Initial Environmental Examination

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India: Rajasthan Secondary Towns Development Sector Project – Additional Financing (PART A)

Bundi Water Supply and Wastewater Works

Prepared by Rajasthan Urban Drinking Water Sewerage and Infrastructure Corporation Limited-External Aided Project (RUDSICO-EAP) for the Asian Development Bank (ADB). This is an updated version of the draft originally posted in February 2023 available on https://www.adb.org/projects/documents/ind-42267-034-iee-0

CURRENCY EQUIVALENTS

(as of 19 January 2024)

Currency unit	–	Indian rupee (₹)
₹1.00	=	$ 0.012
$1.00	=	₹ 83.12

ABBREVIATIONS

ADB	–	Asian Development Bank
BOCW	–	Building and other Construction Workers
CGWB	–	central ground water board
CLC	–	city level committee
CPCB	–	central pollution control board
CPHEEO	–	Central Public Health and Environmental Engineering Organization
CTE	–	consent to establish
CTO	–	consent to operate
CWR	–	clear water reservoir
DBO	–	design-build-operate
DPR	–	detailed project report
EHS	–	Environmental Health and Safety
EIA	–	environmental impact assessment
EMP	–	environmental management plan
FAO	–	Food and Agricultural Organization
FCO	–	Fertilizer control ordinance
IEE	–	initial environmental examination
LSGD	–	Local Self Government Department
MOEFCC	–	Ministry of Environment, Forest and Climate Change
OHSR	–	Overhead service reservoir
PHED	–	Public Health Engineering Department
PIU	–	project implementation unit
PMU	–	project management unit
PWD	–	Public Works Department
REA	–	rapid environmental assessment
ROW	–	right-of-way
RSPCB	–	Rajasthan State Pollution Control Board
RSTDSP	–	Rajasthan Secondary Towns Development Sector Project
RUDSICO-EAP	–	Rajasthan Urban Drinking Water Sewerage and Infrastructure Corporation Limited-Externally Aided Projects
RUDSICO	–	Rajasthan Urban Drinking Water Sewerage and Infrastructure Corporation
SCADA	–	supervisory control and data acquisition
SBR	–	sequential batch reactor
SEIAA	–	State Environmental Impact Assessment Authority
SPS	–	Safeguard Policy Statement, 2009
ULB	–	urban local body
WHO	–	World Health Organization
WTP	–	water treatment plant

WEIGHTS AND MEASURES

m^3	–	cubic meter
dB	–	decibels
°C	–	degree centigrade
dia	–	diameter
kg	–	kilogram
kl	–	kiloliter
km	–	kilometer
kmph	–	kilometer per hour
KLD	–	kiloliters per day
ha	–	hectare
HP	–	horsepower
LPCD	–	liters per capita per day
lps	–	liters per second
m	–	meter
mg	–	milligram
mm	–	millimeter
MCM	–	million cubic meters
MLD	–	million liters per day
km^2	–	square kilometer

NOTE

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

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EXECUTIVE SUMMARY

ADB approved a loan for the Rajasthan Secondary Towns Development Sector Project (RSTDSP, Loan 3972: IND) in September 2020. This is currently under implementation and will close by May 2028. The additional financing (the project) will expand the improved access to WSS services in at least ten urban local bodies (ULBs), benefiting 1.2 million people. Important value addition of the proposed project to the ongoing project is that it will provide innovative solutions to address climate change to respond to the growing climate risks and vulnerability and to improve livability and prosperity through enhancing natural and/or built heritage at least ten ULBs in Rajasthan, benefiting 1.0 million people. The overall project is aligned with the following impacts: (i) access to potable, affordable, reliable, equitable, environmentally sustainable drinking water supply in all urban areas of Rajasthan improved, (ii) health status of urban population, especially the poor and under-privileged improved, and (iii) productivity, livability, and prosperity for the citizens in Rajasthan cities and towns enhanced. Reflecting the additional measures to enhance climate resilience and heritage-sensitive urban development of the project, impact statement was added; (iv) the outcome statement is modified as quality, reliability, equity, and sustainability of urban assets and services in project towns of Rajasthan improved; and additional output was also added, resulting in four outputs.

Bundi is one of the project towns, and improvement of water supply and sewerage system in Bundi is proposed under the RSTDSP-AF. Following are the proposed components:

- **Water supply.** Increase in intake pumping capacity; new water treatment plant (WTP) 8 million liters per day (MLD); clear water pump house; replacement of transmission pipe 1.19 km; replacement of overhead service reservoir (OHSR) 450 kilo liters (kl); new clear water reservoir (CWR) 1,200 kl in place of existing 650 kL CWR; distribution network (75-315 mm dia) in 5 zones 30.884 km; connections with meters 5,060 nos.
- **Sewerage.** New sewage treatment plant (STP) 6.5 MLD; Treated Effluent Elevated Reservoir (TEER), Treated Effluent Storage Reservoir (TESR); distribution lines for treated effluent 10 km; septage collection & conveyance (mobile tankers)

Screening and Categorization. assessment of potential impacts. Bundi Town Water Supply & Sewerage subproject is classified as environmental category B per ADB's Safeguard Policy Statement (SPS), 2009, and 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 subproject. As per the Government of India environmental impact assessment (EIA) Notification, 2006, subproject do not require environmental clearance.

Description of the Environment. Subproject components are in Bundi City 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 subproject sites. The subproject sites are in existing road right of way (RoW) and government-owned lands. Two proposed WTP and STP will be constructed on vacant lands within existing WTP and STP facilities respectively. There are no trees on the site and is surrounded mostly by agricultural areas. The proposed STP site is about 80 m to Ramganj forest block. Nearest habitation is at about 1.4 km. Nearest protected area is Ramgarh Vishdhari Wildlife Sanctuary, about 2 km. No interference with forest resources, as STP will be built within the existing STP component. There is one protected monument of national importance (Wall paintings of Hardoti School in the Palace) and three protected monuments of local importance. None of the components or located in or close to monuments. There are also some old/heritage buildings in old town area of Bundi, which are not notified or protected, but are part of local heritage. No works

are located within these, water distribution lines are proposed along the roads along which some of these buildings are located. About 5-7 trees may be required to cut.

Potential Environmental Impacts and Mitigation measures. In this 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. No impacts on forests or archeological resources envisaged. Temporary measures suggested to avoid any disturbance / damage to heritage buildings during laying of water lines in nearby roads. The source of water for town is Kota barrage, assessment confirm the source sustainability to provide additional water, and no water sharing conflicts or downstream impacts envisaged. Kota barrage, across River Chambal, perineal river of Rajasthan, is large with a live storage capacity of 69.83 million cubic meter (mcm). Total annual water demand of Bundi for 2055 is just about 16% of live storage. Kota barrage is also fed by three upstream dams (Gandhi Sagar, Jawahar Sagar Dam and Rana Pratap Sagar). A new STP of 6.5 MLD is proposed to meet the intermediate year (2040) demand of zones 1,2,3,5 and 6. STP will employ sequential batch reactor (SBR) technology to meet stipulated discharge standards. SBR will involve aerobic treatment, with minimum odour potential. Sludge management is included in the STP, properly dried sludge will be reused as manure in agricultural fields.

Potential impacts during construction are considered significant but temporary and are common impacts of construction in urban areas, and there are well developed methods to mitigate the same. Except laying of water pipelines, all other construction activities will be confined to the selected sites and the interference with the general public and community around is minimal. In these works, the temporary negative impacts arise mainly from construction dust and noise, hauling of construction material, waste and equipment on local roads (traffic, dust, safety etc.), mining of construction material, occupational health and safety (OHS) aspects. Pipe laying works will be conducted along public roads in an urban area congested with people, activities and traffic. Therefore, these works may have adverse, but temporary impacts arising mainly from the disturbance of residents, businesses and traffic due to construction work; safety risk to workers, public and nearby buildings due to deep trench excavations in the road; access impediment to houses and business, disposal of large quantities of construction waste etc. Trenchless method will be adopted for pipelines deeper than 3.5 m and at main road crossings in traffic areas.

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) proper planning and scheduling of water line works to minimize public inconvenience; (ii) measures to avoid impacts on heritage building and chance find procedures (iii) barricading, dust suppression and noise control measures; (iv) traffic management measures for works along the roads and for hauling activities; (v) occupational and community health and safety, labour welfare, (vi) provision of walkways and planks over trenches to ensure access will not be impeded; (vii) reuse of excavated materials to extent possible, (viii) spill and sediment control measures to avoid water and soil pollution, etc.,. 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/ site environmental management plan (SEMP) shall be always kept on-site during the construction period. The EMP will be included in bids and contracts, and implementation shall be binding on contractors. There are some gaps in

regulatory compliance at existing WTP identified in the environmental audit. Consent to operate (CTO) from Rajasthan Pollution Control Board (RPCB) needs to be obtained.

Implementation Arrangements. The executing and implementing agencies will remain unchanged from the current project, which are Government of Rajasthan's Local Self Government Department (LSGD) and Rajasthan Urban Drinking Water, Sewerage and Infrastructure Corporation (RUDSICO), respectively. The AF project retains the project management unit (PMU) at the implementing agency, as well as the two Zonal Offices in Jaipur and Jodhpur. Project implementation units (PIUs) have been established in project towns. A total of eight PIUs will manage 18 ULBs under the AF Project. Consultants will support the PMU and PIUs. Project Officer (Environment) at PMU and Safeguard and Safety Officer at each of the PIUs will be responsible for environment management and monitoring activities and will be supported by Safeguard support staff from Supervision Consultant, town staff/team and Environment Safeguard Specialist of Supervision Consultants. Contractor personnel will also include an Environment, Health and Safety (EHS) Engineer in the project construction team.

Consultation, Disclosure and Grievance Redress. The stakeholders were involved in developing the IEE. Informal and formal consultation are conducted with local population of the area at 8 places along with proposed alignment in the month of April-2022. A City Level Committee (CLC) was held and CLC has appreciated and approved the subproject. The draft IEE was made available at public locations; and this updated IEE will also be disclosed to a wider audience via the ADB and RUDSICO websites. The consultation process will continue during project implementation. A grievance redress mechanism (GRM) was established to redress public grievances. A town level consultation was conducted on 24.03.2023 at Collectorate Meeting Hall in Bundi Town, which was attended by Chairperson, Vice Chairman, and elected councillors of Bundi Municipal council, and officers of district administration and local bodies.

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. SEMRs will be disclosed on ADB and RUDSICO websites.

Conclusions. The proposed project is unlikely to cause significant adverse impacts, and potential impacts are mainly due to construction and can be mitigated or minimized to acceptable levels through measures included in the EMP. The citizens of the Bundi will be the major beneficiaries. The subproject is primarily designed to improve environmental quality and living conditions of Bundi Town through provision of water supply and sewerage. The benefits arising from this subproject include:(i) increased availability of potable water 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; (vi) reduced dependence on fresh water resource due to reuse of treated wastewater, and (vii) improvement in quality of water bodies due to disposal of treated effluent meeting disposal standards.

Based on the findings of the IEE, the classification of the project as Category "B" is confirmed. No further special study or detailed environmental impact assessment (EIA) needs to be undertaken to comply with ADB SPS (2009) or GoI EIA Notification (2006). To conform to government guidelines, the STP requires consent to establishment (CTE) and consent to operate (CTO) from

Rajasthan Pollution Control Board. CTE will be obtained prior to construction, as the detailed designs will be undertaken by the contractor. Draft IEE of this subproject was prepared and approved by ADB based on feasibility / preliminary design and included in bid and contract of DBO package. The IEE is now updated to reflect updated and final design of Water Treatment Plant (WTP), Clear Water Reservoir (CWR) Water supply network in four zones and STP design approval. The IEE will be further updated in the event of change in location and scope of subproject components.

I. INTRODUCTION

A. Rajasthan Secondary Town Development Section Project – Additional Financing

1. Sector Project (RSTDSP, Loan 3972: IND) from its regular ordinary capital resources on 25 September 2020 and became effective on 4 January 2021. The closing date of the current project is 31 May 2028. This project is on track and has performed well consistently since the first quarter of 2021. Under this project, water supply systems are being improved in eight urban local body (ULB) towns (Output 1), and sanitation systems in 13 ULBs (Output 2). During the implementation, an additional 13 ULBs were added to the project for fecal sludge and septage management system development. Under Output 3, capacity building and training activities on sustainable and resilient water supply and sanitation (WSS) operations, hygiene, gender equality and social inclusion conducted.

