in minutes

5. To rule out the probability of the air borne asbestos in the existing scenario at the said site as well as other similar sites at the different work zones, it is necessary to have the asbestos fiber monitoring and sampling counts to be recorded at regular intervals. The environmental air sampling stations will have to be minimum three at 120 degree angle, within 1000-500 m from the ACM. The sampling frequency has to be in all three stages-Pre-Construction, Construction and Post Construction, while the personal sampling has to be done as stated above.

6. Bureau of Indian Standards (BIS) Guidelines for Safe Use of Products containing Asbestos states that "Asbestos cement products (such as AC pipes) generally contain about 10-15% asbestos fibers in a cement matrix that comprises the rest of the materials and are termed as locked in asbestos products as these products have the asbestos fibers bound in cement. The possibilities of air borne asbestos fiber will be in case of mishandling of encountered pipes with unsafe practice. During storing and installation; recommended work practices shall be followed to avoid harmful exposure". According to Hazardous and Other Wastes (Management and Trans-

boundary Movement) Rules, 2016, any waste with asbestos concentration limit of 10,000 mg/kg (i.e. 1%), however this will apply only if the asbestos containing substances are in a friable, powdered or finely divided state. Under the Basel Convention⁴⁴, asbestos or asbestos waste in the form of dust and fibers is classified as hazardous waste. The applicable legislation under the present scenario are:

Summary of Asbestos Management Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Remark
Clearing, transfer and disposal of ACM pipes	Possibilities of air borne asbestos if handled unsafely, cut, drilled or broken into pieces that may cause: ☐ Inflammation of the lungs ☐ Mesothelioma ☐ Peritoneialmesotherlioma ☐ Pleural plaques ☐ Asbestosis ☐ Bronchogenic Carcinoma ☐ Second hand-exposure	Implement the AMP strictly that includes identification of hazards, the use of proper safety gear and disposal methods.	DBO Contractor /RUIDP	There has to be a suitable call to be taken for in-situ disposal if the removed ACM pipes are not damaged, full length or 4.0 ft length not damaged.
Work in narrow streets	Possibilities of air borne asbestos if handled unsafely cut, drilled or broken into pieces that may cause: ☐ Inflammation of the lungs ☐ Mesothelioma ☐ Peritoneialmesotherlioma ☐ Pleural plaques ☐ Asbestosis ☐ Bronchogenic Carcinoma Second hand-exposure	Conduct awareness program on safety during the construction work Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day Provide barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to	DBO Contractor/RUIDP	All provision of safe working with proper signage has to be undertaken prior to work initiation, during the work and after the work.

⁴⁴ Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal, adopted in 1989

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Remark
		avoid accidental fall into open trenches Identify risk of intervention with existing AC pipes. If there is significant risk, implement the AMP strictly that includes identification of hazards, the use of proper safety gear and disposal methods.		
Interventions in existing AC pipelines	Possibilities of air borne asbestos if handled unsafely cut, drilled or broken into pieces that may cause: ☐ Inflammation of the lungs ☐ Mesothelioma ☐ Peritoneal mesothelioma ☐ Pleural plaques ☐ Asbestosis ☐ Bronchogenic Carcinoma Second hand-exposure	Appropriate actions as defined in the Asbestos Management Plan will have to be adhered to	DBO Contractor/RUIDP	Measure to avoid the encounter & removal has to be prioritized and if the same is not avoided then the measures stated have to be strictly followed.
Documentation /record	Unmonitored ACM might be handled incorrectly and can cause release of airborne asbestos	To be formatted and kept as mentioned in the Asbestos Management Plan	DBO Contractor/RUIDP	To be kept intact for easy tracking and reference in legible format. The same can be kept in soft format as well.

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Appendix 15: Sample Outline Spoil Management Plan

The Spoil Management Plan should be site specific and be part of the monthly Construction Management Plan.

The contractor, in consultation with the ULB, has to find out appropriate location/s for the disposal of the excess soil generated. The spoils should be deposited only at these sites.

Further precautions need to be taken in case of the contaminated spoils.

The vehicle carrying the spoil should be covered properly.

The spoils generating from each site should be removed on the same day or immediately after the work is complete. The site / road should be restored to the original condition.

I. Spoils information

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

II. Spoils management

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

III. Documentation

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

Appendix 16: Sample Outline Traffic Management Plan

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

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

B. Operating Policies for TMP

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

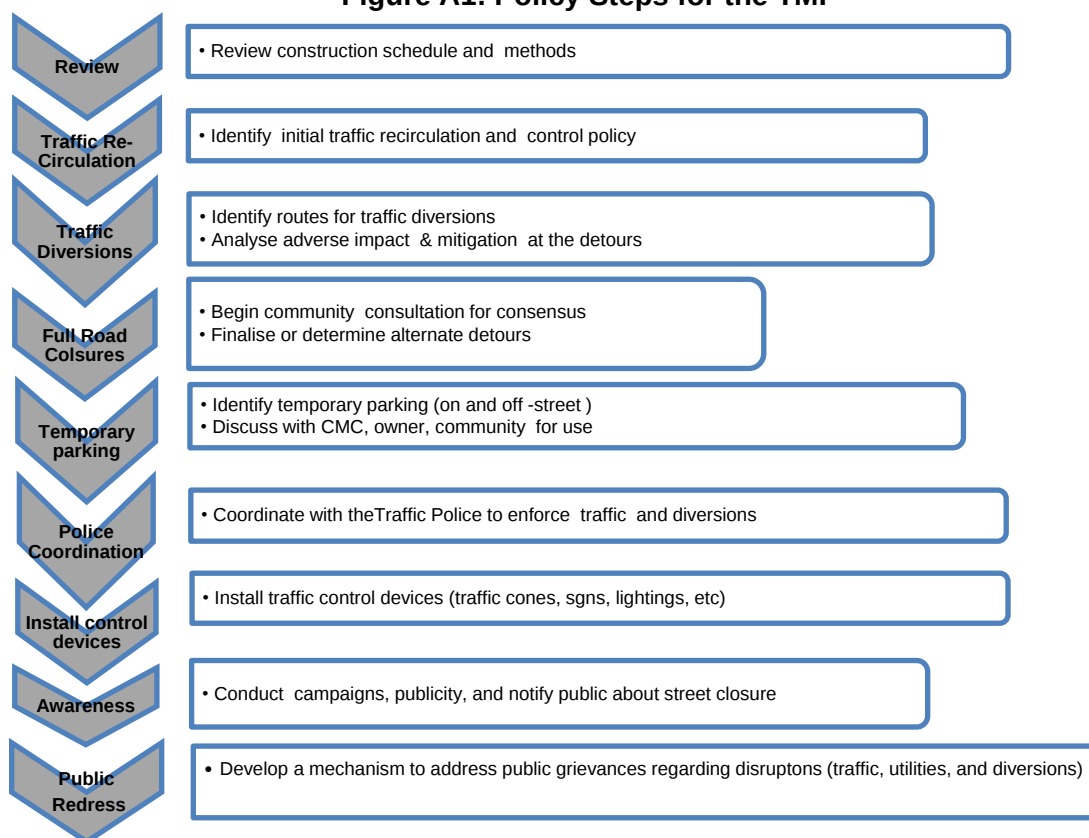
C. Analyze the impact due to street closure

4. Apart from the capacity analysis, a final decision to close a particular street and divert the traffic should involve the following steps:
 - (i) approval from the ULB/Public Works Department (PWD) to use the local streets as detours;
 - (ii) consultation with businesses, community members, traffic police, PWD, etc., regarding the mitigation measures necessary at the detours where the road is diverted during the construction;
 - (iii) determining of the maximum number of days allowed for road closure, and incorporation of such provisions into the contract documents;
 - (iv) determining if additional traffic control or temporary improvements are needed along the detour route;
 - (v) considering how access will be provided to the worksite;
 - (vi) contacting emergency service, school officials, and transit authorities to determine if there are impacts to their operations; and

(vii) developing a notification program to the public so that the closure is not a surprise. As part of this program, the public should be advised of alternate routes that commuters can take or will have to take as result of the traffic diversion.

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

Figure A1: Policy Steps for the TMP



D. Public awareness and notifications

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

6. The awareness campaign and the prior notification for the public will be a continuous activity which the project will carry out to compensate for the above delays and minimize public claims as result of these problems. These activities will take place sufficiently in advance of the time when the roadblocks or traffic diversions take place at the particular streets. The reason for this is to allow sufficient time for the public and residents to understand the changes to their travel

plans. The project will notify the public about the roadblocks and traffic diversion through public notices, ward level meetings and city level meeting with the elected representatives.

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

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

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

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

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

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

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

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

11. Procedures for installing traffic control devices at any work zone vary, depending on road configuration, location of the work, construction activity, duration, traffic speed and volume, and pedestrian traffic. Work will take place along major roads, and the minor internal roads. As such, the traffic volume and road geometry vary. The main roads carry considerable traffic; internal roads in the new city areas are wide but in old city roads very narrow and carry considerable traffic. However, regardless of where the construction takes place, all the work zones should be

cordoned off, and traffic shifted away at least with traffic cones, barricades, and temporary signs (temporary “STOP” and “GO”).