2. The additional financing (the project) will expand the improved access to WSS services in at least ten urban local bodies (ULBs), benefiting 1.2 million people. Important value addition of the proposed project to the ongoing project is that it will provide innovative solutions to address climate change to respond to the growing climate risks and vulnerability and to improve livability and prosperity through enhancing natural and/or built heritage at least ten ULBs in Rajasthan, benefiting 1.0 million people. The overall project is aligned with the following impacts: (i) access to potable, affordable, reliable, equitable, environmentally sustainable drinking water supply in all urban areas of Rajasthan improved, (ii) health status of urban population, especially the poor and under-privileged improved, and (iii) productivity, livability and prosperity for the citizens in Rajasthan cities and towns enhanced. Reflecting the additional measures to enhance climate resilience and heritage-sensitive urban development of the project, impact statement (iii) was added; the outcome statement is modified as quality, reliability, equity, and sustainability of urban assets and services in project towns of Rajasthan improved; and additional output was also added, resulting in four outputs.

(i) **Output 1: Resilient water supply systems developed or improved.** By 2028, the project will (i) At least 1,300 km of water supply pipelines will be commissioned through a district-metered area approach for effective non-revenue water (NRW) management, (ii) at least 79,000 households will be connected to an improved water supply system, including at least 95% below poverty line households, with 100% functional meters allowing for the introduction of volumetric billing, (iii) three new water treatment plants (WTPs) will be commissioned with a total capacity of at least 24 million liters per day (mld).

(ii) **Output 2: Resilient and inclusive sanitation systems developed or improved.** By 2028, (i) at least 500 km of sewers will be constructed; (ii) seven sewage treatment plants (STPs) with co-treatment of wastewater and fecal sludge and with a total capacity of at least 30 mld will be commissioned and one existing STP with 10 mld capacity will be upgraded to meet current effluent standards; and (iii) at least 54,000 new household connections (including at least 95% below poverty line households) to the sewer system will be installed.

(iii) **Output 3: Urban assets to enhance climate resilience and heritage living developed or improved.** By 2028, (i) at least 50 km of drainage networks will be constructed in five ULBs; (ii) at least five either kunds or baories rehabilitated and/or reconstructed in three ULBs that were heritage structures built for drainage, rainwater harvesting, and reuse, but currently are not properly functioning; (iii) five water parks rehabilitated in one ULB to enhance water retention and storage capacity and/or to improve people's well-being, both residents and visitors; and (iv) at least four heritage structures are refurbished in five ULBs to improve the living environment and attract

more tourists.

(iv) **Output 4: Institutional and human capacities strengthened for sustainable service delivery, gender equality, and improved public health**.

3. The executing and implementing agencies will remain unchanged. GOR's Local Self Government Department (LSGD) is executing agency and the Rajasthan Urban Drinking Water, Sewerage and Infrastructure Corporation (RUDSICO) is implementing agency.

4. **Bundi water supply and sewerage subproject.** This is one of the subprojects proposed under RSTDSP-AF. It will improve water supply and sewerage systems in the town.

B. Purpose of Initial Environmental Examination Report

5. As per ADB's Safeguards Policy Statement, 2009, ADB requires the consideration of environmental issues in all aspects of the Bank's operations. Using rapid environmental assessment (REA) checklist (Appendix 1), subproject is unlikely to cause significant adverse impacts, and classified as category B and per ADB SPS requirements this IEE is conducted. Subproject selection confirms with EARF environmental criteria.

C. Scope of IEE

6. The subproject will be implemented under the design-build-operate (DBO) modality. Thus, this IEE is based on the preliminary project design report. The IEE is conducted mainly based on field reconnaissance surveys and secondary sources of information. Stakeholder consultation was an integral part of the IEE. Draft IEE of this subproject was prepared and approved by ADB based on feasibility / preliminary design and included in bid and contract of DBO package. The IEE is now updated to reflect updated to reflect final design of Water Treatment Plant (WTP), Clear Water Reservoir (CWR) Water supply network and STP. The IEE will be further updated in the event of change in location and scope of subproject components. IEE will be further updated during implementation if there are any changes in project scope, design or sites updates will supersede the earlier version.

D. Report Structure

7. This Report contains the following sections:

(i) Executive summary;
(ii) Introduction;
(iii) Description of the project;
(iv) Analysis of alternatives;
(v) Policy, legal and administrative framework;
(vi) Description of the environment;
(vii) Anticipated environmental impacts and mitigation measures;
(viii) Public consultation and information disclosure;
(ix) Grievance redress mechanism;
(x) Environmental management plan; and
(xi) Conclusions and recommendations.

II. DESCRIPTION OF PROJECT

A. Project Location

8. **Bundi Town**. Bundi is one of the towns of Rajasthan state with rustic setting that stands on the foothills of the Aravali Mountains and very famous for its historical Baories, forts and painting. The city is surrounded by rocky and barren hills on North-West side and fertile land on South-East side. The general topography of the town is undulating hilly terrain. The ground level varies from 310m to 248 m and has an average elevation of 268m (879 feet).

B. Existing Water Supply and Sewerage Conditions

1. Existing Water Supply

9. **Source**: Current sources of water at Bundi town are the 26 MLD surface source from Kota Barrage and 5 MLD ground water. The town benefits from Kota Barrage in the Kota City. The total storage capacity of Kota Barrage is 112.06 MCUM, with dead storage capacity of 42.23 MCUM and live storage capacity of 69.83 MCUM. Kota Barrage is located across the Chambal River in Kota town. There are three major dams located upstream of Kota Barrage namely: Gandhi Sagar, Rana Pratap Sagar and Jawahar Sagar Dams. These dams discharge excess water to the Kota Barrage.

10. Part of the water supply in Bundi town comes from 20 numbers of tube wells located on the banks of Mangli River, which is 9 kms from the town. These tube wells were constructed under RUIDP Phase-II. In the year 2007, an anicut was constructed in the river to charge the existing tube wells and the yield from these tube wells was increased from 20,000 liters per hour to about 40,000 liters per hour.

11. **Intake Well**: Intake for Chambal-Bundi Water Supply Project is located on the left bank of Chambal River, near Sakatpura village, approx. 160.0 m upstream of Kota barrage. The Intake (4.0 m x 15.0 m) is located inside the river with truss bridge supported on pile foundation. The components of existing intake are.

(i) Submersible centrifugal VT pump sets: 3 x 55.0 KW, 162 LPS, 30 m Head;
(ii) Electrical substation of 33 KV/11 KV;
(iii) Electrical connection of 300 KV; and
(iv) 2 nos. transformers, 300 KVA (1W+1S).

12. **Raw Water Rising Mains.** The existing raw water rising main has a total length of 9,900m, which consists of 2,200m, 600mm dia MS pipe; internally cement mortar lining; and 7,700m, 600mm dia DI K9 pipe. This existing raw water rising amin conveys water from intake to WTP. This same existing rising main will be used for proposed subproject also.

13. **Water Treatment Plant (WTP):** An existing 26 MLD capacity WTP is in Jakhmund village at a distance of about 9.9km from the intake. This existing WTP was designed for demand year 2029. WTP was operational since 2017 and was constructed under Chambal – Bundi water supply project. This WTP is in good working condition and will be further used in the project along with the proposed 8 MLD WTP. Consent to operate for the existing WTP is not available as it is being operated by PHED and once it is availed by PHED, the same will be updated in IEE. The application for Consent to Establish (CTE) for proposed WTP is being processed with Rajasthan Pollution Control board (RSPCB) The proposed 8 MLD WTP will be constructed in the existing WTP compound.

14. **Treated Water Transmission Mains.** The existing treated water transmission mains have aggregate length of 70.14 kms of DI K-9 pipe, with diameters ranging from 100 mm to 600 mm. This transmission main is already laid in the town which conveys treated water from WTP to Mangli Head works to various OHSRs located in different areas of the town. All the metallic lines have been utilized in the project.

15. **CWRs**. The following are existing CWRs that were constructed in the town under different schemes:

(i) Nainwa Road – 625 KL and 450 KL;
(ii) Vikas Nagar – 800 KL;
(iii) Near Jail – 450 KL and 900 KL;
(iv) Bhata Vilas – 325 KL;
(v) Bal Chand Pada – 250 KL;
(vi) Kumbha Stadium (AMRUT Yozna) – 500 KL; and
(vii) Mangli – 400 KL, 400 KL and 2000 KL.

16. The 625 KL CWR at Nainwa road will be dismantled and replaced with a new CWR with 1200 KL capacity.

17. **OHSR** for water supply distribution Bundi town is divided into 23 zones. Each of the 23 zones has its own OHSR. Details of zone-wise OHSR are provided in the table below.

Table 1: Details of OHSRs in Bundi town

S. No	Location	Capacity (KL)	Staging Height (M)	Year of Construction
1.	Malviya Nagar	600	15	2015
2.	Nainwa Road Campus	450	25	1981
3.	RHB	450	10	1984
4.	Undiyala Durgri	500	18	1998
5.	Ambedkar Nagar	900	15	2015
6.	Aazad Park	500	25	1986
7.	Jail Tank	600	15	2015
8.	Malipura	450	GLSR	1984
9.	Baal Chandpura	3250	GLSR	1960
10.	Navjeevan Colony	950	-	2019
11.	Jawahar Nagar (1)	400	15	1987
12.	Banganga	300		
13.	Ranjeet Niwas	300		
14.	Bal Chandra Para	900	GLSR	2019
15.	Kagji Wara	450	GLSR	2019
16.	Silor Road	400		
17.	Laxmi Colony	700		2019
18.	Rajat Colony	550	18	1998
19.	Holi ka Khoont	600	15	2015
20.	RICCO Campus	800	15	2015
21.	Mahaveer Colony	600	25	1998
22.	Jawahar Nagar (2)	600		2019
23.	Chattrapura	300		- 2019
Total Capacity		15550		

18. **Distribution networks.** Bundi Municipal Area is divided into 23 water supply zones. This

zoning was done by AMRUT Scheme in 2016-2018. About 250 km of water distribution network is already laid in town. This existing distribution system consists of asbestos cement (AC) pipe (30.6Km), DI pipe (23.4 Km), HDPE pipe (166.1Km) and UPVC pipe (30km). AC pipes are already very old and UPVC pipes are already leaking due to breakages and aging. Hence, the need to replace these pipes, except for some alignments with newly laid HDPE pipes. In addition, consumer connections in 5 of the total 23 zones were not replaced under the AMRUT Yojna. Therefore, replacement of the existing consumer connections along with installation of new consumer meters in the 5 remaining zones, has also been proposed under the project. In these five zones, the old AC and Polyvinyl Chloride (PVC) pipelines will be replaced by new HDPE pipes with different sizes ranging from 75 mm to 315 mm dia and by new DI pipes with different sizes ranging from 100mm to 250mm dia.

19. **House Service Connections:** As of December 2021, Bundi town has 22,310 house service connections.

20. In the **SCADA system**, a Master Control Center (MCC) is being established as a Central Control System (CCS), and Local Control Centers (LCCs) at OHSRs, Pumping Stations and Distribution Network. The following results will be monitored by SCADA system:

(i) Monitor and control the designated flow of CWR, water level, pressure, valve mechanism from source to distribution;
(ii) Basic data to be transferred from pumping station – Flow in each pumping main, Pressure, Efficiency of pumps through signals from energy (KWH) meters installed at each outgoing feeder and multifunction meters (MFM) installed at each incoming feeder, readings of pH meters, turbidity meters and residual chlorine meters required for process monitoring will be communicated in PH to the main SCADA station;
(iii) Basic data to be transferred from CWR, OHSR and DMA are CWR & OHSR water levels, DMA- pressure, flow, battery power indicators and other monitoring signals to be communicated to the respective local control centers; and
(iv) The butterfly valves with accouters along with expansion joints are installed at distribution inlet of 7 OHSR (Chatarpura, Nankpuria, Laxmi Nagar, Chittor Road, Navjeevan Colony, Indra Puram and Banganga) and 2 GLSR (Balchnad Para and Modi Para).

2. Existing Sewerage System

21. Part of the existing sewerage system of Bundi Town is constructed under the ongoing RUIDP Phase-II, which covers 13 km sewer lines, 950 nos. of house sewer connections and one STP of 8 MLD capacity that covers Zones 1, 2, 3, 5, and 6. 5% network was covered under the project. Another part of the existing sewerage system of Bundi Town is also being constructed under the ongoing AMRUT Scheme, which covers approximately 135km of sewer lines in Zones 1, 2, 3, 4, 5, 6, 8 and 9; and two STPs of 0.5 MLD capacity each in zones 8 and 9. Under this same AMRUT Scheme, 11,916 nos. of house sewer connections is planned, with about 7,480 nos. of household connections have been accomplished to date.

22. Based on the above, approx. 150 kms sewer network is projected to be laid under the ongoing sewerage projects (i.e., 13 km under RUIDP (Phase-II) and 137 km under AMRUT Scheme). As of to date, about 13 km under RUIDP Phase-II and about 119.627 km under AMRUT Scheme have already been laid. The 8 MLD STP under RUIDP Phase-II has already been constructed using the Sequential Batch Reactor (SBR) technology and is now under operation, while the two 0.50 MLD STPs under AMRUT Scheme is currently being constructed. There are

no existing sewage pumping stations in Bundi Town.