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

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

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

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

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

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

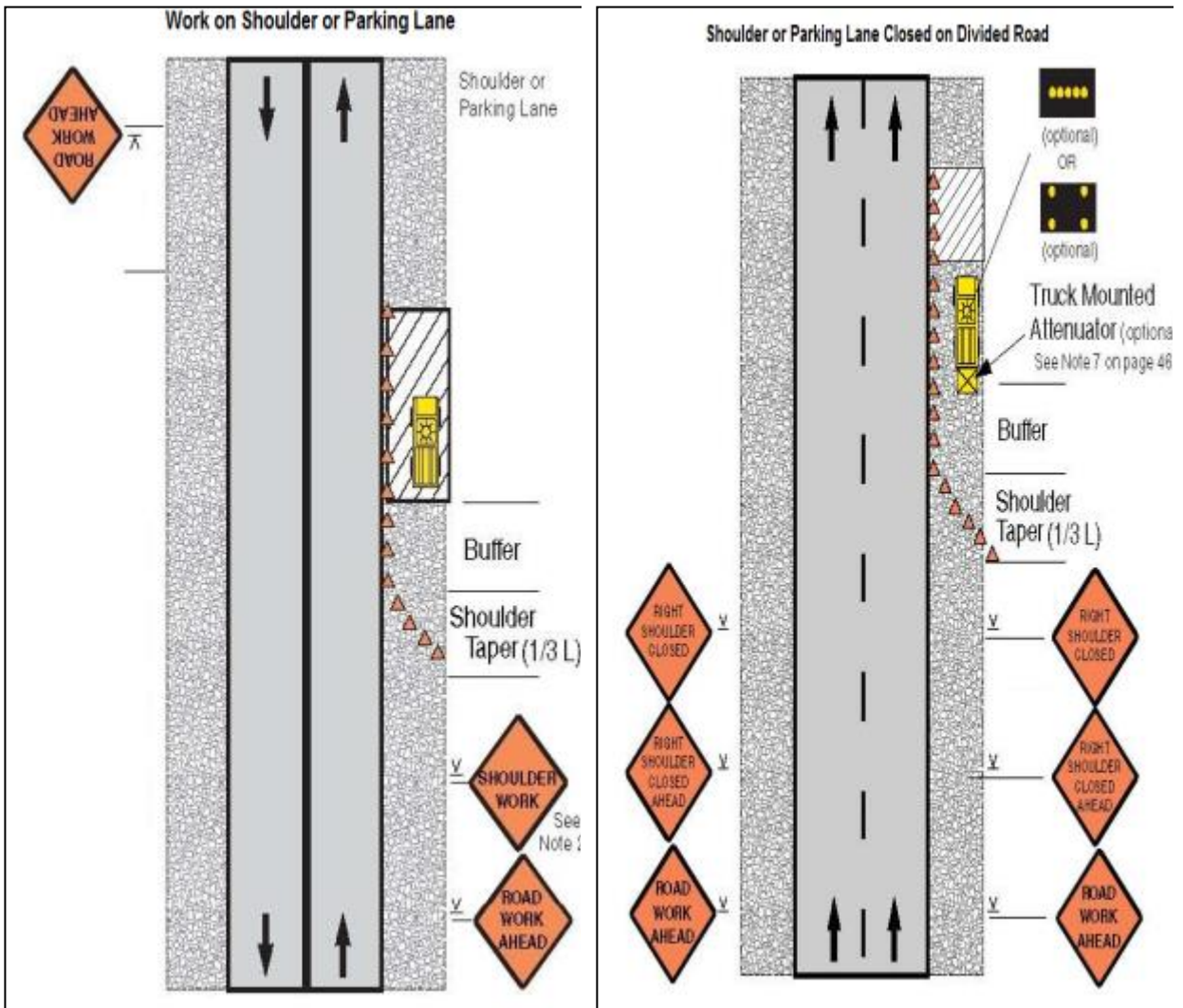


Figure A4 & A5: Work in Travel lane & Lane closure on road with low volume

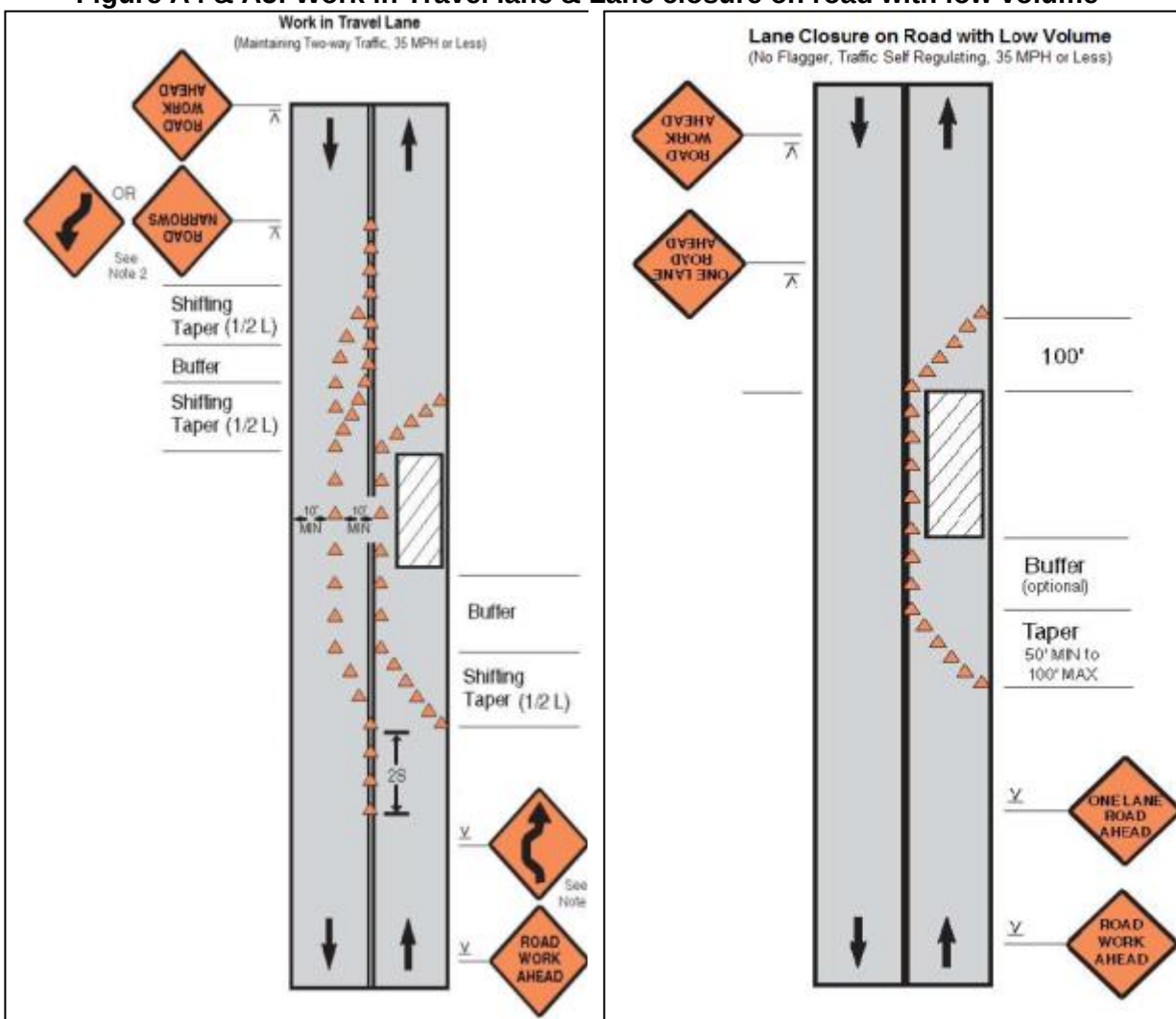


Figure A6 & A7: Lane closure on a two-line road with low volume (with yield sign) & Lane closure on a two-line road with low volume (one flagger operation)

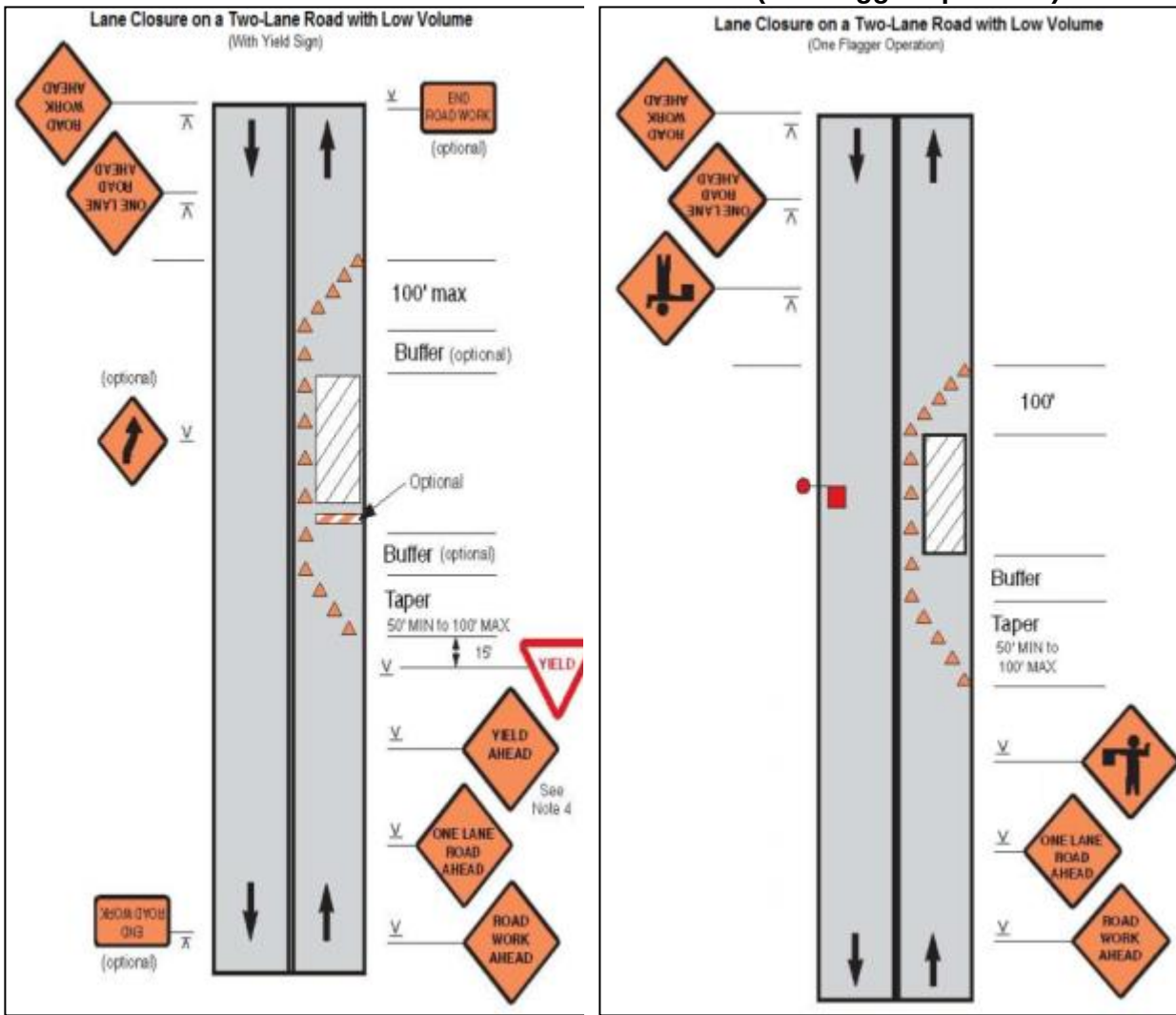


Figure A8 & A9: Lane Closure on a Two-Lane Road (Two Flagger Operation) & Lane Closure on a Four-Lane Undivided Road

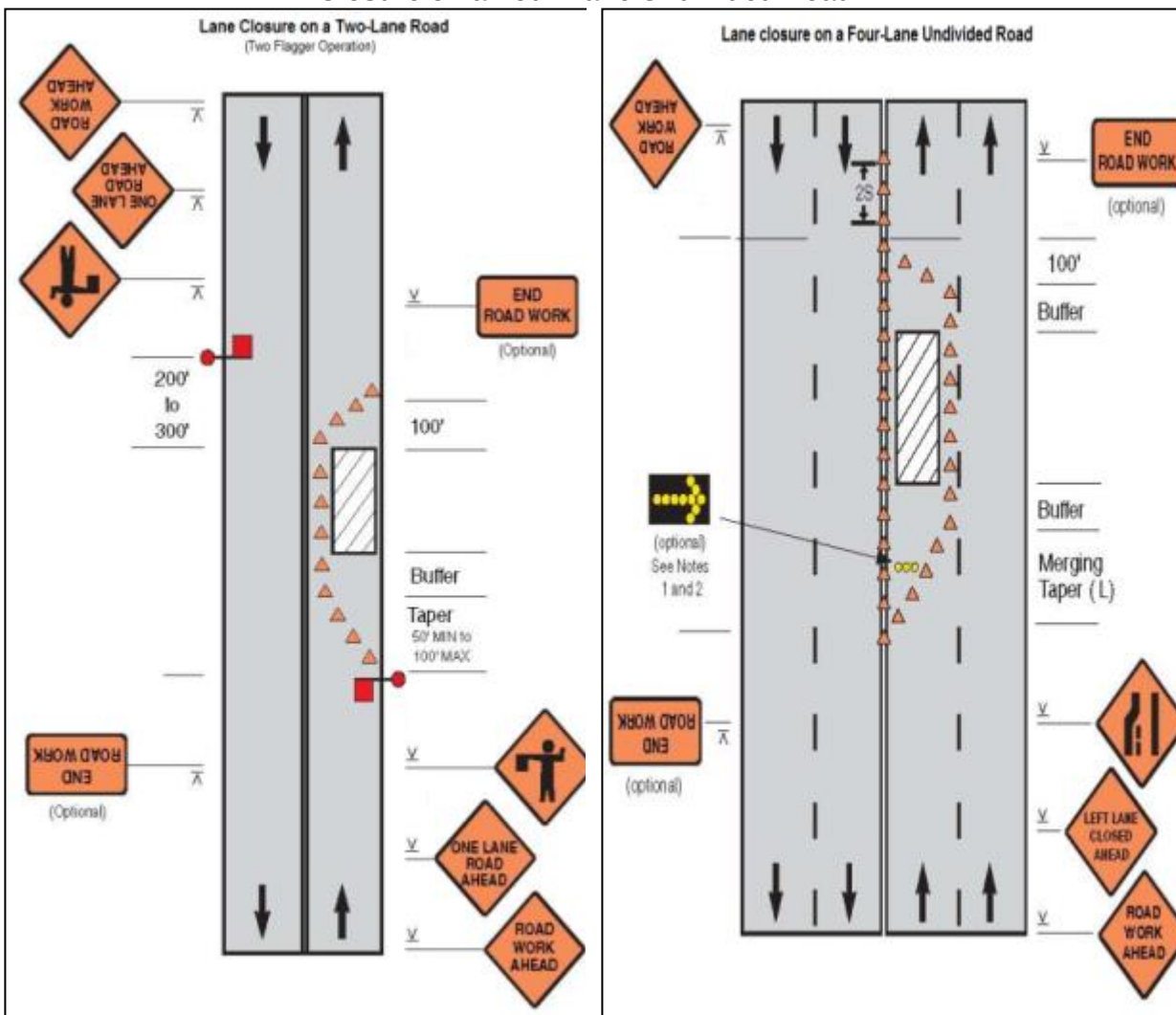


Figure A10 & A11: Lane Closure On Divided Roadway & Half Road Closure On Multi-Lane Roadway

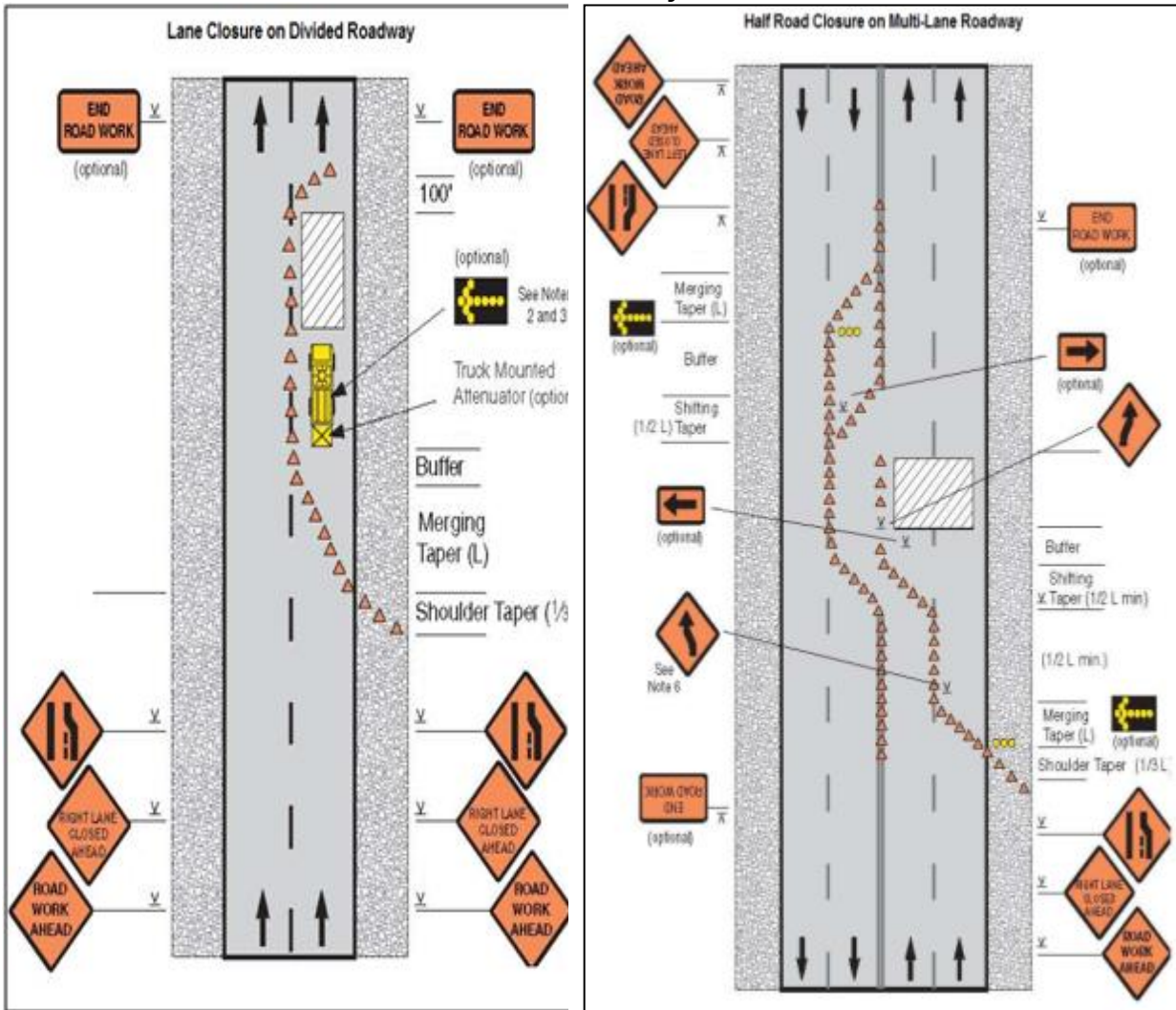
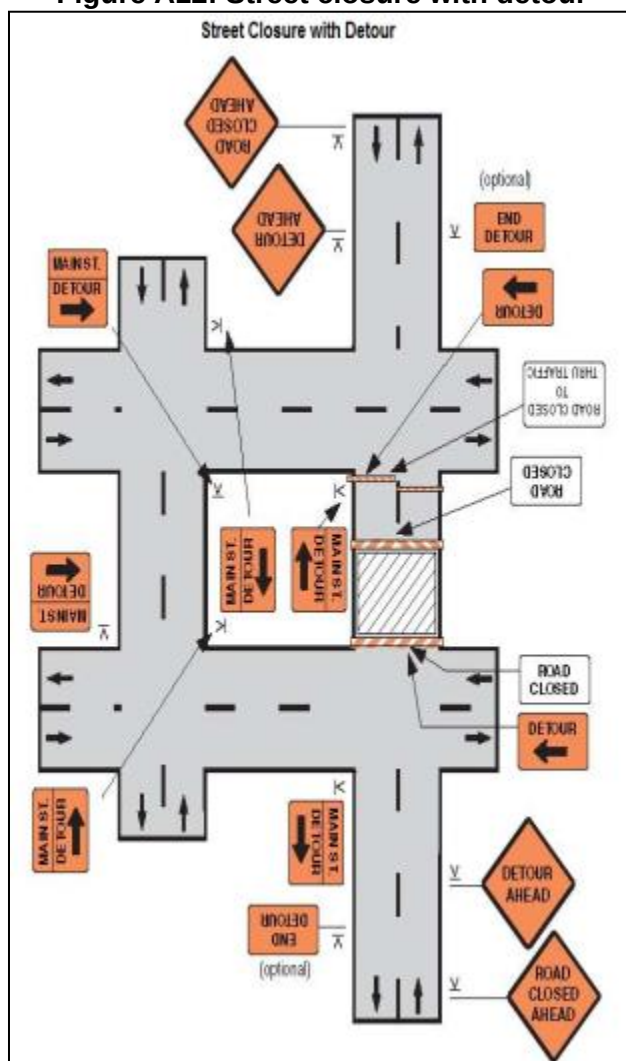


Figure A12: Street closure with detour



Appendix 17: WHO Interim Guidance on Water, Sanitation, Hygiene and Waste

Management for the COVID-19 virus



Water, sanitation, hygiene, and waste management for the COVID-19 virus

Interim guidance
19 March 2020

Background

This interim guidance supplements the infection prevention and control (IPC) documents by summarizing WHO guidance on water, sanitation and health care waste relevant to viruses, including coronaviruses. It is intended for water and sanitation practitioners and providers and health care providers who want to know more about water, sanitation and hygiene (WASH) risks and practices.

The provision of safe water, sanitation, and hygienic conditions is essential to protecting human health during all infectious disease outbreaks, including the COVID-19 outbreak. Ensuring good and consistently applied WASH and waste management practices in communities, homes, schools, marketplaces, and health care facilities will help prevent human-to-human transmission of the COVID-19 virus.

The most important information concerning WASH and the COVID-19 virus is summarized here.

- Frequent and proper hand hygiene is one of the most important measures that can be used to prevent infection with the COVID-19 virus. WASH practitioners should work to enable more frequent and regular hand hygiene by improving facilities and using proven behavior-change techniques.
- WHO guidance on the safe management of drinking-water and sanitation services applies to the COVID-19 outbreak. Extra measures are not needed. Disinfection will facilitate more rapid die-off of the COVID-19 virus.
- Many co-benefits will be realized by safely managing water and sanitation services and applying good hygiene practices.

Currently, there is no evidence about the survival of the COVID-19 virus in drinking-water or sewage. The morphology and chemical structure of the COVID-19 virus are similar to those of other human coronaviruses for which there are data about both survival in the environment and effective inactivation measures. This document draws upon the evidence base and WHO guidance on how to protect against viruses in sewage and drinking-water. This document will be updated as new information becomes available.

1. COVID-19 transmission

There are two main routes of transmission of the COVID-19 virus: respiratory and contact. Respiratory droplets are generated when an infected person coughs or sneezes. Any person who is in close contact with someone who has respiratory symptoms (sneezing, coughing) is at risk of being exposed to potentially infective respiratory droplets.¹ Droplets may also land on surfaces where the virus could remain viable; thus, the immediate environment of an infected individual can serve as a source of transmission (contact transmission).

Approximately 2–10% of cases of confirmed COVID-19 disease present with diarrhoea,^{2,4} and two studies detected COVID-19 viral RNA fragments in the faecal matter of COVID-19 patients.^{5,6} However, only one study has cultured the COVID-19 virus from a single stool specimen.⁷ There have been no reports of faecal–oral transmission of the COVID-19 virus.

2. Persistence of the COVID-19 virus in drinking-water, faeces and sewage and on surfaces

Although persistence in drinking-water is possible, there is no evidence from surrogate human coronaviruses that they are present in surface or groundwater sources or transmitted through contaminated drinking water. The COVID-19 virus is an enveloped virus, with a fragile outer membrane. Generally, enveloped viruses are less stable in the environment and are more susceptible to oxidants, such as chlorine. While there is no evidence to date about survival of the COVID-19 virus in water or sewage, the virus is likely to become inactivated significantly faster than non-enveloped human enteric viruses with known waterborne transmission (such as adenoviruses, norovirus, rotavirus and hepatitis A). For example, one study found that a surrogate human coronavirus survived only 2 days in dechlorinated tap water and in hospital wastewater at 20°C.⁸ Other studies concur, noting that the human coronaviruses transmissible gastroenteritis coronavirus and mouse hepatitis virus demonstrated a 99.9% die-off in from 2 days⁹ at 23°C to 2 weeks¹⁰ at 25°C. Heat, high or low pH, sunlight, and common disinfectants (such as chlorine) all facilitate die off.

It is not certain how long the virus that causes COVID-19 survives on surfaces, but it seems likely to behave like other coronaviruses. A recent review of the survival of human

coronaviruses on surfaces found large variability, ranging from 2 hours to 9 days.¹¹ The survival time depends on a number of factors, including the type of surface, temperature, relative humidity, and specific strain of the virus. The same review also found that effective inactivation could be achieved within 1 minute using common disinfectants, such as 70% ethanol or sodium hypochlorite (for details, see Cleaning practices).

3. Keeping water supplies safe

The COVID-19 virus has not been detected in drinking-water supplies, and based on current evidence, the risk to water supplies is low.¹² Laboratory studies of surrogate coronaviruses that took place in well-controlled environments indicated that the virus could remain infectious in water contaminated with faeces for days to weeks.¹⁰ A number of measures can be taken to improve water safety, starting with protecting the source water; treating water at the point of distribution, collection, or consumption; and ensuring that treated water is safely stored at home in regularly cleaned and covered containers.

Conventional, centralized water treatment methods that use filtration and disinfection should inactivate the COVID-19 virus. Other human coronaviruses have been shown to be sensitive to chlorination and disinfection with ultraviolet (UV) light.¹³ As enveloped viruses are surrounded by a lipid host cell membrane, which is not robust, the COVID-19 virus is likely to be more sensitive to chlorine and other oxidant disinfection processes than many other viruses, such as coxsackieviruses, which have a protein coat. For effective centralized disinfection, there should be a residual concentration of free chlorine of ≥ 0.5 mg/L after at least 30 minutes of contact time at pH < 8.0 .¹² A chlorine residual should be maintained throughout the distribution system.

In places where centralized water treatment and safe piped water supplies are not available, a number of household water treatment technologies are effective in removing or destroying viruses, including boiling or using high-performing ultrafiltration or nanomembrane filters, solar irradiation and, in non-turbid waters, UV irradiation and appropriately dosed free chlorine.

4. Safely managing wastewater and faecal waste

There is no evidence that the COVID-19 virus has been transmitted via sewerage systems with or without wastewater treatment. Further, there is no evidence that sewage or wastewater treatment workers contracted the severe acute respiratory syndrome (SARS), which is caused by another type of coronavirus that caused a large outbreak of acute respiratory illness in 2003. As part of an integrated public health policy, wastewater carried in sewerage systems should be treated in well-designed and well-managed centralized wastewater treatment works. Each stage of treatment (as well as retention time and dilution) results in a further reduction of the potential risk. A waste stabilization pond (an oxidation pond or lagoon) is generally considered a practical and simple wastewater treatment technology particularly well suited to destroying pathogens, as relatively long retention times (20 days or longer) combined with sunlight, elevated pH levels, biological activity, and other factors serve to accelerate pathogen destruction. A final disinfection step may be considered if existing wastewater treatment plants are not optimized to remove viruses. Best practices for protecting the health of workers at sanitation treatment facilities should

be followed. Workers should wear appropriate personal protective equipment (PPE), which includes protective outerwear, gloves, boots, goggles or a face shield, and a mask; they should perform hand hygiene frequently; and they should avoid touching eyes, nose, and mouth with unwashed hands.

WASH in health care settings

Existing recommendations for water, sanitation and hygiene measures in health care settings are important for providing adequate care for patients and protecting patients, staff, and caregivers from infection risks.¹⁴ The following actions are particularly important: (i) managing excreta (faeces and urine) safely, including ensuring that no one comes into contact with it and that it is treated and disposed of correctly; (ii) engaging in frequent hand hygiene using appropriate techniques; (iii) implementing regular cleaning and disinfection practices; and (iv) safely managing health care waste. Other important measures include providing sufficient safe drinking-water to staff, caregivers, and patients; ensuring that personal hygiene can be maintained, including hand hygiene, for patients, staff and caregivers; regularly laundering bedsheets and patients' clothing; providing adequate and accessible toilets (including separate facilities for confirmed and suspected cases of COVID-19 infection); and segregating and safely disposing of health care waste. For details on these recommendations, please refer to Essential environmental health standards in health care.¹⁴

1. Hand hygiene practices

Hand hygiene is extremely important. Cleaning hands with soap and water or an alcohol-based hand rub should be performed according to the instructions known as "My 5 moments for hand hygiene".¹⁵ If hands are not visibly dirty, the preferred method is to perform hand hygiene with an alcohol-based hand rub for 20–30 seconds using the appropriate technique.¹⁶ When hands are visibly dirty, they should be washed with soap and water for 40–60 seconds using the appropriate technique.¹⁷ Hand hygiene should be performed at all five moments, including before putting on PPE and after removing it, when changing gloves, after any contact with a patient with suspected or confirmed COVID-19 infection or their waste, after contact with any respiratory secretions, before eating, and after using the toilet.¹⁸ If an alcohol-based hand rub and soap are not available, then using chlorinated water (0.05%) for handwashing is an option, but it is not ideal because frequent use may lead to dermatitis, which could increase the risk of infection and asthma and because prepared dilutions might be inaccurate.¹⁹ However, if other options are not available or feasible, using chlorinated water for handwashing is an option.

Functional hand hygiene facilities should be present for all health care workers at all points of care and in areas where PPE is put on or taken off. In addition, functional hand hygiene facilities should be available for all patients, family members, and visitors, and should be available within 5 m of toilets, as well as in waiting and dining rooms and other public areas.

2. Sanitation and plumbing

People with suspected or confirmed COVID-19 disease should be provided with their own flush toilet or latrine that has a door that closes to separate it from the patient's room. Flush toilets should operate properly and have functioning drain traps. When possible, the toilet should be flushed with the lid down to prevent droplet splatter and aerosol clouds. If it is not possible to provide separate toilets, the toilet should be cleaned and disinfected at least twice daily by a trained cleaner wearing PPE (gown, gloves, boots, mask, and a face shield or goggles). Further, and consistent with existing guidance, staff and health care workers should have toilet facilities that are separate from those used by all patients.

WHO recommends the use of standard, well-maintained plumbing, such as sealed bathroom drains, and backflow valves on sprayers and faucets to prevent aerosolized faecal matter from entering the plumbing or ventilation system,²⁰ together with standard wastewater treatment.²¹ Faulty plumbing and a poorly designed air ventilation system were implicated as contributing factors to the spread of the aerosolized SARS coronavirus in a high-rise apartment building in Hong Kong in 2003.²² Similar concerns have been raised about the spread of the COVID-19 virus from faulty toilets in high-rise apartment buildings.²³ If health care facilities are connected to sewers, a risk assessment should be conducted to confirm that wastewater is contained within the system (that is, the system does not leak) before its arrival at a functioning treatment or disposal site, or both. Risks pertaining to the adequacy of the collection system or to treatment and disposal methods should be assessed following a safety planning approach,²⁴ with critical control points prioritized for mitigation.

For smaller health care facilities in low-resource settings, if space and local conditions allow, pit latrines may be the preferred option. Standard precautions should be taken to prevent contamination of the environment by excreta. These precautions include ensuring that at least 1.5 m exists between the bottom of the pit and the groundwater table (more space should be allowed in coarse sands, gravels, and fissured formations) and that the latrines are located at least 30 m horizontally from any groundwater source (including both shallow wells and boreholes).²¹ If there is a high groundwater table or a lack of space to dig pits, excreta should be retained in impermeable storage containers and left for as long as feasible to allow for a reduction in virus levels before moving it off-site for additional treatment or safe disposal, or both. A two-tank system with parallel tanks would help facilitate inactivation by maximizing retention times, as one tank could be used until full, then allowed to sit while the next tank is being filled. Particular care should be taken to avoid splashing and the release of droplets while cleaning or emptying tanks.