23. **Sewerage Treatment Plant (STP)**. The existing STP with capacity of 8 MLD that was built under the RUIDP Phase-II is located at Devpura, near Ram Ganj Balaji, Bundi. This STP has been operational since 2015 and treats collected sewerage from the town. It employs the SBR technology. The STP is in good working condition and will be further used under the project along with new proposed STP. This existing STP has valid Consent to establish from RSPCB with validity until 2023. Under the AMRUT Scheme, two STPs, each with 0.50 MLD capacity, are currently under construction. These two STPs will cater to Zones 8 and 9 only.

C. Need for the Project:

1. Water Supply

24. The project under RUIDP Phase-IV will include the water supply system within Bundi Municipal Limits. The project aims at improving the water supply system for project horizon 2040, strengthening distribution system, upgradation & improvement of SCADA system and establishing a continuously pressurized water supply system to the town. In view of the fund allocation for the town in the Program, the water supply project area must be restricted to the municipal limits.

25. **Augmentation of Bundi Water Supply Scheme for Demand Load from 26 MLD to 34 MLD**. Bundi Municipal Area is divided into 23 water supply zones; this zoning was done by AMRUT Scheme in 2016-2018. While water supply infrastructures (source, treatment, storage, transmission and distribution network, pipe network and consumer connections) are currently being constructed under the AMRUT Scheme, 5 of the 23 zones are not covered. Therefore, increasing the treatment capacity and replacement of the existing distribution network and consumer connections within these 5 remaining zones, along with installation of new consumer meters, are needed to ensure full coverage of Bundi town.

26. At present, the capacities of intake well, rising mains and CWRs have been designed for demand in the year 2044, but pumping machinery and treatment plant have been designed only for the demand year 2029.

2. Sewerage System

27. For the design population, the capacity of STP needed is 15.93 MLD for Base Year 2025, 21.80 MLD for Intermediate Year 2040, and 29.89 MLD for Ultimate Design Year 2055. The capacity of the existing STP built under RUIDP Phase-II is 8 MLD which covers Zones 1, 2, 3, 5 and 6. Two 0.50 MLD STPs, which will cover Zones 8 and 9, respectively, will be completed under the AMRUT Scheme Phase 2. Thus, there will be a capacity of 9 MLD.

28. Based on these figures, gaps of 6.93 MLD for Base Year 2025, 12.80 MLD for Intermediate Year 2040, and 20.89 MLD for Ultimate Design Year 2055 are envisaged. To partially fill the gap, the AMRUT Scheme Phase 2 also envisages a septage management and sewerage network for Zones 4 and 7. It will include a 0.50 MLD STP for Zone 7. Therefore, to fully fill the gap, STP capacity increase of 6.43 MLD is needed for Base Year 2025, and subsequent STP capacity increase of 5.97 MLD is needed for Intermediate Year 2040, to ensure full coverage of Bundi town.

D. Proposed Water Supply and Sewerage Infrastructure in Bundi under RSTDSP

1. Water Supply

29. **Status of water demand for Bundi**: Water demand for Bundi town has been calculated based on 135 LPCD as per acceptable PHED, Rajasthan norms. Water demand includes domestic, industrial and fire demand of town. Presently there is no any industrial demand in Bundi and therefore only domestic and fire demand is taken for design purposes. Base year, intermediate year and ultimate year is taken as 2025, 2040 and 2055 respectively. Total water demand of the town is given below Table 2.

Table 2: Population and Water Demand and Water Availability

Year	Stage	Population	Water Demand at Consumer end	Total clear water demand (Except Filter Losses) +Rural Demand	Allocated Water from Kota Barrage (MLD)
2025	Base Year	138450	24.68	20.98	49.32
2040	Intermediate Year	189390	33.72	28.66	49.32
2055	Ultimate Year	259720	45.95	39.05	49.32

*49.32 MLD=49.32 X 365/1000=18 mcm, water reserved from Kota Barrage for Bundi Town

30. The required water is made available from existing Kota Barrage and the water resource department, GoR has allocated 18 CUM of drinking water for Bundi town. Existing tube wells will be used only in case of emergency situations and repair maintenance period after blending of ground water with surface water.

Table 3: Present and proposed production detail from existing source

Source	Existing water Availability (MLD)	Allocated water (MLD)	Total water supply required (MLD)	Percentage change	Remark
Kota Barrage	26 MLD	49.315 MLD	45.95 MLD for year 2055	16 % increase	
Ground water (Existing wells)	5	0	0		Existing ground water sources will not use after completion of subproject; however, they may be used in case of any emergency
Total	31 MLD	49.315 MLD	45.95 MLD for year 2055		

31. **Source**. The present source of water at Bundi town is surface and ground water. The town is benefitting from Kota Barrage in Kota City. Kota barrage is the fourth construction in the Chambal Valley Project over River Chambal, a perineal river of Rajasthan. It was built to store the waters stored by the three upstream dams of the project, namely: Gandhi Sagar Dam, Jawahar Sagar Dam and Rana Pratap Sagar Dam, and then channelize it to the dry areas of Rajasthan and Madhya Pradesh for irrigation purposes via canals. The total storage capacity of Kota Barrage is 112.06 MCUM, with dead storage capacity of 42.23 MCUM and live storage capacity of 69.83 MCUM. Out of total live storage capacity, 18 MCUM is reserved for Bundi water

supply subproject which is about 16.6 % of total available water in barrage.

32. **Sustainability of Source (Kota Barrage)**. Details of daily average level and discharge of Chambal Complex Dams for a period of 10 years from 2007-08 to 2017-18 is obtained from Superintending Engineer (SE) Irrigation Department, Kota Barrage. The average daily water level at Kota Barrage is 853.52m while average maximum water level was 854.90m during the last 10 years, thus the fluctuation in water level between average daily water level and average maximum water level is only 1.38. Further, there are 3 dams in the upstream of Kota Barrage which keep on adding water to this Barrage. Detailed Sustainability report of Kota Barrage is attached in Appendix 9, which states that the barrage has enough water fulfil the demand of Bundi town. As such, the dam was found most dependable for the demand of town for design year 2044. On the basis of the above data analysis, it's come that the proposed water source "Kota Barrage" is sustainable and the required quantity for the proposed water supply subproject from Kota Barrage will be met without any significant fluctuation.

Table 4: Storage capacity of Kota Barrage and Demand for Bundi town

Source	Total Storage capacity of dam	Current abstraction	Total water allocation from Dam	Percentage of proposed abstraction from dam	Allocated water for town
Kota Barrage	307.014 MLD or 112.06 mcm	26 MLD or 9.49 mcm	49.315 MLD or 18 mcm	16.06 %	49.315 MLD or 18 mcm

33. **Intake well**. An intake structure of 26 MLD capacity designed for Bundi Water Supply Project is located on the left bank of Chambal River, near Sakatpura village, approx. 160.0m upstream of Kota Barrage. The intake structure (4 m x 15 m) was built on the middle part of the river, which includes a truss bridge that is supported on pile foundation. Under the subproject, additional pumping machinery is proposed at existing intake well to accommodate additional 8 MLD water demand. The existing raw water rising main is sufficient enough to transfer the planned increase of raw water from intake to WTP.

34. **Water Treatment Plant.** A new 8 MLD Water Treatment Plant has been proposed at the existing 26 MLD WTP campus of PHED at Jakhmund. The capacity of filter plant has been designed as per availability of raw water from Kota Barrage. The headworks will cater for an additional water demand of 8 MLD for Bundi town and nearby villages. Road connectivity of the proposed WTP at Bundi town via single lane Gravels Road. Land area is mostly used in agricultural purpose in surrounding area. Land required for construction of WTP is 4000 Sqm against the land availability is 10000 Sqm. Land for existing WTP was allotted by district collector Bundi in on 2nd July 2013.

35. **Replacement of existing transmission line** of 1,193m total length is proposed. 1,000m of 150 mm dia DI, K-9 pipe is to be laid to replace existing transmission line between Bhatta Vilas Head Works and GLSR at Malipura; and 193m of 200mm dia pipe is to be laid to replace the existing transmission line between Vikas Nagar Pump House and Housing Board OHSR.

36. **CWR.** The existing CWR of 625 KL capacity at Nainwa Road Pumping Station is not in good condition and it is to be replaced. Demand analysis shows a deficit of 1,199 KL CWR capacity for the year 2055; hence, a new CWR of 1200 KL capacity has been proposed.

37. **OHSR.** The existing OHSR at Housing Board is of 450 KL capacity. The OHSR is in poor

physical condition: A column is also damaged. Therefore, the OLD OHSR will be replaced by new OHSR of same capacity.

38. **Distribution Network**: 18 of the total 23 zones have been provided with new distribution pipeline under AMRUT Scheme. The remaining 5 zones will be covered under the subproject, wherein the existing distribution pipelines will be completely replaced and new consumer connections along with consumer meters will be installed.

Table 5: Details of distribution network to be replaced.

DIA	ID	ZONE-5B	ZONE-7	ZONE-8	ZONE-9	ZONE-10	TOTAL
90 MM	81.1	5352.7	5147.5	2630.1	2849.9	4729.4	20709.6
110 MM	99.3	643.3	669.0	480.7	999.3	219.3	3011.6
125 MM	112.8	419.8	513.4	417.0	268.8	783.2	2402.2
140 MM	126.3	0.0	68.6	336.2	535.7	70.3	1010.8
160 MM	144.4	602.4	111.5	155.6	68.7	834.8	1773.0
180 MM	162.5	32.9	319.1	373.4	418.8	0.0	1144.2
200 MM	180.6	60.2	21.1	86.8	26.9	20.0	215.0
225 MM	203.1	86.2	68.6	61.6	20.2	0.0	236.6
250 MM	225.8	0.0	0.0	0.0	274.5	0.0	274.5
280 MM	252.9	0.0	0.0	0.0	107.4	0.0	107.4
TOTAL		7197.5	6918.8	4541.4	5570.2	6656.906	30884.81

39. **Replacement of Consumer Water Meters.** About 5,060 nos. of water meters with meter boxes will be installed in the remaining 5 zones to cover the requirement for intermediate year 2040.

40. **SCADA System**. For efficient and uninterrupted running of pumps at various pumping stations and at the same time ensuring the desired quantity of water to be delivered to each ESR, it is proposed that required field instruments and communication devices be installed and connected with the Central Control System at the Pumping Stations, ESRs, Electric Substations, etc. The SCADA system envisages a Master Control Centre established at EE Campus, Bundi, and Local Control Centers at various locations as follows:

(i) Local Control Centre located at Mangli Head Works
(ii) Local Control Centre located at Nainwa Road Head Works
(iii) Local Control Centre located at Bhata Vilas Head Works
(iv) Local Control Centre at Vikas Nagar Head Works
(v) Local Control Centre located at Chhatarpura Head Works
(vi) Local Control Centre located at Jail Campus Head Works
(vii) Local Control Centres (LCCs) located at 23 numbers ESRs.
(viii) Master Control Centre located at EE Campus.

41. The SCADA for additional facilities proposed under this project will be integrated with the existing SCADA at the Master Control Centre located at the EE Campus.

42. **Master Control Center (MCC)**. The MCC SCADA system shall consist of a high end dual redundant server system (with MS SQL database) operating on a dual redundant high speed Ethernet bus cable system and communicating with:

(i) A minimum of 2 PC based operator workstations completes with 21” LCD screen, keyboard and mouse, one unit being configurable as an engineering workstation;
(ii) A server based large screen display system comprising 2 no 46” LCD displays;

(iii) Laser printers for the purposes of alarm and event reporting and for the production of reports and historical trends; and
(iv) A server-based telecommunications system operating with ISDN and GPRS communications media.

43. **Operation and maintenance of water supply system**. The DBO contractor will operate and maintain the system for a period of 10 years after completion of construction and commissioning the new / improved system. This will include the following:

(i) Drawing raw water from Intake to the WTP including raw water pumping main and maintenance of entire raw water system;
(ii) Operating and maintenance of all the proposed clear water pumping stations to fill all the CWRs through transmission pipelines and also direct pumping to distribution system and operation of chlorination system, maintenance of complete system and maintaining the infrastructure and maintaining the specified water levels at each of the reservoirs throughout the operation and maintenance period;
(iii) Managing the distribution network for distributing water efficiently, equitably and minimizing NRW and maintaining the infrastructure on DMA basis in the distribution network;
(iv) Providing continuous pressurized water supply with improvement in level of service on continuous basis to the connected consumers and maintaining the infrastructure while meeting the performance indicators. 12-meter (m) pressure head shall be maintained at all ferrule points;
(v) Meter reading, customer services and maintaining the infrastructure in water supply sector;
(vi) Meter reading, bimonthly billing, bill distribution, revenue collection and customer services and maintaining the infrastructure in water supply;
(vii) Sampling treated water received at all the CWRs and from random points within the zones/DMA to ensure that it meets the potable water specification and monitor on monthly basis;
(viii) Assessing and minimizing non-revenue water and locating the causes for high NRW and bringing down the NRW level within the 7% for DMA, and 15% of raw water;
(ix) Provide consumer service connections on approval or sanction by employer representative;
(x) Contractor will provide continuous on-the-job trainings that will start from the day the contractor gets mobilized, and other capacity building programs by the contractor as important regular activities for staff of the employer, PHED and local body; and
(xi) Maintain environmental and safety norms at entire system components.

44. **Summary of Proposed Works Under Water Supply**. The subproject is formulated to address gaps in water supply infrastructure in a holistic and integrated manner under RSTDSP. Based on the above detailed discussions, and to meet out the demand up to the Ultimate Design Year 2055 under the present plan, the following is a summary of the components that have been proposed for the water supply component:

(i) **Intake Well:** At existing intake well submersible VT pump sets would be installed for 8 MLD extended load, including all inter connections with existing transfer line.
(ii) **WTP:** Construction of WTP for extended load of 8 MLD is proposed at existing 26 MLD WTP campus.

(iii) **Pump House at WTP Campus:** Required pump installation for 8 MLD load duly connected with existing suction and delivery side.

(iv) **At Mangli Pump House:** Additional pumps for upgradation of 8 MLD and panels for design demand.

(v) **Transmission line:** Replacement of the existing transmission line of 1193 m total length is proposed.

(vi) **OHSR and Distribution System:** A new OHSR of 450 KL capacity will be dismantled and constructed as a replacement of the existing one in Zone 14. The CWR of 625 KL capacity at Nainwa H/W will be discarded and a new CWR of 1200 KL capacity will be dismantled and constructed as replacement. A new dedicated power feeder along with extension of power load will be installed.

(vii) **Replacement of Distribution Network:** Replacement of 30.88 km distribution network in remaining 5 zones

(viii) **Replacement of Consumer Water Meters:** Water meter & Meter Box-5060 Nos in 5 zones for intermediate year 2040.

(ix) **Upgradation of SCADA System:** Additional unit of SCADA system will be installed for the new facilities being proposed and it will be integrated with the existing SCADA (under installation at present).

(x) **O&M:** 10 years O&M for all new constructions.

2. Sewerage

45. **Proposed Sewerage.** As per the available detailed a total of 225 Km length of sewer network is required for Bundi Town. Of this, 13 km has been laid by RUIDP (TRANCHE-2) and 135 Km is in the scope of AMRUT Scheme, of which 119.627 Km has already been laid. Thus, balance 77 km of sewerage network is still required to be laid, which shall be laid by ULB under separate projects. To treat the increased sewage under RSTDSP, it is proposed to develop a sewerage treatment system in Bundi Town for Zone 1,2,3,5 and 6 to treat, and dispose/reuse the collected domestic wastewater safely. The objectives of the proposed sewerage works are:

(i) Construction of energy efficient and mechanized STP and electromechanical machinery;

(ii) Septage management and decentralized wastewater treatment systems in suitable areas;

(iii) Provision for reuse of treated effluent etc.;

(iv) To ensure sustainability of the project by implementing a comprehensive asset management plan focusing on an integrated approach to O&M to minimize lifecycle costs.

46. Proposed works under Sewerage are:

(i) Construction and operation and maintenance (O&M) of 1 No. 6.50 MLD Sewage treatment plant (STP) that will cover Zones 1, 2, 3, 5 and 6 only;

(ii) 10 Years O&M of the proposed STP with performance guarantee;

(iii) Design, construction, execution, testing and commissioning of Treated Effluent Elevated Reservoir (TEER), Treated Effluent Storage Reservoir (TESR) along with ancillary civil works – 10 Kms HDPE 200 mm pipe proposed for distribution of treated effluent from STP;

(iv) Reuse of Treated Effluent; and

(v) Faecal Sludge Management – Desludging of septage from household pits/ septic tank/ community septic tank, transportation to STP, disposal to designated unit in STP for treatment including O&M of the equipment with all accessories complete in all respect.

47. The sewer system will be designed as a separate sewer system that carries only domestic wastewater. The open drain system that exists in the town will cater to storm runoff. No industrial wastewater will be allowed into the sewers.

48. **Sewage Flows for Different Horizon Years.** As per CPHEEO Sewerage Manual, 80% of the water may be expected to reach the sewers unless there is data available to the contrary. In Bundi, it is proposed to supply the water at the rate of 135 LPCD. The expected flow of sewage be 108 LPCD, over this to account for ground water infiltration and any other unaccounted for nondomestic addition.

Table 6: Population Projections and Sewage Generation for Different Horizon Years (Municipal Area)

Particulars		POPULATION			Remark
		YEAR-2025	YEAR-2040	YEAR-2055	
Total Population of Bundi Town	**Urban**	138450	189390	259720	
	Floating	6923	9470	12986	
Base Water demand	Urban	18.69	25.57	35.06	135 LPCD
	Floating	0.28	0.38	0.52	40 LPCD
	Total	**18.97**	**25.95**	**35.58**	
Sewage Generation (80 % of the Water Demand		15.17	20.76	28.47	
5 % of Infiltration		0.76	1.04	1.42	
Total		**15.93**	**21.80**	**29.89**	

Note:
1. Sewage generated from municipal population: Population x 135 LPCD x 80% return factor + 5% infiltration.
2. Sewage generated from floating population: Population x 40 LPCD x 80% return factor + 5% infiltration

49. After the completion of all house sewer connections in the year 2025, the generated sewage flow at STP will be 15.93 MLD, which is more than the available capacity of STP, i.e., 9 MLD (8 MLD already completed by RUIDP Phase-II and 2 x 0.5 MLD under construction through AMRUT Scheme Phase-II).

50. In particular, to the zones that will be covered by the sewerage component of the subproject (i.e., Zones 1, 2, 3, 5, and 6 only), table below shows a summary of capacity calculations for the three design years under consideration.

Table 7: Capacity Calculation of Sewage Generation in Zones 1, 2, 3, 5, and 6

Particulars	Details		
	2025	2040	2055
Total Urban Population to be covered by STP near Ramganj Balaji	112062	125633	144367
Total floating Population to be covered by STP near Ramganj Balaji	5781	7908	10845
135 LPCD Water demand for Urban	15.13	16.96	19.49
40 LPCD Water demand for floating	0.23	0.32	0.43
Total Water Demand (in MLD)	15.36	17.28	19.92
80% of water demand	12.29	13.82	15.94
5% infiltration	0.61	0.69	0.80

Sewage generation to be covered by STP at Ramganj Balaji (in MLD)	12.90	14.51	16.74
AVAILABLE STP (CAPACITIES) (in MLD)	8	8	8
Balanced Capacity (in MLD)	4.90	6.51	8.74
STP Proposed (in MLD)	**5.0**	**6.5**	**9.0**

51. Based on the above tabulation, an additional STP capacity of 6.5 MLD is required for design year 2040 for zones 1, 2, 3, 5, 6 & RUIDP zone. This considers a 15-year design period and 3 years of construction & commissioning period.

52. **Sewage treatment Plant**. It is proposed that STP based on sequential batch reactor (SBR) technology be constructed to treat the incoming sewage to stringent discharge standards specified in this IEE and included in the bid documents. SBR is a cyclic activated sludge treatment process and provides the highest treatment efficiency possible in a single step biological process. One STP (SBR technology) of 6.5 MLD based on SBR Technology near Existing STP at Ramgunj Balaji in Bundi with co-treatment of sludge is proposed as part of the project in Bundi to meet the demand. Proposed treatment process is shown in table 8 below. As per site selection criteria framed in EARF, At STP site there is no habitations exist within 500 meters of the proposed project site, Nearest habitation of Belle Exotic Farmhouse is 1.4 km far from the proposed STP site on North-East direction, no wild fauna is reported at this site; The selected site is also had sufficient area for future expansion of the STP. Required land is only 6000 sqm against available land of 15000 sqm. The STP land area of about 39 ha (44 bigha and 4 biswa) of land was allotted by District Collector to Public Health Engineering Department on dated 26.06.2008. New STP will be constructed on the same allotted land. The land is surrounded by Ramganj forest area.

Table 8: Treatment Process proposed in Bundi under RSTDSP

Module	Description	Design Capacity Average Daily Flow (MLD)	Proposed Treatment Process with Co-Treatment of Fecal Sludge
A	Campus Layout and unit arrangements	9.70	Planning of the STP shall be for 9.7 MLD (Two module of 6.50 MLD – under project and 3.20 MLD-Future planning)
B	MPS and Pre-treatment units	9.70 (Civil Units) 6.50 (Electro-mechanical works)	MPS (Inlet Chamber, Coarse Screen Channel, Distribution Chamber, Sump etc. Inlet chamber with grit removal mechanism as per CPHEEO Manual. Primary Treatment: Fine Screening + Distribution Chamber + Grit Removal system + Parshall Flume
C	Sewage Treatment Plant (STP) (Including provision of Co-treatment of Fecal Sludge)	6.50	**Secondary Treatment**: SBR **Sludge Handling**: Sludge Thickening (gravity or an efficient proven mechanical process) + Dewatering (centrifuge, volute or an efficient proven dewatering process) **Disinfection**,
D	Reuse of Effluent	6.50	Reservoir (TEER), Treated effluent Pump House of required capacity, and treated sewage bypass to nearest disposal point when reuse system cannot be worked, as per direction of EIC.

Module	Description	Design Capacity Average Daily Flow (MLD)	Proposed Treatment Process with Co-Treatment of Fecal Sludge
E	Sludge Management and Disposal	6.50	Safe disposal of sludge
F	Effluent disposal pipe	9.70	Safe disposal of treated effluent
G	Bypass arrangement	9.70	To bypass in rainy season.

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

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

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

55. 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 TESR, effluent pumping station and a TEER are proposed at the STP in the subproject. Total storage capacity of TESR and TEER at each STP is 15% of respective STP treatment capacity. Treated effluent will be chlorinated prior to its entry into TESR/TEER.

56. **Discharge of treated wastewater**. The excess / surplus treated wastewater that is not reused will be discharge into a natural drain, the drain no-1265 The distance between STP & Drain approx. 50 Meter and that drain is discharged into the Mangli river, and necessary facilities – pipelines and pumping requirements, will be developed.

57. **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.

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

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

59. **Fecal Sludge Management**. Fecal Sludge Management (FSM) is to provide low costs sanitation where sewer network is not an immediate requirement and make its collection, treatment and effluent management environment friendly. Rajasthan Urban Infrastructure Development Project (RUIDP) has proposed to implement non-sewer sanitation solution to some selected pockets of the towns through Fecal Sludge and Septage Management. These pockets /areas are having the population density less than the density required to generate the sewage in sufficient quantity for piped sewer network. However, sewer network has been designed including these areas so that in future whenever required sewer network can be laid.

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

61. **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, and will make septage collection, treatment and effluent management environment- friendly.

62. Bundi town is having 60 municipal wards. There are total nine wards namely 4, 5, 23, 24, 25, 27, 29, 42 and 53 which are having the low density or less habited area. Since sewer is already laid in some parts of these wards, it is expected that sewage load due to some growth in population will be taken care by these sewers. It has been further assumed that the already laid sewer will be adequate for population corresponding to year 2025 projection. For remaining

growth, Fecal Sludge and Septage Management (FSSM) has been planned. Therefore, projected population beyond base year 2025 is covered under proposed FSM in the town.

Table 9: FSM ward and Population Covered under FSM

Ward No.	Total Area	Habituated Area*	Ward area to be cover with FSM (%)	Census Population	Total Projected Population			Population to be covered by FSM		
	Ha.			2011	2025	2040	2055	2025*	2040	2055
WARD-4	42.95	38.23	100.00	1275	2417	4071	6355	0	1654	3938
WARD-5	1104.02	504.02	100.00	3910	8621	15444	24866	0	6823	16245
WARD-23	47.60	47.60	100.00	1050	2763	5244	8670	0	2481	5907
WARD-24	85.09	60.09	100.00	1789	3045	4865	7377	0	1820	4332
WARD-25	497.33	247.33	100.00	1762	7145	14944	25711	0	7799	18566
WARD-27	78.27	43.27	100.00	1300	2556	4376	6888	0	1820	4332
WARD-29	28.17	28.17	100.00	1276	2113	3327	5001	0	1214	2888
WARD-42	204.03	134.03	88.00	1676	4026	7721	12823	0	3695	8797
WARD-53	24.94	21.86	70.00	995	1270	2099	3247	0	830	1978
Total:	**587.95**	**178.66**	**409.29**	**5827**	**9558**	**12652**	**14813**	**0**	**28136**	**66983**

***** It has been further assumed that the already laid sewer will be adequate for population corresponding to year 2025 projection

63. **Table 10** below shows the nature and size of the various civil works components of this water supply and sewerage subproject in Bundi Town. Google Coordinates of proposed work sites are given in **Table 11**. Locations of project sites layout maps are shown in **Figures 1, to 12**.