3. Toilets and the handling of faeces

It is critical to conduct hand hygiene when there is suspected or direct contact with faeces (if hands are dirty, then soap and water are preferred to the use of an alcohol-based hand rub). If the patient is unable to use a latrine, excreta should be collected in either a diaper or a clean bedpan and immediately and carefully disposed of into a separate toilet or latrine used only by suspected or confirmed cases of COVID-19. In all health care settings, including those with suspected or confirmed COVID-19 cases, faeces must be treated as a biohazard and handled as little as possible. Anyone handling

faeces should follow WHO contact and droplet precautions¹⁸ and use PPE to prevent exposure, including long-sleeved gowns, gloves, boots, masks, and goggles or a face shield. If diapers are used, they should be disposed of as infectious waste as they would be in all situations. Workers should be properly trained in how to put on, use, and remove PPE so that these protective barriers are not breached.²⁵ If PPE is not available or the supply is limited, hand hygiene should be regularly practiced, and workers should keep at least 1 m distance from any suspected or confirmed cases.

If a bedpan is used, after disposing of excreta from it, the bedpan should be cleaned with a neutral detergent and water, disinfected with a 0.5% chlorine solution, and then rinsed with clean water; the rinse water should be disposed of in a drain or a toilet or latrine. Other effective disinfectants include commercially available quaternary ammonium compounds, such as cetylpyridinium chloride, used according to manufacturer's instructions, and peracetic or peroxyacetic acid at concentrations of 500–2000 mg/L.²⁶

Chlorine is ineffective for disinfecting media containing large amounts of solid and dissolved organic matter. Therefore, there is limited benefit to adding chlorine solution to fresh excreta and it is possible that this may introduce risks associated with splashing.

4. Emptying latrines and holding tanks, and transporting excreta off-site.

There is no reason to empty latrines and holding tanks of excreta from suspected or confirmed COVID-19 cases unless they are at capacity. In general, the best practices for safely managing excreta should be followed. Latrines or holding tanks should be designed to meet patient demand, considering potential sudden increases in cases, and there should be a regular schedule for emptying them based on the wastewater volumes generated. PPE (long-sleeved gown, gloves, boots, masks, and goggles or a face shield) should be worn at all times when handling or transporting excreta off-site, and great care should be taken to avoid splashing. For crews, this includes pumping out tanks or unloading pumper trucks. After handling the waste and once there is no risk of further exposure, individuals should safely remove their PPE and perform hand hygiene before entering the transport vehicle. Soiled PPE should be put in a sealed bag for later safe laundering (see Cleaning practices). Where there is no off-site treatment, in-situ treatment can be done using lime. Such treatment involves using a 10% lime slurry added at 1-part lime slurry per 10 parts of waste.

5. Cleaning practices

Recommended cleaning and disinfection procedures for health care facilities should be followed consistently and correctly.¹⁹ Laundry should be done and surfaces in all environments in which COVID-19 patients receive care (treatment units, community care centres) should be cleaned at least once a day and when a patient is discharged.²⁷ Many disinfectants are active against enveloped viruses, such as the COVID-19 virus, including commonly used hospital disinfectants. Currently, WHO recommends using:

- 70% ethyl alcohol to disinfect small areas between uses, such as reusable dedicated equipment (for example, thermometers);
- sodium hypochlorite at 0.5% (equivalent to 5000 ppm) for disinfecting surfaces.

All individuals dealing with soiled bedding, towels, and clothes from patients with COVID-19 infection should wear appropriate PPE before touching soiled items, including heavy duty gloves, a mask, eye protection (goggles or a face shield), a long-sleeved gown, an apron if the gown is not fluid resistant, and boots or closed shoes. They should perform hand hygiene after exposure to blood or body fluids and after removing PPE. Soiled linen should be placed in clearly labelled, leak-proof bags or containers, after carefully removing any solid excrement and putting it in a covered bucket to be disposed of in a toilet or latrine. Machine washing with warm water at 60–90°C (140–194°F) with laundry detergent is recommended. The laundry can then be dried according to routine procedures. If machine washing is not possible, linens can be soaked in hot water and soap in a large drum using a stick to stir and being careful to avoid splashing. The drum should then be emptied, and the linens soaked in 0.05% chlorine for approximately 30 minutes. Finally, the laundry should be rinsed with clean water and the linens allowed to dry fully in sunlight.

If excreta are on surfaces (such as linens or the floor), the excreta should be carefully removed with towels and immediately safely disposed of in a toilet or latrine. If the towels are single use, they should be treated as infectious waste; if they are reusable, they should be treated as soiled linens. The area should then be cleaned and disinfected (with, for example, 0.5% free chlorine solution), following published guidance on cleaning and disinfection procedures for spilled body fluids.²⁷

6. Safely disposing of greywater or water from washing PPE, surfaces and floors.

Current WHO recommendations are to clean utility gloves or heavy duty, reusable plastic aprons with soap and water and then decontaminate them with 0.5% sodium hypochlorite solution after each use. Single-use gloves (nitrile or latex) and gowns should be discarded after each use and not reused; hand hygiene should be performed after PPE is removed. If greywater includes disinfectant used in prior cleaning, it does not need to be chlorinated or treated again. However, it is important that such water is disposed of in drains connected to a septic system or sewer or in a soakaway pit. If greywater is disposed of in a soakaway pit, the pit should be fenced off within the health facility grounds to prevent tampering and to avoid possible exposure in the case of overflow.

7. Safe management of health care waste

Best practices for safely managing health care waste should be followed, including assigning responsibility and sufficient human and material resources to dispose of such waste safely. There is no evidence that direct, unprotected human contact during the handling of health care waste has resulted in the transmission of the COVID-19 virus. All health care waste produced during the care of COVID 19 patients should be collected safely in designated containers and bags, treated, and then safely disposed of or treated, or both, preferably on-site. If waste is moved off-site, it is critical to understand where and how it will be treated and destroyed. All who handle health care waste should wear appropriate PPE (boots, apron, long-sleeved gown, thick gloves, mask, and goggles or a face shield) and perform hand hygiene after removing it. For more information refer to the WHO guidance, Safe management of wastes from health-care activities.²⁸

Considerations for WASH practices in homes and communities.

Upholding best WASH practices in the home and community is also important for preventing the spread of COVID-19 and when caring for patients at home. Regular and correct hand hygiene is of particular importance.

1. Hand hygiene

Hand hygiene in non-health care settings is one of the most important measures that can prevent COVID 19 infection. In homes, schools and crowded public spaces – such as markets, places of worship, and train or bus stations – regular handwashing should occur before preparing food, before and after eating, after using the toilet or changing a child's diaper, and after touching animals. Functioning handwashing facilities with water and soap should be available within 5 m of toilets.

2. Treatment and handling requirements for excreta.

Best WASH practices, particularly handwashing with soap and clean water, should be strictly applied and maintained because these provide an important additional barrier to COVID-19 transmission and to the transmission of infectious diseases in general.¹⁷ Consideration should be given to safely managing human excreta throughout the entire sanitation chain, starting with ensuring access to regularly cleaned, accessible, and functioning toilets or latrines and to the safe containment, conveyance, treatment, and eventual disposal of sewage.

When there are suspected or confirmed cases of COVID-19 in the home setting, immediate action must be taken to protect caregivers and other family members from the risk of contact with respiratory secretions and excreta that may contain the COVID-19 virus. Frequently touched surfaces throughout the patient's care area should be cleaned regularly, such as beside tables, bed frames and other bedroom furniture. Bathrooms should be cleaned and disinfected at least once a day. Regular household soap or detergent should be used for cleaning first and then, after rinsing, regular household disinfectant containing 0.5% sodium hypochlorite (that is, equivalent to 5000 ppm or 1-part household bleach with 5% sodium hypochlorite to 9 parts water) should be applied. PPE should be worn while cleaning, including mask, goggles, a fluid-resistant apron, and gloves,²⁹ and hand hygiene with an alcohol-based hand rub or soap and water should be performed after removing PPE.

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WHO continues to monitor the situation closely for any changes that may affect this interim guidance. Should any factors change, WHO will issue a further update. Otherwise, this interim guidance document will expire 2 years after the date of publication.

Contributors

This interim guidance was written by staff from WHO and UNICEF. In addition, a number of experts and WASH practitioners contributed. They include Matt Arduino,

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Appendix 18: Guidelines and Emergency plan for handling and storing chlorine

Instructions for Storage and Handling of Chlorine Cylinders (Based on the 'Manual on Operation and Maintenance of Water Supply Systems' published by the Central Public Health and Environmental Engineering Organization (CPHEEO) in 2005)

1.1 Storage Area

- (I) Obtain storage license from controller of explosives under gas cylinder rules 2004 if the quantity of Cl_2 containers to be stored is more than 5 nos.
- (II) Storage area should be cool, dry, well ventilated, and clean of trash and protected from external heat sources. Please refer to manual on "water supply and treatment", (1999 edition), for further details.
- (III) Ventilation must be sufficient to prevent accumulation of vapour pockets. The exhaust should be located either near the floor or duct be provided extending to the floor. All fan switches should be outside the storage area.
- (IV) Do not store container directly under the sun.
- (V) Weather cock should be installed near the storage to determine wind direction.
- (VI) The storage building should be of non-combustible construction with at least two exits opening outside.
- (VII) Neutralization system should be provided.
- (VIII) Continuous monitoring of chlorine leak detection equipment with alarm should be installed in the storage area.
- (IX) The area should be free and remote from elevators, gangways or ventilating system to avoid dangerous concentration of chlorine during leak.
- (X) Two portable foam type fire extinguishers should be provided in the premises.
- (XI) Corrosive substances shall not be stored nearby which react violently with each other.
- (XII) Unauthorized person should not be allowed to enter into the storage area.
- (XIII) The floor level of storage shed should be preferably 30 cms (at least one foot) higher from the ground level to avoid water logging.
- (XIV) Ensure that all containers are properly fitted with safety caps or hooks.

1.2. Cylinder & drum containers

- (I) Store chlorine cylinders upright and secure them so that they do not fall.
- (II) Drum containers should be stored on their sides on rails, a few inches above the floor. They should not be stacked one upon the other. They should be stored such that the valves are in vertical plane.
- (III) Keep enough space between containers so as to have accessibility in case of emergency.
- (IV) Store the containers in a covered shed only. Keep them away from any source of heat as excessive heat may increase the pressure in container which will result into burst.
- (V) Do not store explosives, acids, turpentine, ether, anhydrous ammonia, finely divided metals or other flammable material in the vicinity of chlorine.
- (VI) Do not store containers in wet and muddy areas.
- (VII) Store filled and empty containers separately.
- (VIII) Protective covers for valves are secured even when the containers are empty, except during use in the system.
- (IX) Never use containers as a roller to move other equipment.
- (X) Never tamper with fusible plugs of tonners.
- (XI) Check leakages every day by means of ammonia torch. However, it should not be

touched to brass components like valves of container for safety.

- (XII) Never carry out any welding work on the chlorine system as combustion of steel takes place at 2510°C in presence of chlorine.
- (XIII) The boxes containing emergency kit, safety applications and self contained breathing apparatus should be kept in working order in an easily approachable area.

1.3. Use of cylinders & drum containers in process system

- (I) Use containers in the order of their receipt, as valve packing can get hardened during prolonged storage and cause gas leaks.
- (II) Do not use oil or lubricant on any valve of the containers.
- (III) Badly fitting connections should not be forced and correct tool should always be used for opening and closing valves. They should never be hammered.
- (IV) The area should be well ventilated with frequent air changes.
- (V) Transport the cylinders to the process area by using crane, hoist or railings etc.
- (VI) The drum containers should be kept in a horizontal position in such a way that the valves are in a vertical plane. The upper valve gives out gas and the lower one gives out liquid chlorine.
- (VII) The cylinder should be kept in upright position in order to release gas from the valve. For liquid chlorine withdrawal, it should be inverted with the help of an inverted rack.
- (VIII) Connect the containers to the system by using approved accessories.
- (IX) Use copper flexible tube, with lead washer containing 2 to 4% antimony or bonded asbestos or teflon washer. Use yoke clamp for connecting chlorine container.
- (X) Never use rubber tubes, pvc tubes etc. For making connections.
- (XI) Use the right spanner for operating the valve. Always keep the spanner on the valve spindle. Never use ill fitting spanner.
- (XII) After making the flexible connection, check for the leakage by means of ammonia torch but it should not come in contact with a valve.
- (XIII) Keep minimum distance between the container valve and header valve so that during change-over of the container, minimum amount of gas leaks.
- (XIV) The material of construction of the adapter should be same as that of valve outlet threads. O. The valve should not be used as a regulator for controlling the chlorine. During regulation due to high velocity of chlorine, the valve gets damaged which in turn can cause difficulty in closing.
- (XV) The tools and other equipment used for operating the container should be clean and free of grease, dust or grit.
- (XVI) Wear breathing apparatus while making the change-over of the container from the process header.
- (XVII) Do not heat the container to withdraw more gas at faster rate.
- (XVIII) Use pressure gauge and flow measuring device to control the flow and to know the quantity of gas left in the container.
- (XIX) Use an inverted u type barometric leg or vacuum breaking arrangement for connecting the container to the process piping.
- (XX) Withdrawal of the gas should be stopped when the gas pressure inside the container is between 0.1 to 0.5 kg/cm² approximately.
- (XXI) If withdrawal of the gas from the container connected to the process system has to be suspended for long intervals, it should be disconnected from the system, and the valve cap and hood replaced.
- (XXII) Gas containers should be handled by trained persons only.

1.4. Disconnecting containers from process system

- (I) Use breathing apparatus before disconnecting the container.

- (II) First close the container valve fully. After removal of chlorine the process valve should be closed.
- (III) Remove the flexible connection, plug the flexible connection in order to avoid entry of humid air. Replace the valve cap or hood on the container.
- (IV) Put the tag on the empty container & bring it to storage area marked for empties. E. Check for the leakage.

1.5. Loading and unloading of containers

- (I) The handling of containers should be done under the supervision of trained and competent person.
- (II) It should be done carefully with a crane, hoist or slanted ramp. Do not use magnet or sharp object for lifting the containers.
- (III) Small cylinders should not be lifted by means of valve caps as these are not designed to carry the weight.
- (IV) The containers should not be allowed to strike against each other or against any hard object.
- (V) Vehicles should be braked and isolated against any movement.
- (VI) After loading, the containers should be secured properly with the help of wooden wedges, rope or sling wire so that they do not roll away.
- (VII) The containers should never be dropped directly to the ground or on the tyre from the vehicle.
- (VIII) There should be no sharp projection in the vehicle.
- (IX) Containers must have valve caps and plugs fitted properly.
- (X) Check containers for leakage before loading/unloading.