Table 10: Scope of Proposed Works in Bundi Town

Infrastructure	Function	Description of works/capacity	Location and ownership
Water Supply			
Intake – cum – raw water pump house	Raw Water extraction from Kota Barrage	Intake Installation of 2 numbers of new VT pumps at existing Intake near for increasing intake capacity by addition 8 MLD, including all inter connections with existing transfer line Environmental compliance audit will be conducted for the existing intake and pump house. CMSC is collecting data from PHED and will be included in the next updated IEE.	Within existing pump house located on the left bank of Chambal River, Sakatpura village, approx. 160.0 m upstream of Kota Barrage **Ownership- Water Resource department (WRD)**

Infrastructure	Function	Description of works/capacity	Location and ownership
Rapid Gravity Filter Water Treatment Plant (WTP)	Treatment of Collected water to meet drinking water standard.	New 8 MLD To meet the intermediate demand of 2040. • Alum coagulation & flocculation • Sedimentation, • Rapid gravity filtration, • Disinfection with chlorination • Wash water recovery • Sludge drying beds etc.,	Existing WTP Campus at Jakhmund. **Ownership- PHED**
Clear Water Pumping System	To provide adequate pressure in water supply system to distribute to consumers directly/transmit water to overhead tanks for gravity supply	Providing clear water pumping system in the existing clear water pump house- 2 nos.- • Mangli HWs (additional pumps, 1W+1S for 8 MLD Supply through existing pumping main. • Vikas Nagar HWs to feed proposed OHSR at Housing Board (1W+1S)	• Mangli HWs • Vikas Nagar HWs **Ownership- PHED**
Clear Water Reservoir (CWR)	Storage and pumping of clear water for supply	*Replacement* Existing 650 kl CWR at Nainwa road will be dismantled and replaced with new 1200 KL new CWR	Nainwa road PHED Campus head works **Ownership-PHED**
Transmission line	Water transmission from Headworks to CWRs	*Replacement* 1193 m total length to be replaced. • 1000m of 150 mm dia Di, K-9 to be replaced between Bhatta Vilas Head Works and GLSR at Malipura 193 m 200 mm Dia pipe to be replaced between Vikas Nagar Pump House to Housing Board OHSR.	Transmission pipelines will be mostly laid along the main roads. Pipes will be laid underground. **Ownership of Roads – Nagar Palika**

Infrastructure	Function	Description of works/capacity	Location and ownership
OHSR (Overhead Service Reservoir)	Storage of Clear Water	*Replacement* Existing 450 KL OHSR at Vikas Nagar, Housing board will be dismantled and replaced with new 450 KL new OHSR for zone 14.	Existing OHSR site at Housing Board, Zone 14 **Ownership PHED**
Distribution System	Collect water from service reservoir and distribution to households.	Replacement Length: 30.884 Kms Material: HDPE Pipe Diameter: 75mm to 315 mm	Along existing roads of five zones (ZONE-5B, ZONE-7, ZONE-8, ZONE-9 and ZONE-10) **Ownership-Nagar Palika**
House Service Connections	Connection consisting of all pipes, fittings and appurtenances from the water riser pipe to the water inlet pipe of the distribution system	5060 Numbers. house water connections	5 zones Covered out of 23 zones.
Sewerage Work			
Sewage Treatment Plant (STP-01) (Including provision of Co-treatment of Fecal Sludge	Treatment of collected wastewater to meet stipulated discharge standards	*New – STP* • 6.50 MLD Components • SBR (sequential batch reactor) based STP with primary, secondary, tertiary treatment • Disinfection of treated wastewater for reuse – chlorination tank • sludge management (sludge collection, thickening, dewatering and disposal) • Laboratory, and online testing facilities for BOD, COD, TSS etc.,) Instrumentation, automation, SCADA etc.	**Location:** Existing STP campus at Ramgunj Balaji. **Ownership: PHED**, Bundi
Treated wastewater storage tanks	Store the treated wastewater for reuse, and also provide adequate pressure / elevation for supply	**New** TESR of 325 KL. TEER 650 KL • Provision for mobile tanker filling points	Within designed STP campus

Infrastructure	Function	Description of works/capacity	Location and ownership
		and rising mains/ distribution system, bypass/overflow arrangements at the TEER to facilitate reuse Instrumentation, automation, SCADA etc	
Outfall sewer	Disposal of treated effluent – after reuse surplus/excess treated effluent that is not put to reuse will be discharged through outflow sewer	• Outfall sewer / effluent discharge pipe This will be designed during the detailed design phase	From STP outlet to the drain no-1265 along government owned vacant land, Drain final leads to Mangli River.
Sludge Management and Disposal	To reduce its volume and to stabilize the organic materials.	sludge sump returning arrangement for supernatant inlet/equalization tank for treatment; pumping sludge to sludge thickener and pumping thickened to mechanical sludge dewatering system. a shed for dewatered sludge cake can be further air dried for 15 days.	Within STP campus
FSSM			
Truck mounted mobile desludging equipment	storage, collection, transport, treatment, and safe end use or disposal of fecal sludge.	Mobile tankers with suction and discharge arrangements and one with 4000 litre capacity. No of tankers will be worked out during final design. Truck-mounted mobile desludging equipment, each with a capacity of 4000 liters, equipped with suction and discharge arrangements, will collect fecal sludge from households using a mechanized vacuum process. The number of tankers required will be determined during the	Mobile Equipment

Infrastructure	Function	Description of works/capacity	Location and ownership
		final design phase. After collection, the sludge will be transferred into the SPS, and then, through pressure pumping, it will be transported to the STP for treatment. These vehicles will be parked and washed in a designated area within the STP premises and will be managed by the contractor for a period of 10 years and by ULB after 10 years during the operation and maintenance (O&M) phase.	

Table 11: Coordinates of Sub Project Locations

COMPONENTS	Latitude	Longitude
WTP (8MLD) at Jakhmund HWs	25°13'55.5"N	75°46'13.8"E
CWR (1200 KL) at Nainwa road	25°46'03.52"N	75°51'37.42"E
STP (6.5 MLD) at Ramganj Balaji	25°39'28.7"N	75°65'52.8"E

64. Raw and treated sewage characteristics are provided in table 11 below.

Table 12: Raw and treated Sewage Parameter for proposed STP

		Raw	Treated
Sewage Parameters	**Unit**	**Value**	**Value**
pH	unit less	6.5-7.5	6.5-9
BOD5 @ 20 degree C	mg/L	300	≤ 10
COD	mg/L	650	≤ 50
TSS	mg/L	600	≤ 10
TKN	mg/L	55	≤ 5
N-Total			≤ 10
Fecal Coliform			<100

Figure 1: Location of Subproject Components on Google Earth Imagery

Figure 2: Schematic Diagram for Water Supply Scheme at Bundi (Proposed components in green ink)

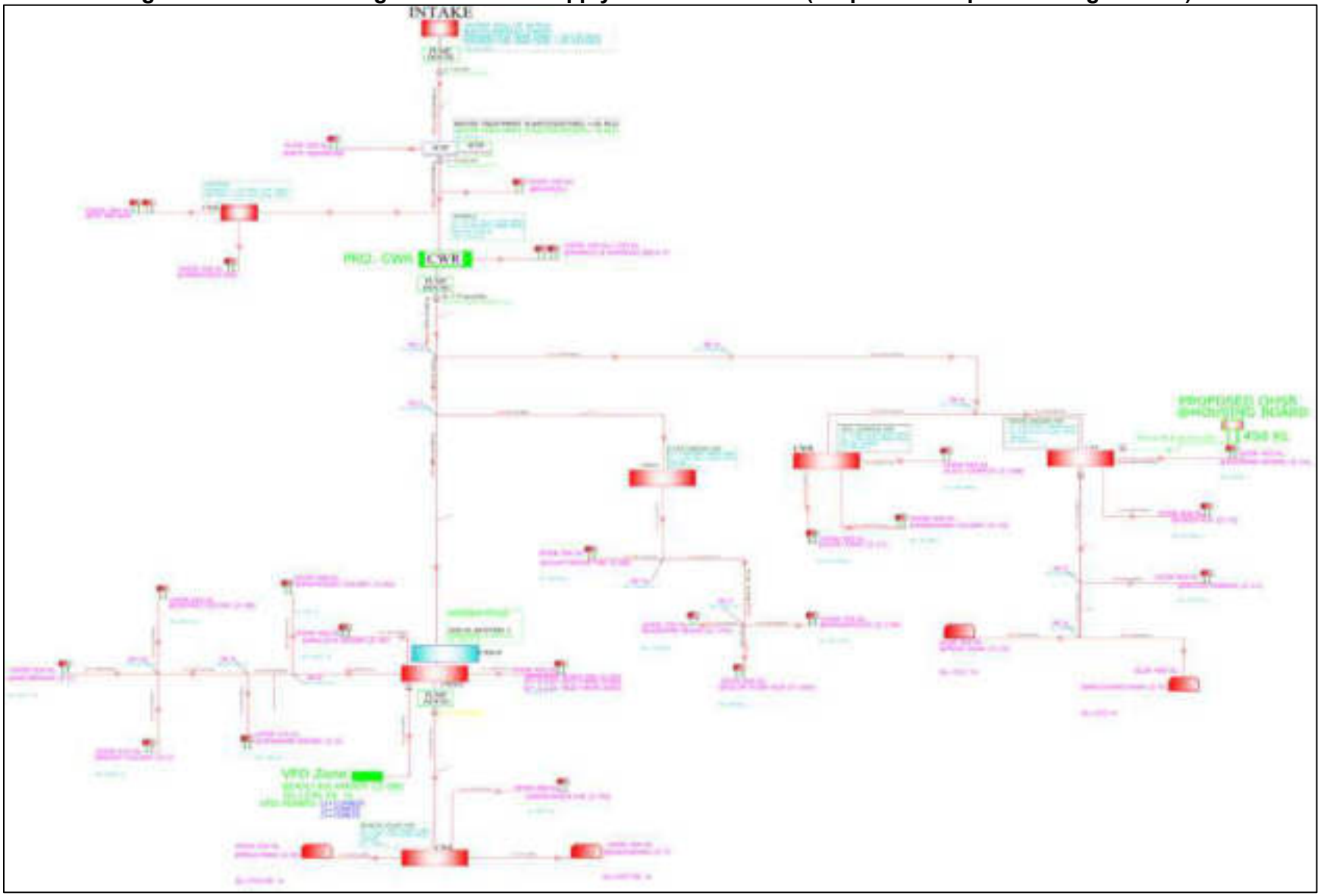


Figure 3: Location of Proposed Water Supply Project Components on Bundi Map.

Figure 4: Location of Kota Barrage Intake on Google Map.

Figure 5: Layout of Proposed WTP in Jakhmund, Bundi (Showing Backwash and Sludge processing units)

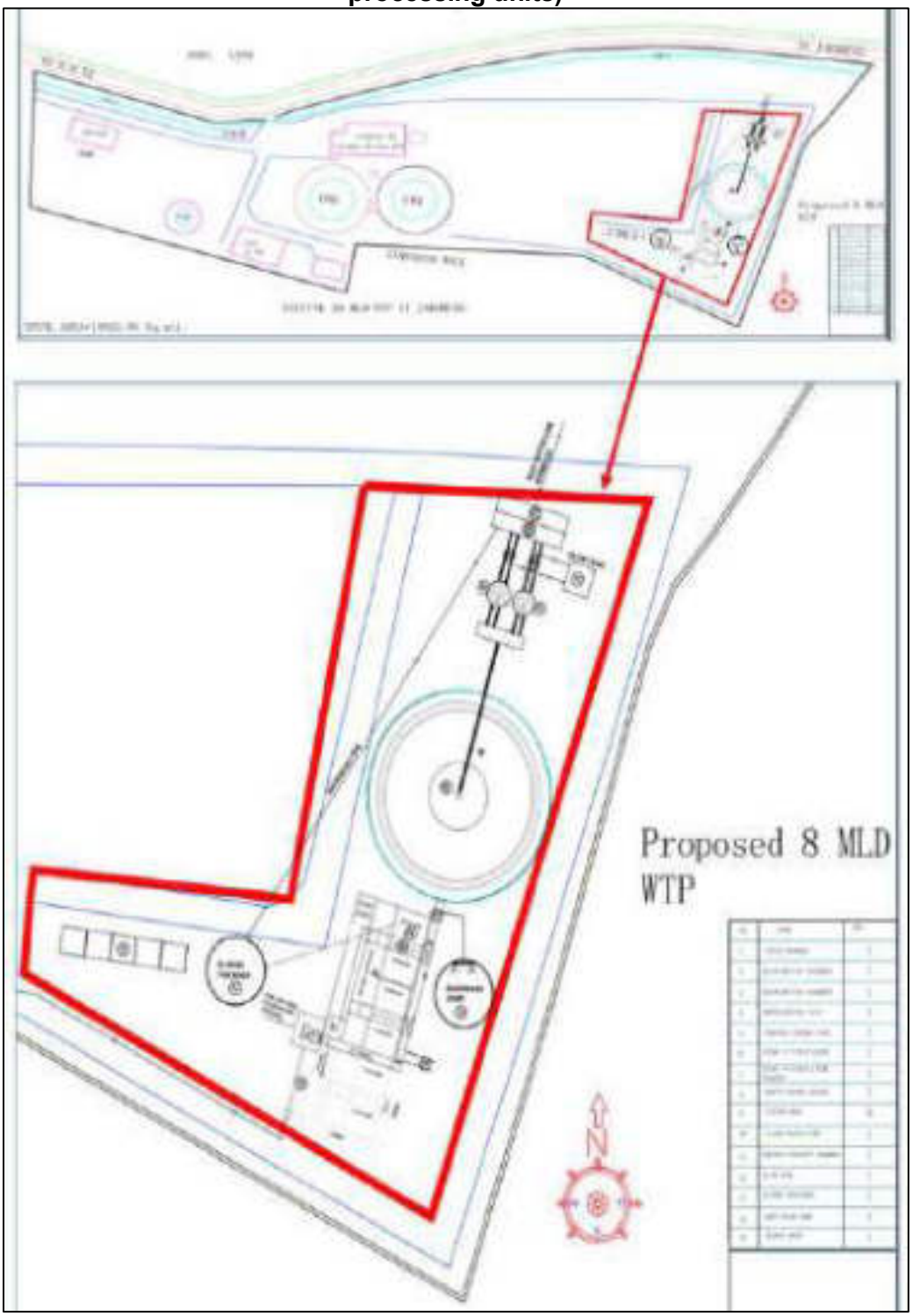


Figure 6: Proposed CWR Site (1200 KLD) at Nainwa road, PHED, Bundi on Google Map

Latitude:- 25°46'03.52"N , **Longitude**:- 75°51'37.42"E

Figure 7: Location of Proposed WTP (8 MLD) Site at Jakhmund in Bundi on Google Earth

Latitude: - 25°13'55.5"N, Longitude:- 75°46'13.08"E

Figure 8: Location of OHSR (450 KL) at Vikas Nagar H/Ws on Google Earth Map

Figure 9: Line Diagram Showing Sewerage System Existing (blue) an Proposed(yellow) in Bundi Town

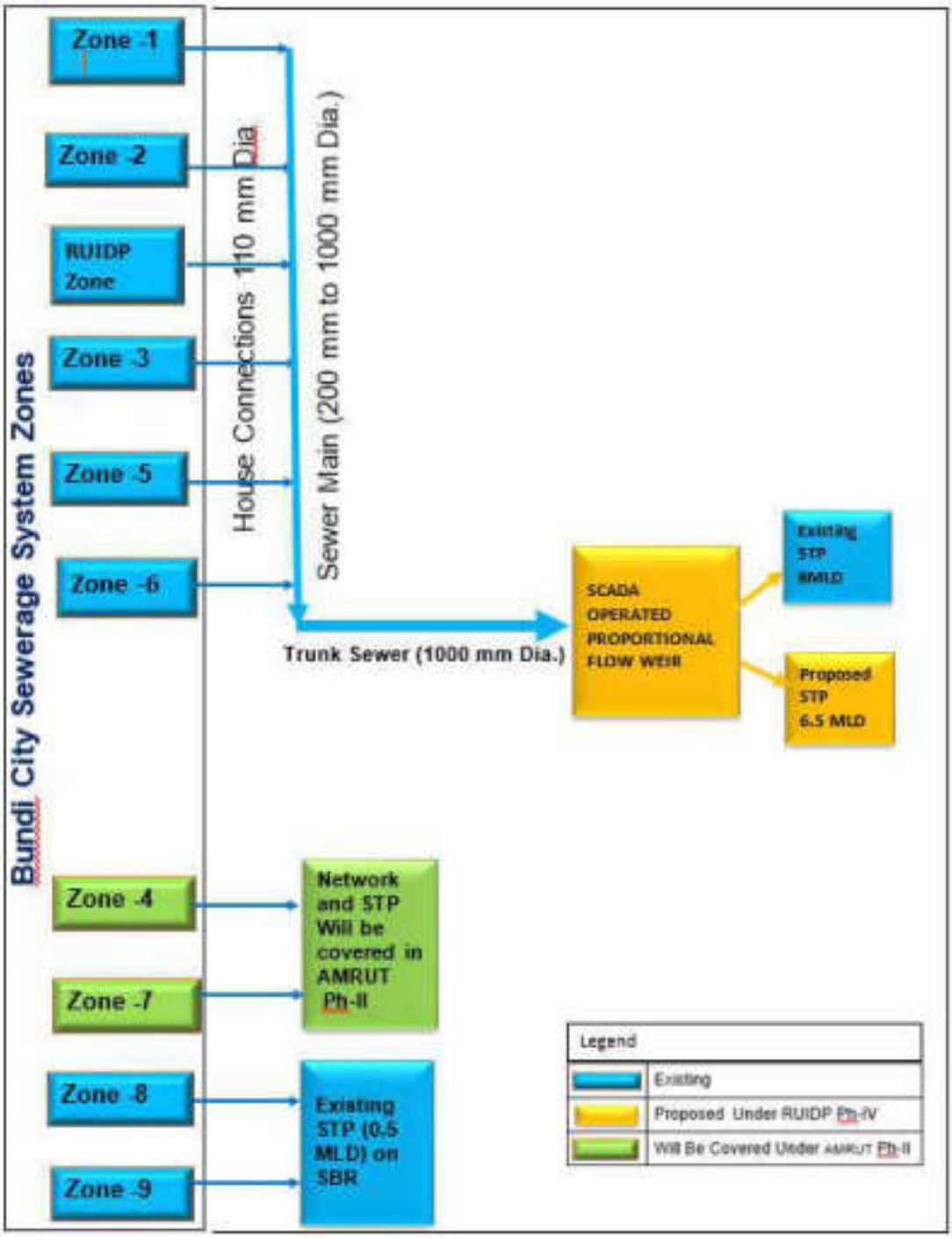


Figure 10: Existing (8 MLD) and Proposed (6.5 MLD) STP Campus of Bundi on Google Earth Map

Latitude:- 25°39'28.07"N , Longitude:- 75°65'52.08"E

Figure 11: Approved Layout Plan of Proposed STP 6.5 MLD in Bundi in Existing 8 MLD STP campus