1.6. Transportation of container

- (I) The name of the chemical along with diamond pictorial sign denoting the dangerous goods should be marked on the vehicle.
- (II) The name of the transporter, his address and telephone number should be clearly written on the vehicle.
- (III) The vehicle should not be used to transport any material other than what is written on it. D. Only trained drivers and cleaners should transport hazardous chemical
- (IV) The driver should not transport any leaking cylinder.
- (V) The cylinder should not project outside the vehicle.
- (VI) The transporter must ensure that every vehicle driver must carry "trem card" (transport emergency card) and 'instructions in writing booklet' and follow them.
- (VII) Every driver must carry safety appliances with him, viz; emergency kit, breathing apparatus etc.
- (VIII) The vehicles must be driven carefully, specially in crowded localities and on bumpy roads. Do not apply sudden brakes.
- (IX) Check for the leakage from time to time.
- (X) In the case of uncontrollable leakage the vehicle should be taken to an open area where there is less population.

1.7. Emergency Kit It consists of various tools and appliances like gaskets, yokes, studs, tie rods hoods, clamps, spanners, mild steel channels, screws, pins, wooden pegs etc. of standard sizes. Separate kits are used for cylinders and tonners. All the gadgets are designed for using in controlling or stopping the leakages from valves, fusible plug and side walls of cylinders and containers used for handling chlorine.

a. Leakage may occur through the valve. There are basically four types of valve leaks.

I. Valve packing

- II. Valve seat
- III. Defective inlet thread
- IV. Broken valve thread

- b. Leakage may occur through container wall. For controlling such leakages, clamps are used for cylinders and chain and yoke arrangement is used for tonner. Sometimes wooden peg is used by driving into the leaking hole as a temporary arrangement.
- c. Leakage may occur through fusible plug.
 - i. If the leakage is through the threads of fusible plug, yoke, hood and cap nut arrangement is used to control the leak.
 - ii. If fusible metal itself in the plug is leaking, yoke and stud arrangement is used to control the leak.

1. First Aid to be Provided for a Person Affected by Chlorine

a. General Remove the affected person immediately to an uncontaminated area. Remove contaminated clothing and wash contaminated parts of the body with soap and plenty of water. Lay down the affected person in cardiac position and keep him warm. Call a physician for medical assistance at the earliest. Caution: Never attempt to neutralize chlorine with other chemicals.

b. Skin Contact Remove the contaminated clothes, wash the affected skin with large quantity of water. Caution: No ointment should be applied unless prescribed by the physician.

c. Eye Contact If eyes get affected with liquid chlorine or high concentration of chlorine gas, they must be flushed immediately with running water for atleast 15 minutes keeping the eyelids open by hand. Caution: No ointment should be used unless prescribed by an eye specialist.

d. Inhalation If the victim is conscious, take him to a quiet place and lay him down on his back, with head and back elevated (cardiac position). Loosen his clothes and keep him warm using blankets. Give him tea, coffee, milk, peppermint etc. for making good effect on breathing system. If the victim is unconscious, but breathing, lay him down in the position mentioned above and give oxygen at low pressure until the arrival of doctor. If breathing has stopped, quickly stretch him out on the ground or a blanket if available, loosen his collar and belt and start artificial respiration without delay. Neilson arm lift back pressure method is useful. Automatic artificial respiration is preferable if available. Continue the respiration until the arrival of the doctor. Amboo bag can also be used for this purpose.

3. On-Site Emergency Plan to Cover the Leakage of Chlorine

3.1. Introduction As chlorine is a hazardous chemical, handling and storage of it demand adequate precautions to avoid possible hazards. Leakage of chlorine may develop into a major emergency. Therefore the emergency procedure to cover this eventuality is essential. It is drawn in the form of on-site emergency plan. The elements of onsite emergency plan are as follows:

3.2. Identification of Hazard Chart

In this case the site risk is evaluated by the expert and the extent of the probable damage is calculated on the basis of stored chlorine quantity, nearby population, wind direction, type of equipment failure etc. For this purpose hazard analysis is conducted in which case all the hazardous properties of chlorine are considered. If evacuation is required, the range of it is calculated.

3.3. Appointing Key Persons In order to control the incident like chlorine leakage, it is essential to appoint various persons with their well-defined responsibilities. Taking into account the various

activities likely to be involved, the following key persons are appointed (i) Site Controller, (ii) Incident controller, (iii) Shift Executive In charge, (iv) Communication Officer, (v) Safety Officer, (vi) Fire and Security Officer, (vii) Utilities and Services In charge, (viii) Traffic Controller, (ix) First Aider

3.4. Assembly Points These points are set up where persons from the plant would assemble in case of chlorine leakage. At these points the in-charge for counting the heads will be available.

3.5. Emergency Control Center

The control centre is the focal point in case of an emergency from where the operations to handle the emergency from are directed and coordinated. It contains site plan, telephone lines, public address system, safety equipment, first aid boxes, loud speaker, torches, list of essential telephone numbers, viz. fire brigade, police, hospital, civil defence, collector, factory inspector, organizational authorities, chlorine suppliers, mutual aid group, social workers, list of key persons and their addresses, copy of chemical fact sheet, location plan of fire hydrant, details of dispersion model of chlorine gas, population distribution pattern, location of alarm system.

3.6. Procedure to Meet Emergency

The actions to be taken by the staff and authority are given below; Emergency Alarm: An audible emergency alarm system is installed throughout the plant. On hearing the alarm the incident controller will activate the public address system to communicate with the staff about the emergency and give specific instructions for evacuations etc. anyone can report the occurrence of chlorine leakage to section in-charge or incident controller through telephone or intercom or in person.

3.7. Communication

Communication officer shall establish the communication suitable to that incident.

3.8. Services

For quickness and efficient operation of emergency plan the plant is divided into convenient number of zones and clearly marked on the plan. These are emergency services viz. fire fighting, first aid, rescue, alternative source of power supply, communication with local bodies etc. The incident controller will hand over the charge to the site controller of all these coordinating activities, when the site controller appears on the site. The site controller will coordinate all the activities of the key persons. On hearing the emergency alarm system all the key persons will take their charge. In case of their absence other alternatives are nominated. The person nominated for personnel and administration purposes will be responsible for informing all statutory authorities, keeping account of all persons in the plant including contract labour, casual workers and visitors. He will be responsible for giving information to press or any outside agencies. He is also responsible for organizing canteen facilities and keeping informed the families of affected persons. The person nominated as security officer should guide police, fire fighting and control the vehicle entries. The site controller or any other nominated person will announce resumption of normalcy after everything is brought under control. The onsite emergency plan needs to be evaluated by mock drill. Any weaknesses noticed during such drills should be noted and the plan is modified to eliminate the weaknesses.

3.9. Emergency

Measures In case of leakage or spillage of Chlorine, the following emergency measures should be taken:

- (I) Take a shallow breath and keep eyes opened to a minimum.
- (II) Evacuate the area.

- (III) Investigate the leak with proper gas mask and other appropriate personal protection.
- (IV) The investigator must be watched by a rescuer to rescue him in emergency.
- (V) If liquid leak occurs, turn the containers so as to leak only gas.
- (VI) In case of major leakage, all persons including neighbours should be warned.
- (VII) As the escaping gas is carried in the direction of the wind all persons should be moved in a direction opposite to that of the wind. Nose should be covered with wet handkerchief.
- (VIII) Under no circumstances should water or other liquid be directed towards leaking containers, because water makes the leak worse due to corrosive effect.
- (IX) The spillage should be controlled for evaporation by spraying chilled water having temperature below 9.4°C. With this water crystalline hydrates are formed which will temporarily avoid evaporation. Then try to neutralize the spillage by caustic soda or soda ash or hydrated lime solution carefully. If fluorochemical foam is available, use for preventing the evaporation of liquid chlorine.
- (X) Use emergency kit for controlling the leak.
- (XI) On controlling the leakage, use the container in the system or neutralize the contents in alkali solution such as caustic soda, soda ash or hydrated lime. Caution: keep the supply of caustic soda or soda ash or hydrated lime available. Do not push the leaking container in the alkali tank. Connect the container to the tank by barometric leg.
- (XII) If container commences leak during transport, it should be carried on to its destination or manufacturer or to remote place where it will be less harmful. Keeping the vehicle moving will prevent accumulation of high concentrations.
- (XIII) Only specially trained and equipped workers should deal with emergency arising due to major leakage.
- (XIV) If major leak takes place, alert the public nearby by sounding the siren.
- (XV) Any minor leakage must be attended immediately or it will become worse.
- (XVI) If the leakage is in the process system, stop the valve on the container at once.

3.10. Safety systems required at chlorination plant

The following safety systems should be kept ready at the chlorination plant:

- (I) Breathing apparatus.
- (II) Emergency kit.
- (III) Leak detectors.
- (IV) Neutralisation tank.
- (V) Siren system.
- (VI) Display of boards in local language for public cautioning, first aid and list of different authorities with phone numbers.
- (VII) Communication system.
- (VIII) Tagging system for equipments.
- (IX) First aid including tablets and cough mixtures.
- (X) Exhaust fans.
- (XI) Testing of pressure vessels, chlorine lines etc. Every year as per factory act.
- (XII) Training & mock drill.
- (XIII) Safety showers.
- (XIV) Eye fountain.
- (XV) Personal protective equipment.
- (XVI) Protecting hoods for ton-containers.
- (XVII) Fire extinguishers.
- (XVIII) Wind cock

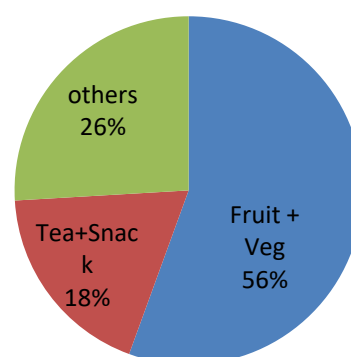
Appendix 19: Public Consultations Conducted During Project Preparation

A. Results of Socio-Economic Surveys Conducted

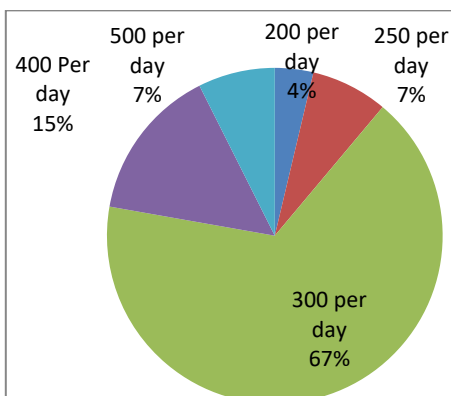
1. The following sections present socio-economic profile of the households likely to be affected by the proposed works. To estimate the temporary impacts transect walks were conducted. The baseline information collected through survey provides the socio-economic conditions of affected households. A wide range of data including, social category, Type of losses, Type of Occupation, sources of income, choice of resettlement etc have been collected.

2. **Occupation:** Transect walks identified a total of 27 APs whose business will be temporarily affected during pipe laying, as they carry their activities within RoW. These businesses can be broadly classified into three main categories as: (i) vegetable/fruit selling; (ii) Snacks and Tea stall (iii) small businesses like Cloth Stall, Cosmetic, Genral Store. Close to 56 percent of these however are engaged in vegetable/fruit selling, followed by Tea and Snack selling comprise 18 percent. Some of the surveyed APs (especially those engaged in vegetable/fruit selling) indicated that they sometimes take rounds in confined areas to sell their products home-to-home though their place of standing is stationary/fixed otherwise. All of them have movable structures while some APs sit on roads for selling their goods.

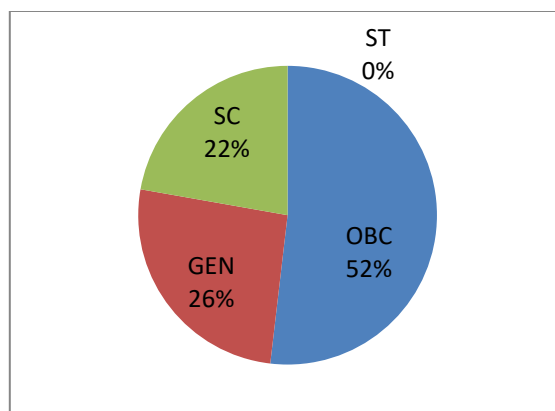
Nos of DPs



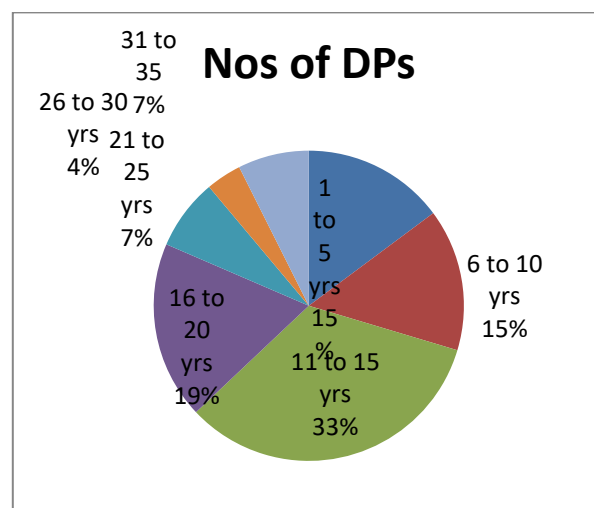
3. **Income:** No households with a monthly income of less than or equal to Rs. 2500/- per month was identified. 4 % of the households likely to be affected have income of Rs. 200 per day. 7% of the households likely to be affected have income of Rs. 250 per day. 67 % of the households likely to be affected have income of Rs. 300 per day. 15 % of the households likely to be affected have income of Rs. 400 per day. 7 % of the households likely to be affected have income of Rs. 500 per day.