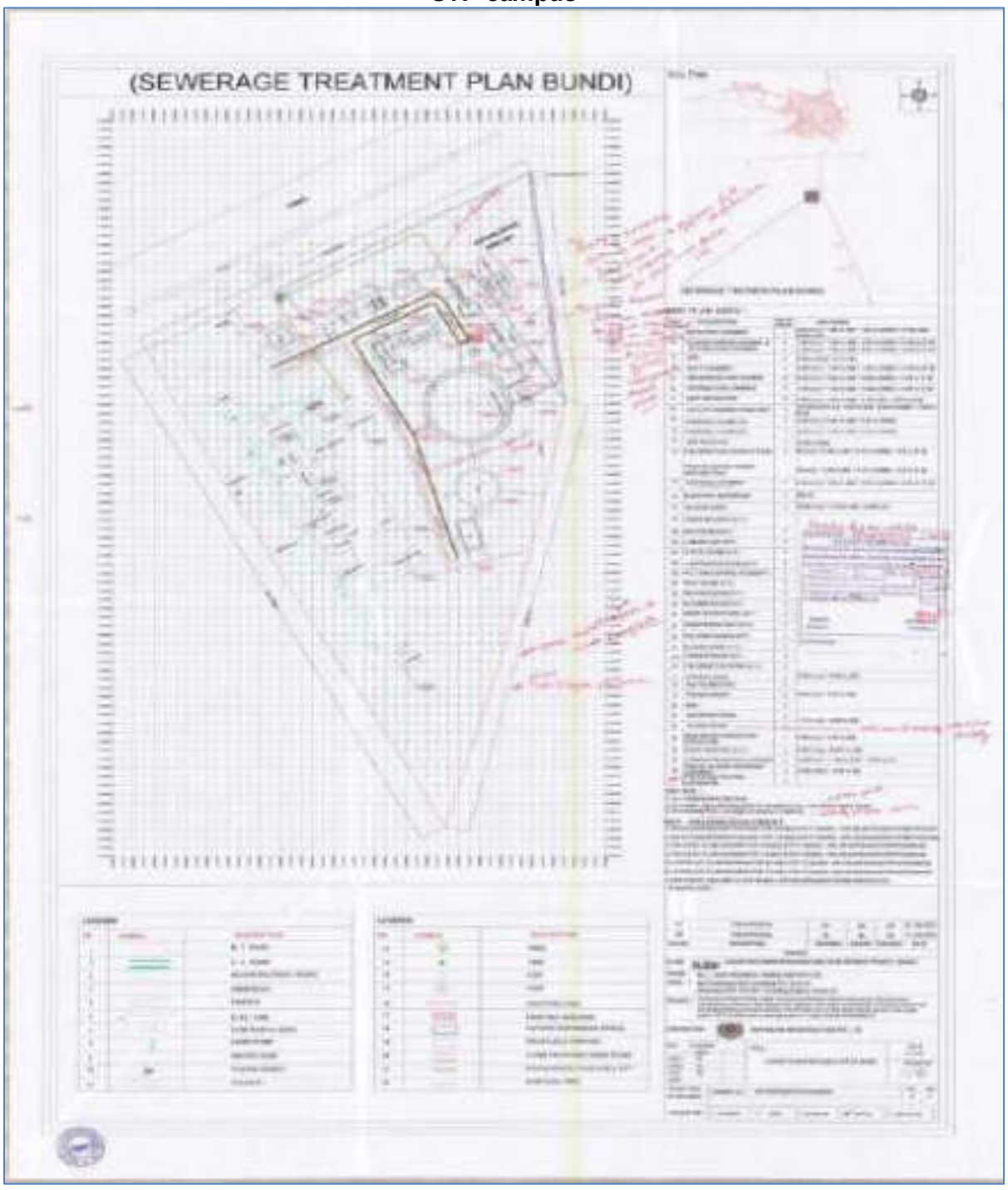


Figure 12: Approved Layout Plan of 8 MLD WTP Plant in Bundi

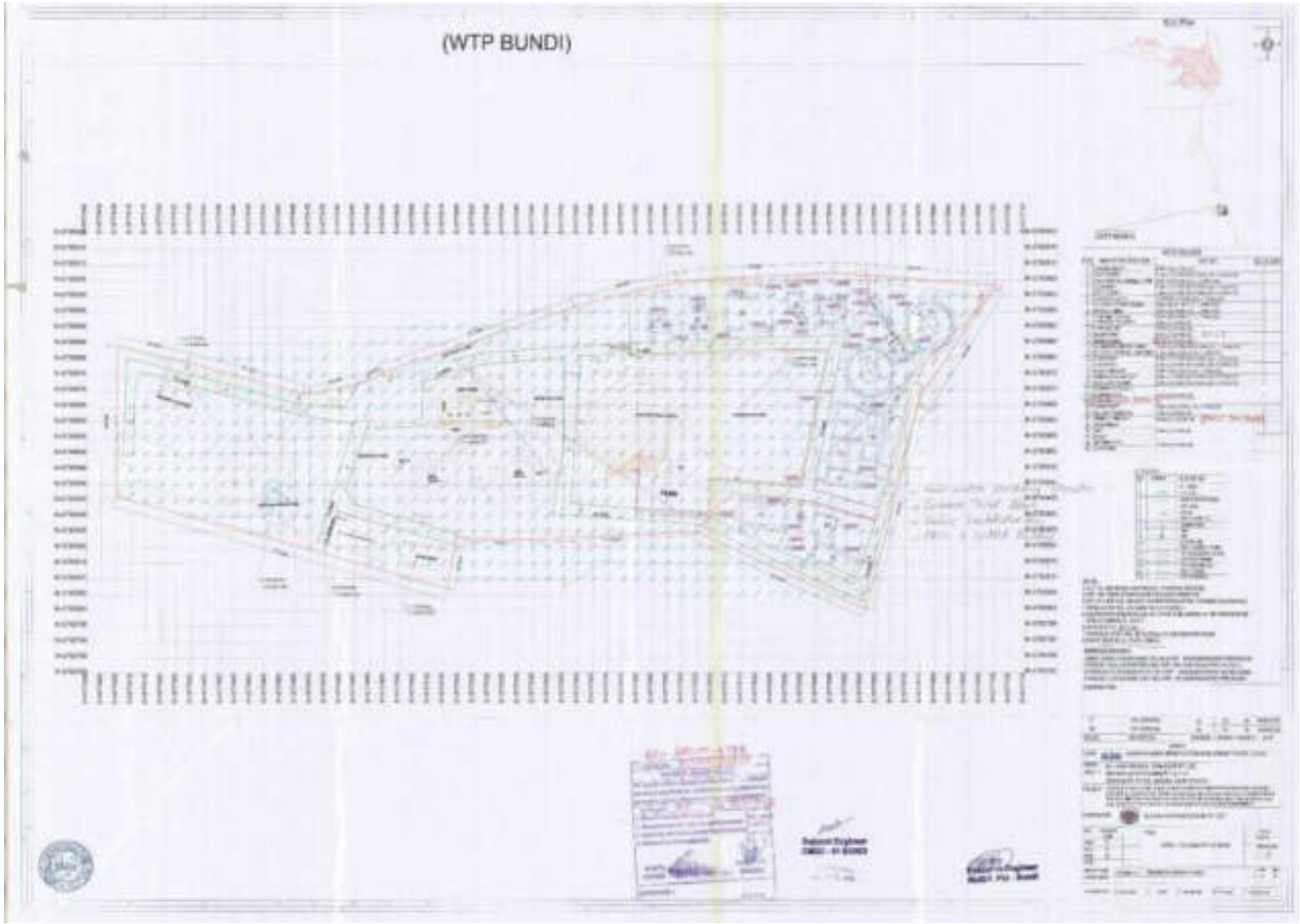


Figure 13: Approved Hydraulic Flow Diagram of 8 MLD WTP Plant in Bundi

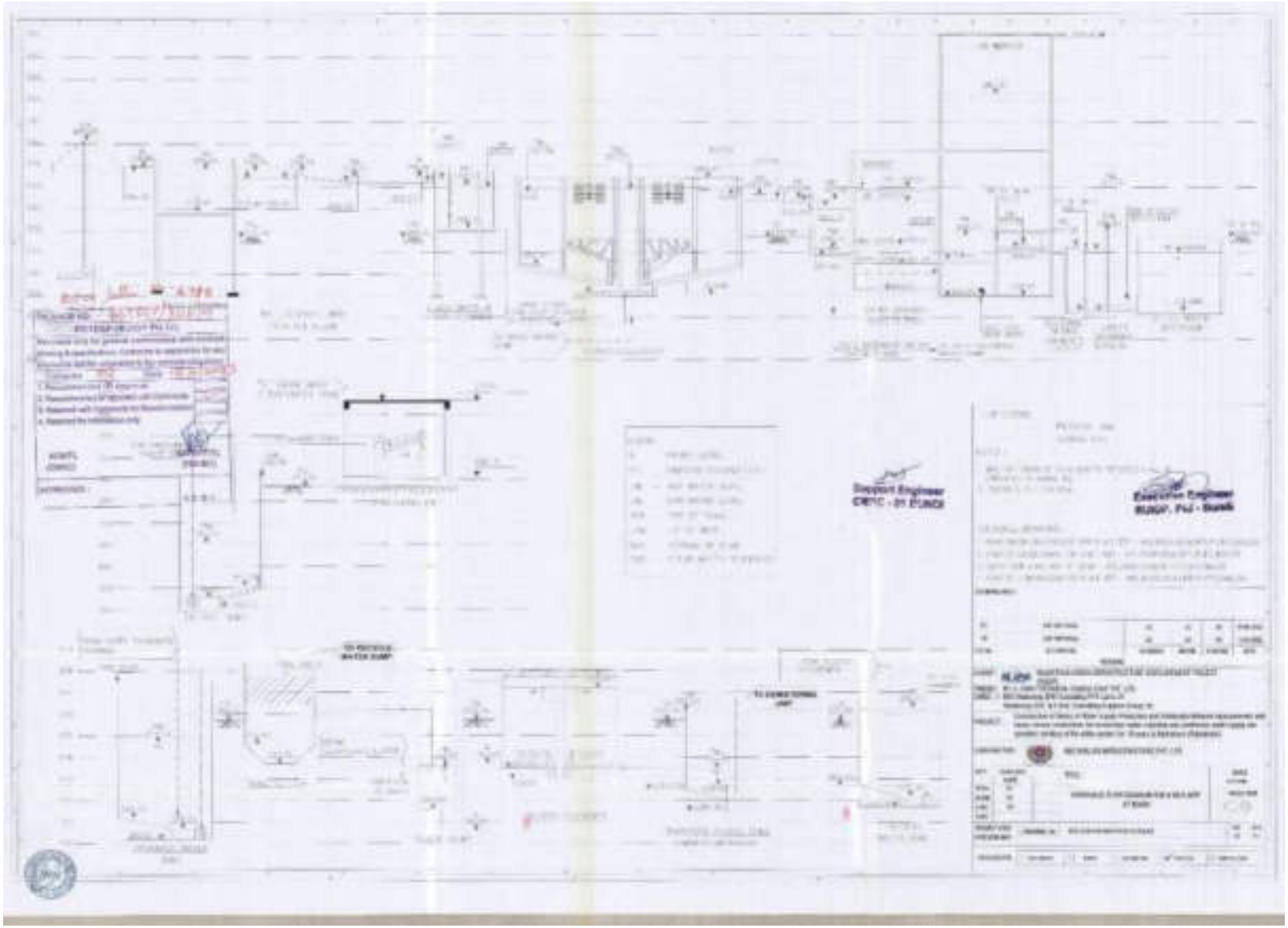


Figure 14: Approved Process Flow Diagram of 8 MLD WTP Plant in Bundi

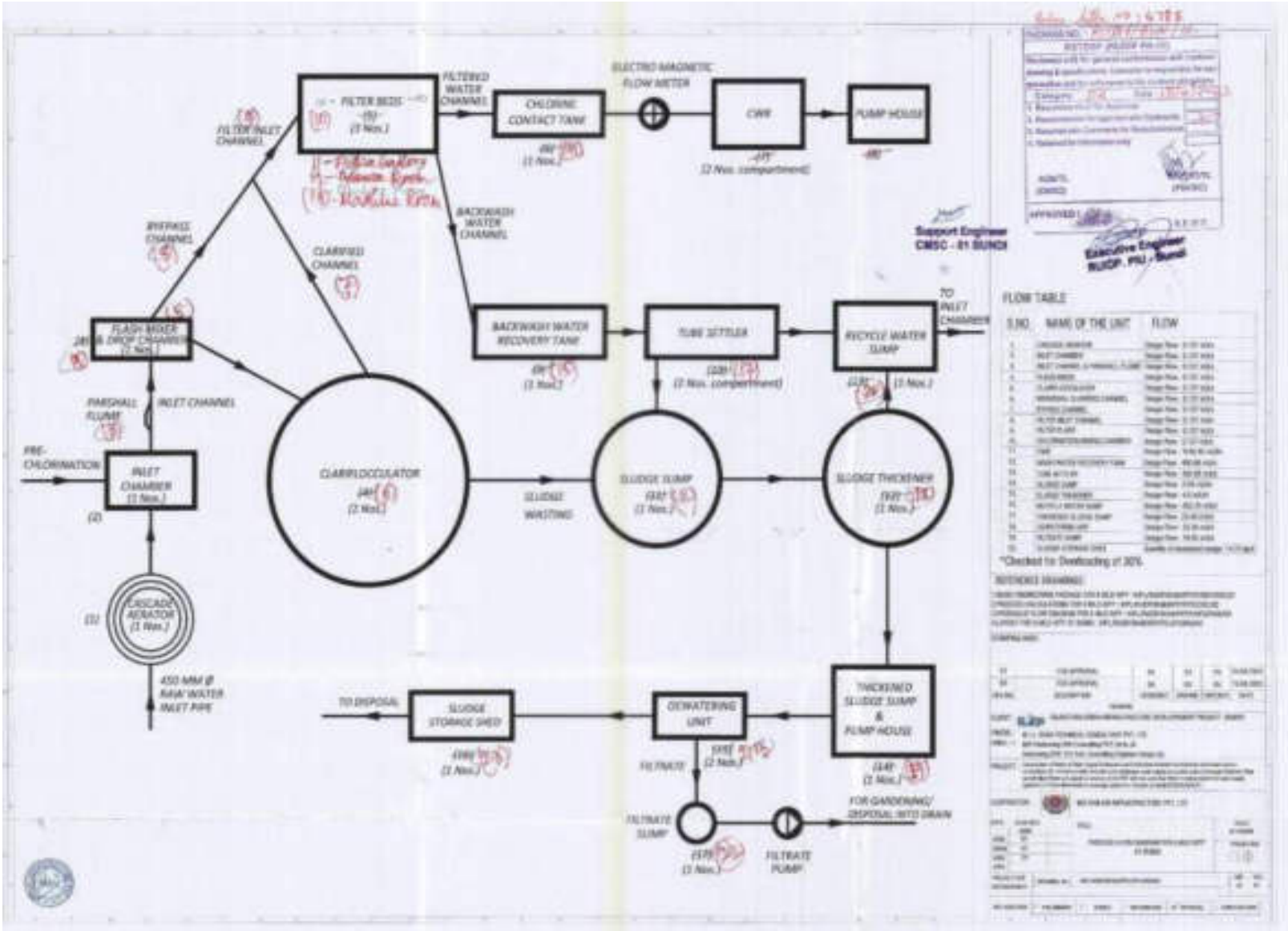


Figure 15A: Approved Layout Drawing of Water Distribution Network for Zone-5B