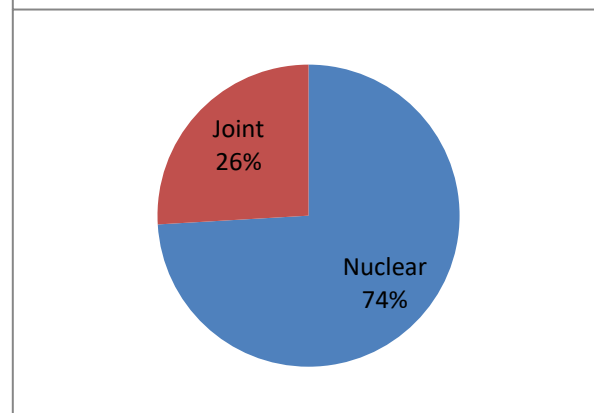
4. **Cast:** Households likely to be affected as per social category have been presented in Annexure 1. General Caste Comprise 26%, Other Backward Castes (OBC) comprises 52%, SC comprises 22%. It may be noted that OBC constitutes the majority in the overall social profile closely followed by the SC castes.



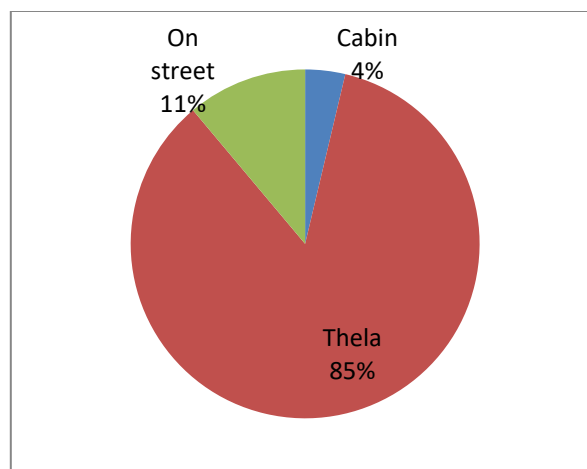
5. **Working in Towns in Years:** 15% APs are living/working in town since last 1 to 5 years, 15% APs are living/working in town since last 6 to 10 years, 33% APs are living in town / working since last 11 to 15 years, 19% APs are living / working in town since last 16 to 20 years, , 7% APs are living / working in town since last 21 to 25 years, , 4% APs are living / working in town since last 26 to 30 years, 7% APs are living / working in town since last 31 to 35 years.



6. **Type of Family:** As per Transect Walk data, 26 percent DPs have a joint family, while 74 percent have a nuclear family.



7. **Type of Structure:** As per Transect Walk data, 85 percent DPs are running their occupation in movable structure(Thela), 4 percent having a Cabin while 11 percent are sitting on road.



8. Transect walk data/analysis will be updated road wise where pipelines will be laid before mobilization of contractor and revised RP will be submitted to the ADB for approval. A 100 percent census and socio-economic surveys will be undertaken to register and document the status of affected people (APs) within subproject impact area⁴⁵.

B. Stakeholder Consultation Conducted during preparation of IEE and DPR

S.No	Name of Persons	Location	Topic Discussed	Outcome
1	Devesh Shah, A.En ,PHED, Nilesh Patel, J.En PHED, Bithal Ram, Lineman, PHED, Mohmad Khan ,Kanchan Signh, Lineman, PHED	Nagar Palika & PHED Campu s	Proposed water supply works and availability of land, R&R issues etc.	Meeting with PHED officials and discussion were done about Proposed project. PHED officers assured of their full cooperation with RUIDP during planning and implementation of the project
2	Raju Mochi, Gajendra Shankarlal, Raja Aadiwasi, Saakir, Ramesh	Near Old Bus Stand	1) Present Status of Water Supply in the town 2) Work Proposed by RUIDP 3) Quality of present Water Supply. 4) Willingness to pay for improved services	1) People are concerned about the poor supply (intermittent supply on alternate days) and quality of water. 2) People are supportive of the project. 3) No Sewerage System

⁴⁵During RP revision, census/socio-economic surveys for temporary impacts should include specific questions on place of business, its seasonal variation and AP's migrant nature. A separate list of such APs should be made to suggest that they may not be present at the same location during construction time/compensation. These APs however will be still entitled for compensation (if affected due to project). However, such list will tentatively indicate PMU/PIU/ADB the extent of missing APs during implementation. It is also suggested under this RUSDP that missing APs under temporary impacts not traceable for more than 18 months after the start of compensation disbursement, or do not claim their entitlement within project construction period, will bear no impacts of the project and hence will not be considered for compensation.

S.No	Name of Persons	Location	Topic Discussed	Outcome
				4) People are willing to pay for improved services.
3	Jakir Hussain	Kushal Baag	1) Present Status of Water Supply in the town 2) Work Proposed by RUIDP 3) Quality of present Water Supply. 4) Willingness to pay for improved services	1) Water supply is intermittent and on alternate days. . 2) People are willing to pay for the improved services of Water and Sewerage.
4	Mohanlal Nathulal, Hemant Kumar Bhat, Laxmi Bai, Laxman, Raja Balmiki	Collectorate Circle	1) Present Status of Water Supply in the town 2) Work Proposed by RUIDP 3) Quality of present Water Supply. 4) Willingness to pay for improved services	1) People are supportive of the project and indicated their willingness to participate in the project to make it successful. (especially women) 2) People understand direct benefits along with latent benefits of the project
5	Jaimalai, Md. Makkam Mukesh Mochi, Sayeed Khan, Ayub Khan, Bablu Khan, Yusuf Khan, Raju Gawaria, Jagdish Tamboli, Bhanwarlal Dilip Kumar, Mukesh Tolachand, Md.Akbar	New Bus Stand	1) Present Status of Water Supply in the town 2) Work Proposed by RUIDP 3) Quality of present Water Supply. 4) Willingness to pay for improved services	1) Poor supply and quality of water are persistent problem 2) People are supportive of the project and indicated their willingness to participate (especially women); they are willing to pay for improved services.

Photographs of Consultations



C. Consultations with Stakeholders (City Level Committee)- Stakeholder meeting was done under chairmanship of Collector, Bansawara on 20.08.2017 in Banswara town in which public representatives, officers of RUIDP, PHED, Municipal Council, WRD and consultant firms were present. Discussion were done on proposed scope of works under RUIDP Phase-4, arrangement of raw water for water supply from existing system of PHED at Kagdi weir pickup, methodology of works proposed, up gradation of existing STP, trenchless works for sewer pipe laying, covering all the left out works of UIDSSMT and operation and maintenance for 10 years. Minutes of meeting, photographs and attendance sheet are attached below-

Minutes of CLC



राजस्थान सरकार
कार्यालय अधिशाषी अभियन्ता, उदयपुर
राजस्थान शहरी आधारभूत विकास परियोजना (आर.यू.आई.डी.पी.)
173, Vakil Colony, Opp. Income Tax Colony, Hiran Magri Sec. No. 11, Udaipur- 313002
web site : www.ruidp.rajasthan.gov.in Phone No. 0294-2481721 E-mail – ipju.udaipur@gmail.com

**सिटी लेवल कमेटी मिटिंग दिनांक 22.08.2017 बांसवाड़ा
आर.यू.आई.डी.पी. फेस चतुर्थ की बैठक कार्यवाही विवरण**

आरयूआईडीपी चतुर्थ चरण के अन्तर्गत जलप्रदाय एवं सीवरेज योजना पर विस्तृत चर्चा हेतु जिला कलेक्टर, बांसवाड़ा की अध्यक्षता में दिनांक 22.08.2017 को सिटी लेवल कमेटी की बैठक आयोजित की गई। सलाहकार फर्म द्वारा प्रजेन्टेशन के माध्यम से योजना के अन्तर्गत किए जाने वाले कार्यों की विस्तृत जानकारी दी गई। नगर पालिका, बांसवाड़ा द्वारा नियुक्त सलाहकार फर्म के द्वारा शहर की जलप्रदाय एवं सीवरेज योजना की विस्तृत परियोजना रिपोर्ट बनवाई जा रही है। आरयूआईडीपी द्वारा इन विस्तृत परियोजना रिपोर्ट की समीक्षा की जावेगी। बैठक में उपस्थित जनप्रतिनिधियों एवं अधिकारियों की सूची अनुच्छेद-अ पर संलग्न है।

सलाहकार द्वारा निम्नलिखित प्रस्तावित जलप्रदाय व सीवरेज योजना के कार्यों पर प्रस्तुतिकरण दिया गया।

(अ) जल प्रदाय कार्य : जिसके अन्तर्गत शहरी क्षेत्र में पानी की छीजत (NRW-Non Revenue Water) को कम करने के साथ उचित दबाव के साथ निर्बाध जल वितरण करने का प्रावधान रखा गया है। इस जल वितरण प्रणाली के अन्तर्गत निम्नलिखित कार्य प्रस्तावित किये गये हैं:

- वाटर ट्रीटमेन्ट प्लांट : 9 एम.एल.डी
- ट्रांसमिशन मेन-डीआई के-9 (100 एमएम से 400 एमएम व्यास) की पाईप लाईन-16 किमी
- सी.डब्ल्यू.आर : 1.55 एम.एल.
- डिस्ट्रीब्यूशन मेन-
 - एच.डी.पी.ई (75 एमएम से 355 एमएम व्यास) पाईप लाईन-62 किमी
 - डीआई के-7 (100 एमएम से 500 एमएम व्यास) पाईप लाईन-268 किमी
- हाउस सर्विस कनेक्शन - 22300 कनेक्शन

(ब) सीवरेज कार्य : इस परियोजना के अन्तर्गत निम्नलिखित निर्माण कार्य प्रस्तावित किये गये हैं।

- एच.डी.पी.ई (200 एमएम से 315 एमएम व्यास) पाईप लाईन-110 किमी
- आर.सी.सी. एन पी-4, (350 एमएम से 450 एमएम व्यास) पाईप लाईन-3.4 किमी
- एच.डी.पी.ई (200 एमएम से 450 एमएम व्यास) पाईप लाईन-5.2 किमी (ट्रेंचलेस पद्धति)
- सीवरेज पम्पिंग स्टेशन- 3
 - नीलम नगर (वार्ड नं-14)

- नाथेलाव तालाब के पास (वार्ड नं-21)
- प्रतापगढ़ रोड के पास (वार्ड नं-01)
- सीवरेज ट्रीटमेन्ट प्लान्ट (एसबीआर टेक्नोलॉजी) -12 एम.एल.डी

उपरोक्त कार्यों की विस्तृत परियोजना रिपोर्ट की अनुमानित लागत राशि रुपये 301 करोड़ है। बैठक में निम्न बिन्दुओं पर चर्चा एवं निर्णय लिया गया :-

1. पीएचईडी के अधिकारियों के द्वारा यह सुझाव दिया गया की ग्रीष्म ऋतु के दौरान कागदी वियर जलाशय में जलस्तर कम होने के कारण कई युक्त पानी की आपूर्ति की समस्या रहती है तथा इस वर्ष कागदी वियर की मरम्मत हेतु 15 दिन के शटडाउन के लिए भी जल संसाधन विभाग द्वारा मांग की जा रही है जिसके कारण शहर की जल आपूर्ति में समस्या उत्पन्न होगी। इससे निजात पाने के लिए इस परियोजना के अन्तर्गत माही बांध पर पीएचईडी प्रोजेक्ट के अन्तर्गत बन रहे इन्टेकवेल का उपयोग बांसवाड़ा शहर के लिए किया जाए। पीएचईडी अधिकारियों द्वारा बताया गया कि इस इन्टेकवेल पर दो पम्प लगाने की जगह उपलब्ध है जहाँ पर बांसवाड़ा शहर की सप्लाई के लिए पम्प लगाये जा सकते हैं। बैठक में विचार विमर्श उपरांत बांसवाड़ा शहर के लिए माही बांध में निर्माणाधीन इन्टेकवेल में दो पम्प लगाये जाने का प्रावधान लेने का निर्णय लिया गया।
2. परियोजना निदेशक, आरयूआईडीपी ने जन प्रतिनिधियों तथा अधिकारियों को बताया कि सीवरेज एवं वाटर सप्लाई के एक डीएमए के समस्त कार्य (पानी तथा सीवर की लाईन दोनों के कनेक्शन एवं सडक का पुनर्निर्माण) एक साथ पूर्ण होने के पश्चात् ही दूसरे डीएमए का कार्य प्रारंभ किया जायेगा जिससे समय-समय पर जिला कलेक्टर महोदय द्वारा कार्य की निगरानी की जा सकेगी।
3. पीएचईडी विभाग द्वारा डिस्ट्रीब्यूशन मैन में पाईप का न्यूनतम व्यास 75 मि.मी. के स्थान पर 90 मि. मी. लेने का सुझाव दिया गया है। जिसकी समीक्षा आरयूआईडीपी द्वारा की जायेगी।
4. इस योजना के अन्तर्गत शहर के सभी house service connection के साथ वाटर मीटर लगाने का भी प्रावधान किया गया है।
5. वर्तमान में स्थापित 6.34 एम.एल.डी सीवरेज ट्रीटमेन्ट प्लान्ट को सी.पी.सी.बी मानदण्ड के अनुसार Up gradation किया जाना प्रस्तावित है। सीवरेज के पानी को एसटीपी से शुद्धीकरण के पश्चात उच्च जलाशय में एकत्रित किया जायेगा। जिसके द्वारा शोधित सीवरेज को उपयोग में लिया जा सके।

6. 3.5 मीटर से अधिक गहरी सीवर लाईनों को ट्रेचलेस द्वारा ढाला जायेगा जिससे शहरवासियों को असुविधाओं का सामना न करना पड़े। 4.0 मीटर चौड़ाई तक सभी सड़कों का पूर्ण चौड़ाई में रोड रेस्टोरेशन किया जायेगा।
7. चेयरमेन, नगर परिषद द्वारा बताया गया कि वर्तमान में बांसवाड़ा शहर में चल रहे RUDSICO के सीवरज कार्यों में कई गलियां छोड़ दी गई हैं। सलाहकार फर्म को यह निर्देश दिया गया कि RUDSICO के कार्यों की ड्राईंग की समीक्षा कर जो भी गलियां RUDSICO सीवर जोन सीमा के अलावा हैं जो आरयूआईडीपी के प्रोजेक्ट में जुड़ सकती हैं उन्हें जोड़ ली जाये तथा चेयरमेन, नगर परिषद ने कहा की जो गलियां RUDSICO सीवर जोन सीमा के अन्दर हैं उन्हें RUDSICO के प्रोजेक्ट में ही पूर्ण करवाया जाये।
8. सभी कार्यों का संचालन एवं संधारण कन्टेक्टर फर्म द्वारा 10 वर्ष तक किया जायेगा। जिसमें पानी तथा सीवरज लाईनों का भी रखरखाव शामिल है।

सिटी लेवल कमेटी की बैठक में विचारविमर्श एवं दिये गये निर्देशों को विस्तृत परियोजना रिपोर्ट में सम्मिलित किया जावेगा। उक्त कार्यों के लिए निविदाएं माह अक्टूबर 2017 में आमंत्रित की जाएगी।

11.9.17
अधिशायी अभियन्ता,
आर.यू.आई.डी.पी. (पी.आई.यू.)
उदयपुर

क्रमांक : आरयूआईडीपी/पीआईयू/उदयपुर/ CLC Meeting /2017-18/ 250-264 दिनांक: 11.09.2017

प्रतिलिपि निम्नांकित को सूचनार्थ :-

- 1- माननीय श्री मानशंकर नीनामा, लोकसभा सदस्य, बांसवाड़ा
- 2- श्री धन सिंह रावत, विधायक एवं मंत्री महोदय, बांसवाड़ा
- 3- श्रीमान् परियोजना निदेशक, आर.यू.आई.डी.पी., एवीएस बिल्डिंग, जवाहर सर्किल, जयपुर
- 4- श्रीमान् जिला कलक्टर एवं अध्यक्ष, सिटी लेवल कमेटी, बांसवाड़ा
- 5- अध्यक्ष/उपाध्यक्ष/आयुक्त, नगर परिषद, बांसवाड़ा
- 6- अधीक्षण अभियन्ता, (वेस्ट वाटर) आर.यू.आई.डी.पी., जयपुर ।
- 7- अधीक्षण अभियन्ता, (वाटर सप्लाई) आर.यू.आई.डी.पी., जयपुर ।
- 8- अधीक्षण अभियन्ता, सा.नि.वि./जन.स्वा.अभि.विभाग/जल संसाधन विभाग, बांसवाड़ा
- 9- वरिष्ठ नगर नियोजक, उदयपुर
- 10- अधिशायी अभियन्ता, नगर परिषद, बांसवाड़ा
- 11- प्रबुद्धजन, बांसवाड़ा

11.9.17
अधिशायी अभियन्ता,
आर.यू.आई.डी.पी. (पी.आई.यू.)
उदयपुर

Summary of Minutes of CLC meeting in English Transcript
Minutes of City Level Committee Meeting dtd. 22.08.2017 in Banswara for RUIDP Phase-IV

Under RUIDP Phase-IV, proposed water supply and sewerage works in Banswara were discussed in City Level Committee meeting on 22.08.2017 under the chairmanship of District Collector, Banswara. Consultants appointed by Municipal Council, Banswara were given presentation on proposed works. RUIDP will scrutinize the DPR. List of Personnel present in this meeting is attached as Appendix A.

A. Water Supply Works: water supply works are proposed for the purpose of reduction of NRW and supply of water in appropriate pressure. Following works are proposed-

- WTP: 9 MLD
- Transmission main: DI K9 (100 mm to 400 mm dia)- 16 KM
- CWR: 1.55 ML
- Distribution main- PHED pie line (75 mm to 355 mm dia)- 62 KM, DI K7 (100 mm tp 500 mm dia)- 268 KM
- House service connection: 22300

B. Sewerage works: Following works are proposed-

- HDPE (200 mm to 315 mm dia)- 110 KM
- RCC NP-4 (350 mm to 450 mm dia)-3.4 KM
- HDPE (200 mm to 450 mm dia)- 5.2 KM (trenchless method)
- SPS-3: Neelam Nagar (Ward no. 14), near Nathelav Pond (Ward no. 21) and at Pratapgarh Road (Ward no. 1)
- STP (SBR technology)- 12 MLD

Estimated project cost of proposed works as per DPR for above works is Rs. 301 crores. Following points were discussed and decisions were taken as-

1. PHED officials suggested that during summer season in Kagdi pickup weir, water level goes down and water is affected by scums and create problem of water supply and 15 days shut down is also required, which will created problem in water supply. To cope up with this problem they suggested to use intake well, constructed by PHED, where there is vacant slot to fit water pumps, where proposed pumps can be fitted. Therefore decision was taken to install two pumps at already established intake well at Mahi Dam.
2. Project Director, RUIDP informed that Water supply and sewerage works will be completed along with road restoration and house connections for both in one DMA and then only works will be started in other DMA and District Collector will monitor the project works.
3. PHED suggested using 90 mm pipe instead of 75 mm pipes for distribution main, RUIDP will review this proposal.
4. It is proposed to provide water meters along with all house service connection
5. Existing STP of 6.34 MLD is proposed to be upgrade as per latest CPCB norms. Treated effluent from STP shall be collected in elevated service reservoir so that it can be used.
6. Sewers of depth more than 3.5 mtrs shall be laid by trenchless method so that the residents can not face problems. Roads up to 4.0 mtr width will be restored up to full width.
7. Chairman, Municipal Council informed that presently ongoing sewerage works under RUDSICO, there are several lanes left out and consulting firms is directed to evaluate the works under RUDSICO and take left out lands in RUIDP phase-IV project.

8. Contractor shall be responsible for 10 years O&M including water and sewer networks.

Points discussed and directions given in the CLC meeting should be covered in DPR. Tenders shall be invited in October 2017 for above proposed works.

Signed by
Executive Engineer
PIU, RUIDP, Udaipur

Attendance Sheet of CLC Meeting

TOWN-BANSWARA				DATE-22-08-2017
क्र.सं.	नाम अधिकारी	पद	मोबाईल नं.	हस्ताक्षर
1	किशोर कुमार	सहस्रपांडा	992911628	किशोर
2	Dr. Preetam Yadwani	PD RUIDP	965691422	प्रीतम
3				
4				
5				
6	Bhagwati Prasad	DM		भगवती
7	Hasnuddin Pathan	S.E. PHED	9414242701	हसन
8	Nawal Chittoor	E.E. PHED	9414168261	नावल
9	Durgesh Shah	A.E. PHED	9414471748	दुर्गेश
10	Rajendra Singh	Representative	9414101212	राजेंद्र
11	Dr. Bhavinder Lal	Gen. Secy. N.P. Bd.	8890463322	भल्ल
12	Praveen Arora	SE, RUIDP, Bui	9414057444	प्रवीण
13	Bharat Raju	Gen. Secy	9462713525	भारत
14	Nakash Kar. Maitha	Gen. N.P. Bd.	8290553616	नाकेश
15	Ravi Suthar	WWE, PMDSC	9413389458	राज
16	Mohan Kumar	Consultant	9461823211	मोहन
17				
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Appendix 20: Guidelines for Safety during Monsoon/Heavy rainfall

Excavation and refilling of earth are common activities, which, if not carefully executed may pose problems to the safety of works as well as passersby and road users during the impending Monsoon.

Normal and heavy rainfall event affect our ongoing works, It should be our conscientious effort to ensure that such events do not prove to be problematic to people and structures in town. During monsoon PIU/PMDSC should ensure that any further excavation work is taken up only after ensuring that the earlier work is in safe stage. It is desired that DCM/ACM & Ex En PIU should inspect all sites during rains and take proactive actions.

Some of the precautions and mitigation measures to be taken are discussed below-

1. The execution of works having deep excavation in smaller lanes and congested areas should be completed well before monsoon. The works of deep excavation during monsoon should not be preferably taken up or extensive care should be taken for execution of such works.
2. The settlement in refilled trenches of sewerage and water supply lines may occur during monsoon. PMDSC and PIU team should inspect all sites after a storm to identify such reaches and take immediate corrective action by proper refilling and compacting. It is responsibility of all engineers to look after this activity during monsoon and ensure corrective actions from Contractor's side.
3. The contractor's crew should be equipped with vehicle, gum boots, raincoats, torch etc. to tackle such situation during and after rains. Adequate quantities of earth, debris and gravel should be stacked at strategic places so that no time is lost in procuring such material.
4. In trenches where pipe laying has been done and duly tested and approved, refilling should be done and all surplus material relocated to safe disposal sites such that it does not obstruct traffic or waterways.
5. All open ends of WS and WW pipelines should be firmly plugged to prevent debris from entering the pipeline. Manhole covers of sewer lines should be fixed in place to avoid any harm to road users.
6. Drains are primary or secondary carriers of storm water. Any unutilized construction material should be relocated to allow free passage of storm water. Surplus earth should be suitably and immediately be relocated to avoid earth from falling into the drain so that choking does not occur.
7. Overhead works should not be carried on in-weather conditions that threaten the safety of workers. More frequent checks on scaffold and bracings should be done during monsoon season.
8. Additional precautions should be taken of the power lines, ignorance and carelessness can cause major accidents and casualty.
9. Take preventive measures for water logging in working areas by providing dewatering pumps. Place bright and reflective warning signs.
10. Inspection should also be carried out before resumption of work after a shower/rain.
11. Storage of Construction Material: Steel & Cement are vital ingredients for quality construction work but in absence of proper storage, especially during monsoon, cement and steel may rapidly decline in quality and strength. Care should be taken to protect these materials and use of any exposed material should be allowed only after conducting fresh tests. Improper storage of such material should be reported to SE PIU/ACM PMDSC and use of any apparently affected material should be done after permission of SE PIU/DCM/ACM.

Additional Precautions

1. Adequate set up and resources such as dewatering pumps, electrical routings etc should be planned ahead. Water logging on main roads to be avoided, where construction works are going on.
2. Ensuring the monsoon specific PPE's issued in adequate and are used during monsoon.
3. Use of electric extension box should be avoided; extension cables (if used) should not be wet and damaged. Cables connections should be only weatherproof/waterproof. Electrical and HSE personnel of contractor should visit permanent and running sites regularly. Transparent protective sheets/rain sheds should be placed for the power distribution boards.
4. Welding machines, bar cutting machines etc. should be kept in dry conditions; should not stand in water logged area. Brakers and Drill machines should not be used when raining; dirt/mud should be scrubbed with cloth.
5. Special Trainings to all drivers and operators on safe practices and all vehicles/ equipment's maintenance checks to be more frequent.
6. High boom equipment to be stopped during blowing of high speed wind and rain storm. Arresting of parked vehicles, equipment during monsoon should be done.
7. All chemicals should be stored as per MSDS, chemicals to be protected from water ingress. Chemical waste should be disposed for preventing overflow of chemicals.
8. At labor camps following precautions should be taken:-
 - Maintaining hygiene & proper housekeeping.
 - Additional health checkup camp to identify seasonal diseases
 - Preventive measures on mosquito/parasite breeding mainly in work locations and camps
 - Frequent cleaning of toilets
 - To avoid water borne diseases, high level of cleanliness to be maintained, drinking water containers need to be cleaned and kept covered. Walk areas and pathways to be covered with Murom and soft rock particles (to avoid soft soil conditions).
 - Obstacle free approach to rest sheds, camp and toilets.
 - Proper illumination, provision of battery operated emergency lights
 - No bonfires inside resting sheds. No use of wood.

SE-PIU and DCM/ACM-PMDSC should oversee the arrangements to effectively deal with the eventuality.

EHS officer of contractor should visit each site and camps more frequently. Contractor/EHS officer will also impart training on safe working methods during Monsoon and will keep a daily watch on weather conditions to share with site team to act accordingly.

Contractor should organize Monsoon Health Camps and Monitor Workmen Habitat and Hygiene.

Appendix 21: Sample Grievance Registration Form

(To be available in Hindi and English)

The _____ Project welcomes complaints, suggestions, queries, and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback.

Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing *(CONFIDENTIAL)* above your name. Thank you.

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

FOR OFFICIAL USE ONLY

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

Appendix 22: Sample Environmental Site Inspection Report

Project Name _____
Contract Number _____

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

WEATHER: _____

Project Activity Stage	Survey	
	Design	
	Implementation	
	Pre-Commissioning	
	Guarantee Period	

Monitoring Items	Compliance
Compliance marked as Yes / No / Not applicable(NA) / Partially Implemented (PI)	
EHS supervisor appointed by contractor and available on site	
Construction site management plan (spoils, safety, schedule, equipment etc..) prepared	
Traffic management plan prepared	
Dust is under control	
Excavated soil properly placed within minimum space	
Construction area is confined; no traffic/pedestrian entry observed	
Surplus soil/debris/waste is disposed without delay	
Construction material (sand/gravel/aggregate) brought to site as & when required only	
Tarpaulins used to cover sand & other loose material when transported by vehicles	
After unloading , wheels & undercarriage of vehicles cleaned prior to leaving the site	
No chance finds encountered during excavation	
Work is planned in consultation with traffic police	
Work is not being conducted during heavy traffic	
Work at a stretch is completed within a day (excavation, pipe laying & backfilling)	
Pipe trenches are not kept open unduly	
Road is not completely closed; work is conducted on edge; at least one line is kept open	
Road is closed; alternative route provided & public informed, information board provided	
Pedestrian access to houses is not blocked due to pipe laying	
Spaces left in between trenches for access	
Wooden planks/metal sheets provided across trench for pedestrian	
No public/unauthorized entry observed in work site	

Children safety measures(barricades, security)in place at works in residential areas	
Prior public information provided about the work, schedule and disturbances	
Caution/warning board provided on site	
Guards with red flag provided during work at busy roads	
Workers using appropriate PPE (boots, gloves, helmets, ear muffs etc)	
Workers conducting or near heavy noise work is provided with ear muffs	
Contractor is following standard & safe construction practices	
Deep excavation is conducted with land slip/protection measures	
First aid facilities are available on site and workers informed	
Drinking water provided at the site	
Monitoring Items	Compliance
Toilet facility provided at the site	
Separate toilet facility is provided for women workers	
Workers camps are maintained cleanly	
Adequate toilet & bath facilities provided	
Contractor employed local workers as far as possible	
Workers camp set up with the permission of PIU	
Adequate housing provided	
Sufficient water provided for drinking/washing/bath	
No noisy work is conducted in the nights	
Local people informed of noisy work	
No blasting activity conducted	
Pneumatic drills or other equipment creating vibration is not used near old/risky buildings	

Signature

Sign off

Name
Position

Name
Position

Appendix 23: Sample Monthly Reporting Format for Assistant Safeguards Officer/Assistant Construction Manager

I. INTRODUCTION

- Overall project description and objectives
- Environmental category as per ADB Safeguard Policy Statement, 2009
- Environmental category of each subproject as per national laws and regulations
- Project Safeguards Team

Name	Designation/Office	Email Address	Contact Number
1. PMU			
2. PIUs			
3. Consultants			

- Overall project and sub-project progress and status
- Description of subprojects (package-wise) and status of implementation (preliminary, detailed design, on-going construction, completed, and/or O&M stage)

Package Number	Components/List of Works	Status of Implementation (Preliminary Design/Detailed Design/On-going Construction/Completed/O&M) ^a	Contract Status (specify if under bidding or contract awarded)	On-going Construction	
				%Physical Progress	Expected Completion Date

^a If on-going construction, include %physical progress and expected date of completion.

II. COMPLIANCE STATUS WITH NATIONAL/STATE/LOCAL STATUTORY ENVIRONMENTAL REQUIREMENTS^a

Package No.	Subproject Name	Statutory Environmental Requirements ^b	Status of Compliance ^c	Validity if obtained	Action Required	Specific Conditions that will require
-------------	-----------------	---	-----------------------------------	----------------------	-----------------	---------------------------------------

						environmental monitoring as per Environment Clearance, Consent/Permit to Establish^d

^a All statutory clearance/s, no-objection certificates, permit/s, etc. should be obtained prior to award of contract/s. Attach as appendix all clearance obtained during the reporting period. If already reported, specify in the "remarks" column.

^b Specify (environmental clearance? Permit/consent to establish? Forest clearance? Etc.)

^c Specify if obtained, submitted and awaiting approval, application not yet submitted.

^d Example: Environmental Clearance requires ambient air quality monitoring, Forest Clearance/Tree-cutting Permit requires 2 trees for every tree, etc.

III. COMPLIANCE STATUS WITH ENVIRONMENTAL LOAN COVENANTS

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

IV. COMPLIANCE STATUS WITH THE ENVIRONMENTAL MANAGEMENT PLAN (REFER TO EMP TABLES IN APPROVED IEE/S)

- Confirm if IEE/s require contractors to submit site-specific EMP/construction EMPs. If not, describe the methodology of monitoring each package under implementation.

Package-wise Implementation Status

Package Number	Component s	Design Status (Preliminary Design Stage/Detailed Design Completed)	Final IEE based on Detailed Design				Site-specific EMP (or Construction EMP) approved by Project Director? (Yes/No)	Remarks
			Not yet due (detailed design not yet completed)	Submitted to ADB (Provide Date of Submission)	Disclosed on project website (Provide Link)	Final IEE provided to Contractor/s (Yes/No)		

- Identify the role/s of Safeguards Team including schedule of on-site verification of reports submitted by consultants and contractors.

- For each package, provide name/s and contact details of contractor/s' nodal person/s for environmental safeguards.
- Include as appendix all supporting documents including **signed** monthly environmental site inspection reports prepared by consultants and/or contractors.
- With reference to approved EMP/site-specific EMP/construction EMP, complete the table below
- Provide the monitoring results as per the parameters outlined in the approved EMP (or site-specific EMP/construction EMP when applicable).
- In addition to the table on EMP implementation, the main text of the report should discuss in details the following items:
 - (i) **Grievance Redress Mechanism.** Provide information on establishment of grievance redress mechanism and capacity of grievance redress committee to address project-related issues/complaints. Include as appendix Notification of the GRM (town-wise if applicable).
 - (ii) **Complaints Received during the Reporting Period.** Provide information on number, nature, and resolution of complaints received during reporting period. Attach records as per GRM in the approved IEE. Identify safeguards team member/s involved in the GRM process. Attach minutes of meetings (ensure English translation is provided).
- Confirm if any dust was noted to escape the site boundaries and identify dust suppression techniques followed for site/s.
- Identify muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads.
- Identify type of erosion and sediment control measures installed on site/s, condition of erosion and sediment control measures including if these were intact following heavy rain;
- Identify designated areas for concrete works, chemical storage, construction materials, and refueling. Attach photographs of each area.
- Confirm spill kits on site and site procedure for handling emergencies.
- Identify any chemical stored on site and provide information on storage condition. Attach photograph.
- Describe management of stockpiles (construction materials, excavated soils, spoils, etc.). Provide photographs.
- Describe management of solid and liquid wastes on-site (quantity generated, transport, storage and disposal). Provide photographs.
- Provide information on barricades, signages, and on-site boards. Provide photographs.
- Checking if there are any activities being under taken out of working hours and how that is being managed.

Summary of Environmental Monitoring Activities (for the Reporting Period)^a

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

^a Attach Laboratory Results and Sampling Map/Locations

Overall Compliance with CEMP/EMP

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

V. APPROACH AND METHODOLOGY FOR ENVIRONMENTAL MONITORING OF THE PROJECT

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

VI. MONITORING OF ENVIRONMENTAL IMPACTS ON PROJECT SURROUNDINGS (ambient air, water quality and noise levels)

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

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

Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)			
			PM10 µg/m ³	PM2.5 µg/m ³	SO2 µg/m ³	NO2 µg/m ³

Surface Water Quality Results

S.No.	Parameters	Results		
		Location-1 (Name)	Location-2 (Name)	Location-3 (Name)
1.	pH			
2.	Turbidity			
3.	Total Hardness			
4.	DO			
5.	BOD			
6.	COD			
7.	Chloride			
8.	Iron			
9.	TSS			
10.	Arsenic			
11.	Cadmium			
12.	Fluoride			

13.	Potassium			
14.	Sodium			
15.	Calcium			
16.	Zn			
17.	Cr ⁺⁶			
18.	Magnesium			
19.	Copper			
20.	Manganese			
21.	Sulphate			
22.	Cyanide			
23.	Nitrate			
24.	Lead			
25.	Boron			
26.	Selenium			
27.	Aluminium			
28.	Totalresidual Chlorine			

Ground Water Quality Results

S.No.	Parameters	Results		
		Location-1 (Name)	Location-2 (Name)	Location-3 (Name)
1.	pH			
2.	Total Alkalinity			
3.	Total Hardness			
4.	Chloride			
5.	Iron			
6.	TDS			
7.	Arsenic			
8.	Fluoride			
9.	Zn			
10.	Cr+6			
11.	Copper			
12.	Manganese			
13.	Sulphate			
14.	Phosphate			
15.	Nitrate			
16.	Lead			
17.	Phenolic Compound			

Noise Quality Results

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

VII. ASBESTOS MANAGEMENT

Information on encountered or potential asbestos materials and capacity building activities on project sites should be included in this section.

FORM I – ASBESTOS INVENTORY, INSPECTION AND ACTION FORM		
Format: RUIDP/IIA/ LOCATION/NAME OF DBO CONTRACTOR/HSE 002/YEAR		
Location:		
Site coordinates:		
Elevation:		Team:
Date of visit:		Sign:
Present Status		Indicate if installed, operational, in storage, etc.
Original age		Months or years since installation
Diameter		mm or inches
Length		meters
Volume		
Total packet		
Packing date		
Disposal date		
Existing Site (Photo or illustrations):		
Illustration/ Design of Activities On-site with respect to existing asbestos (include details such as size of new pipes, distance from existing AC pipes, other notable observations)		
DBO Contractor Handling Asbestos:		
Number of persons handling waste		
Medical Records		
Safety Gears		
Vocational Training Last Conducted:		
Number of attendees:		
Conducted by Schedule:		
Required Actions:		
Remarks		
Conclusion/Remark		
HSE Signatory		

MATRIX FOR TRAINING & RECORDS

Format: RUIDP/INSP.MATRIX/LOCATION/NAME OF DBO CONTRACTOR/HSE 001/YEAR			
S. No.	Aspects of Asbestos Materials	Check points	Remarks
Training Schedule:			
Trainer Details:			
Date/Location of Training:			

Number of attendees:			
Training Schedule, Training Materials & Attendance Sheet, Feedback of Trainees.			
Understanding of:			
C. DOCUMENTS AND RECORDS			
4.	Site Inventory		
5.	List of Asbestos materials storage and installation points		
6.	Structure of Asbestos materials management committee		
D. INVENTORY			
1.	Inventory of Asbestos materials		
	Number of Asbestos materials/ pipes		
	Dimensions of Asbestos materials/ pipes		
	Total volume of Asbestos materials/ pipes		
2.	Storage facility/ installation location:		
A.	In-use	Location	
		Condition	Intact/ damaged
		Purpose	
		Accessibility by the workers	
		Evidence of physical damage and approximate size (length, width, volume) without coming into contact with The damaged Asbestos materials	
		Impacts on the environment (Based on Asbestos fiber Monitoring)	
3.	LABELING AND SIGNAGE		
	Notification to workplace safety and health		
	Working instruction		
	The risks associated with exposure to asbestos fibers		
	Cautionary statement to not disturb materials containing asbestos		
4.	PERSONAL PROTECTIVE EQUIPMENT (PPE)		
	Record of PPE		
	Mask		
	Eye glasses		
	Gloves		
	Ear muffs		
	Others		
	Training		
	On occupational risks of asbestos to the workers		Date: Time: In-house/ external: Faculty: No of workers attended:
	Training for maintenance, repair and renovation		Date: Time:

• Labels to be displayed in legible format • Specific training of Asbestos materials to be inducted in the Asbestos materials storage area for residing population in the campus.
Details of transit storage of Asbestos materials to be maintained as per norms in an isolated storage room full covered

VIII. SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

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

APPENDIXES

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

Appendix 24:Environmental Monitoring Plan - Ambient Air, Noise, Water and Soil

1. Under RUIDP works Environmental Monitoring will done for ambient air, noise, surface water, ground water and soils with following parameters-

A. Ambient Air Quality- Particulate Matters PM₁₀, Particulate Matter PM_{2.5}, SO_x, NO_x, Carbon Monoxide (CO) as per methods and norms approved by CPCB

B. Ambient Noise Quality- L_{day} and L_{night} (in Leq dBA) 24 hrs basis as per methods and norms approved by CPCB

C. Surface Water Quality- pH, Turbidity, Total Hardness, DO, BOD, COD, Chloride, Hg, Iron, TDS, TSS, Calcium, Zn, Cr⁺⁶, Magnesium, Copper, Manganese, Sulphate, Cyanide, Nitrate, Sodium, Potassium, Fluoride, Cadmium, Arsenic, Lead, Boron, Selenium, Aluminium, Total residual Chlorine

D. Ground Water Quality- pH, TDS, Total Hardness, Zn, Chloride, Iron, Copper, DO, Manganese, Suplhate, Nitrate, Fluiride, Hg, Cadmium, Cr⁺⁶, Arsenic, Lead, Total Alkalinity, Phosphate, Phenolic compound

E. Soil quality- pH, Elect. Conductivity (at 25°C), Moisture (at 105°C), Texture (silt, clay, sand), Calcium (as CaO), Magnesium (as Mg), Permeability, Nitrogen (as N), Sodium (as Na), Phosphate (as PO₄), Potassium (as K), Organic Matter, oil and grease

2. During pre-construction stage monitoring is required to establish baseline at following sites-

Environmental Monitoring in Construction Period

S.N .	Type of monitoring	Location of monitoring and no. of samples	Total No. of samples
1	Ambient Air Monitoring	WTP PHED site-1 WTP Kagdi Pick Up-1 Intake Site-1 STP Site-1 SPS sites -2 Proposed workers camp-1 Additional site (if any)-1	8
2.	Ambient Noise monitoring	WTP PHED site-1 WTP Kagdi Pick Up-1 Intake Site-1 STP Site-1 SPS sites -2 Proposed workers camp-1 Additional site (if any)-1	8
3.	Surface quality Water	Kagdi Dam (Intake site)-1	1
4.	Ground quality Water	WTP PHEDsite-1 STP site-1 SPS sites-2 Construction camp-1	5
5.	Soil Quality	WTP PHEDsite-1 STP site-1 SPS sites-2 Construction camp-1	5

3. During construction stage below monitoring should be done on minimum quarterly basis at the following sites-

Proposed sites	Ambient Air quality	Ambient Noise quality	Surface water quality	Ground Water Quality	Soil Quality
WTP site (PHED)	1	1	Nil	1	1
WTP site (Kagdi Pick up)	1	1	Nil	Nil	Nil
Intake works at KagdiDam	Nil	Nil	1	Nil	Nil
Pipe laying site within the town preferably near sensitive receptor*	2	2	Nil	Nil	Nil
Construction camp/storage yard/Labor camp	1	1	Nil	1	1
SPS near Nathelao Pond	1	1	Nil	1	1
SPS near Pratapgarh Road	1	1	Nil	1	1
STP site at Udaipur Road	1	1	Nil	1	1
Total number of samples in each quarter (A)	8	8	1	5	5
Total number of samples in construction period (B)	88	88	11	55	55

* Sensitive receptors are hospitals, schools, any major religious place etc

Calculation of total Number of samples-

Project duration= 4years=16quarters

Pre-construction phase= 3 months=1quarter

Monsoon period in each year=3 months=1 quarter (July-Sept)

Monsoon period in project duration=4quarter

Effective period of environmental monitoring (C) = 16-1-4= 11quarters

Total number of samples in construction period (B)= AxC

Note -

- All the tests should be done by labs approved by CPCB and/or RPCB and should be accredited by NABL
- All the tests should be done as per the norms and methods approved by CPCB/RPCB
- All the meteorological data like weather, wind, location, nearby features etc. should be recorded during sampling and indicated in the report for ambient air quality
- If surface water is not available within 500 meters of the site, ground water quality monitoring should be done from the vicinity within 500 meters and if both surface and ground water is available at any site both should be taken
- For air quality monitoring, if any two sites are within the distance of 2 kms from each other, only one sampling can be done at any site