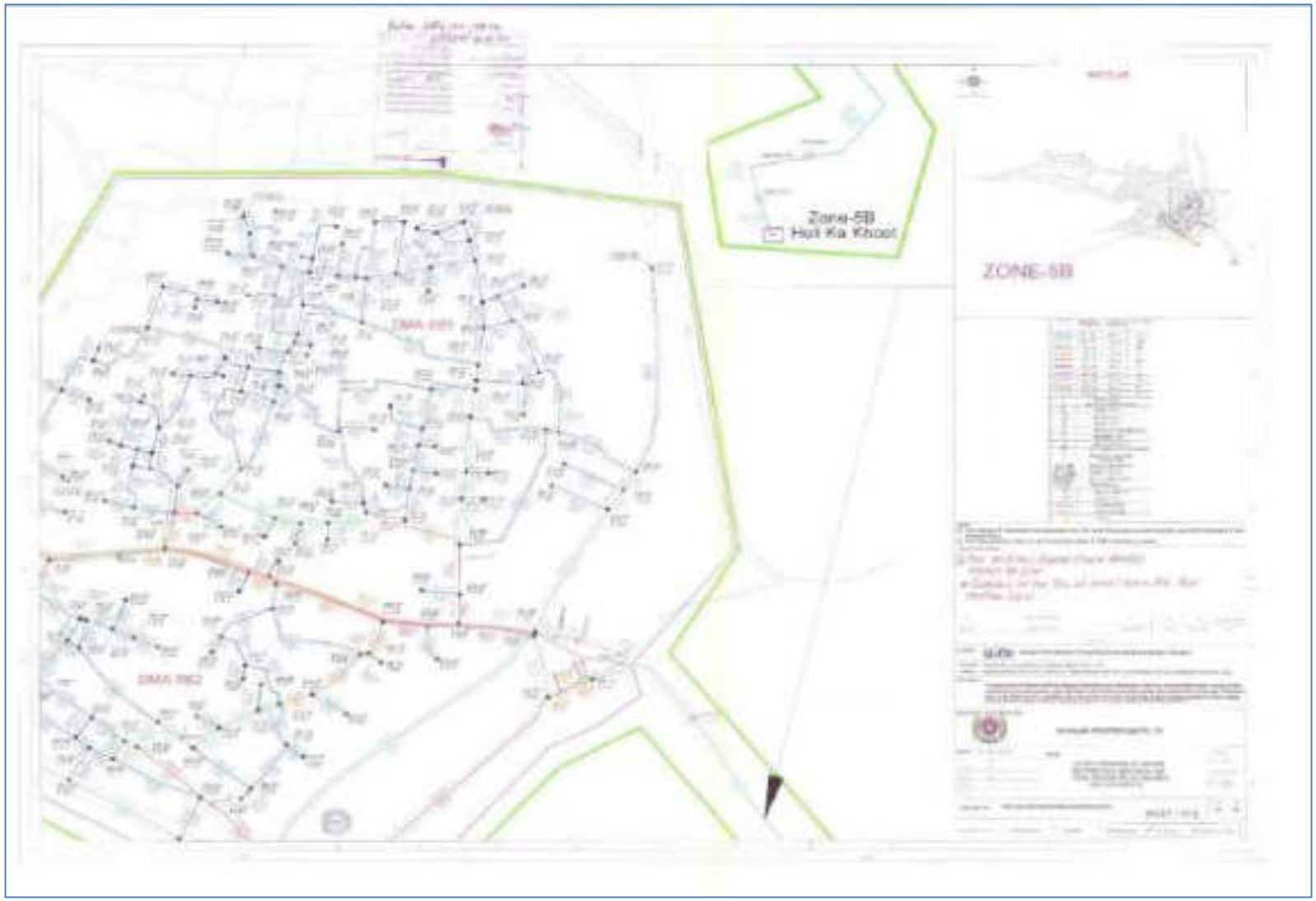


Figure 15B: Approved Layout Drawing of Water Distribution Network for Zone-5B

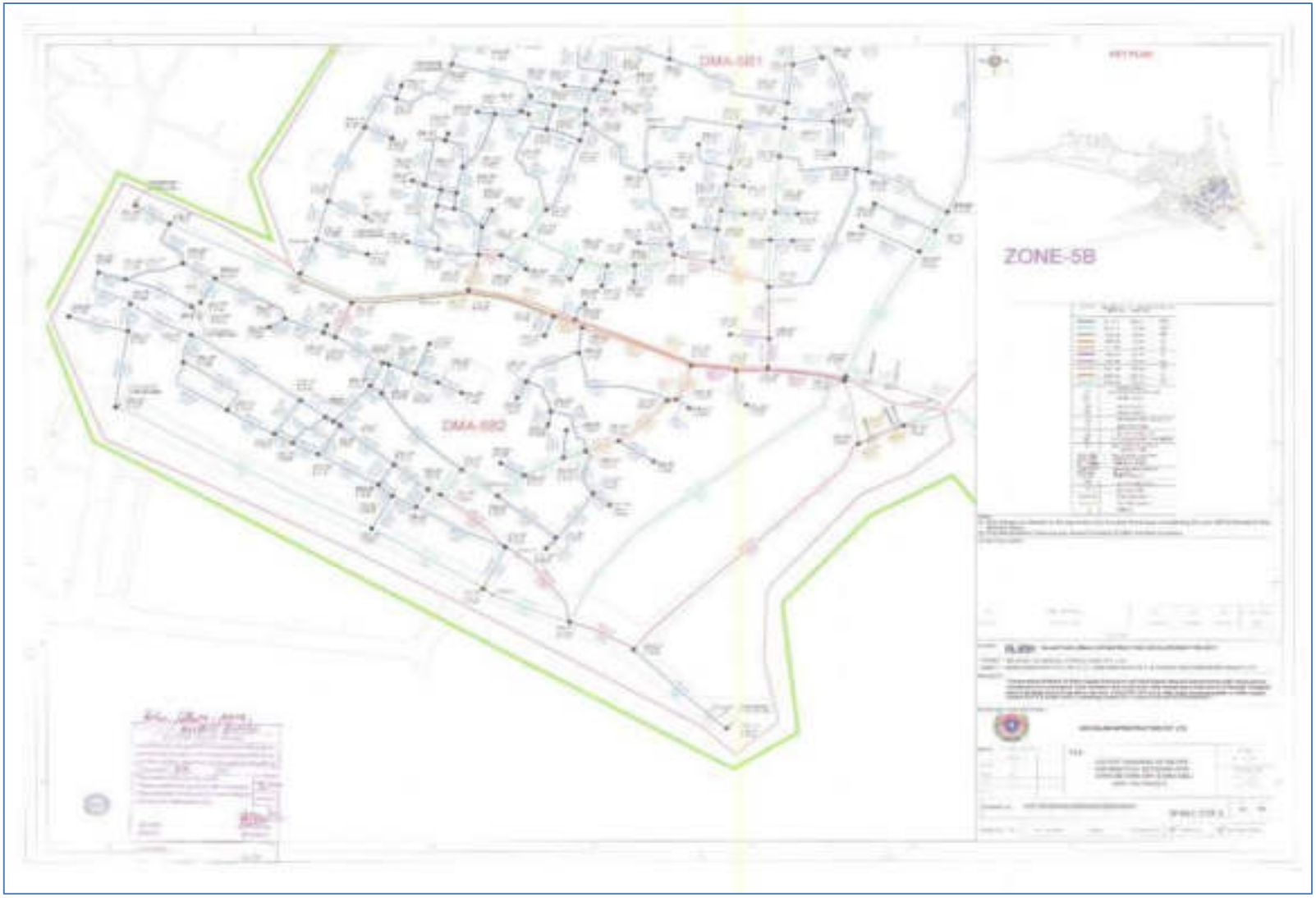


Figure 16A: Approved Layout Drawing of Water Distribution Network for Zone-7

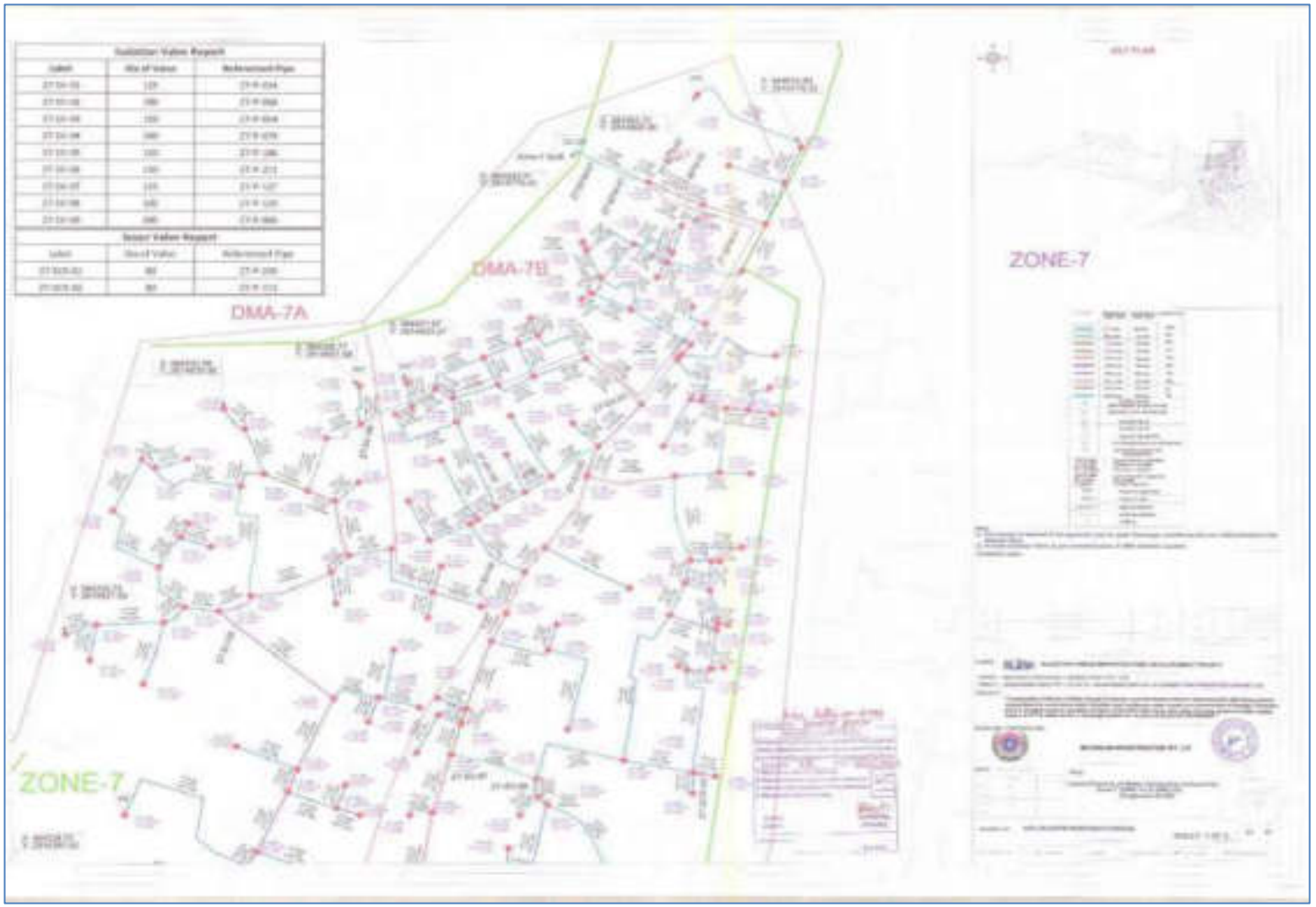


Figure 16B: Approved Layout Drawing of Water Distribution Network for Zone-7

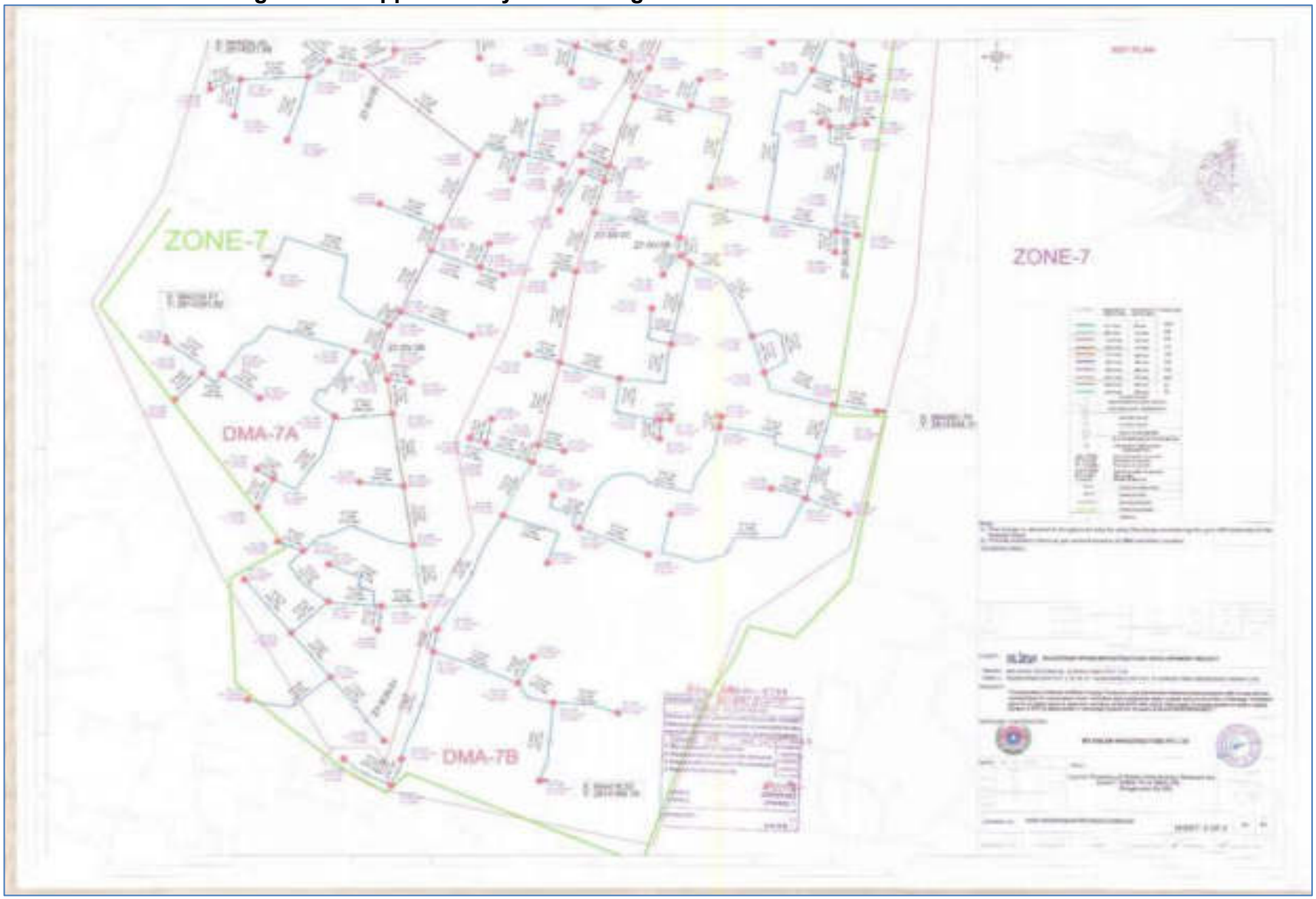


Figure 17: Approved Layout Drawing of Water Distribution Network for Zone-8

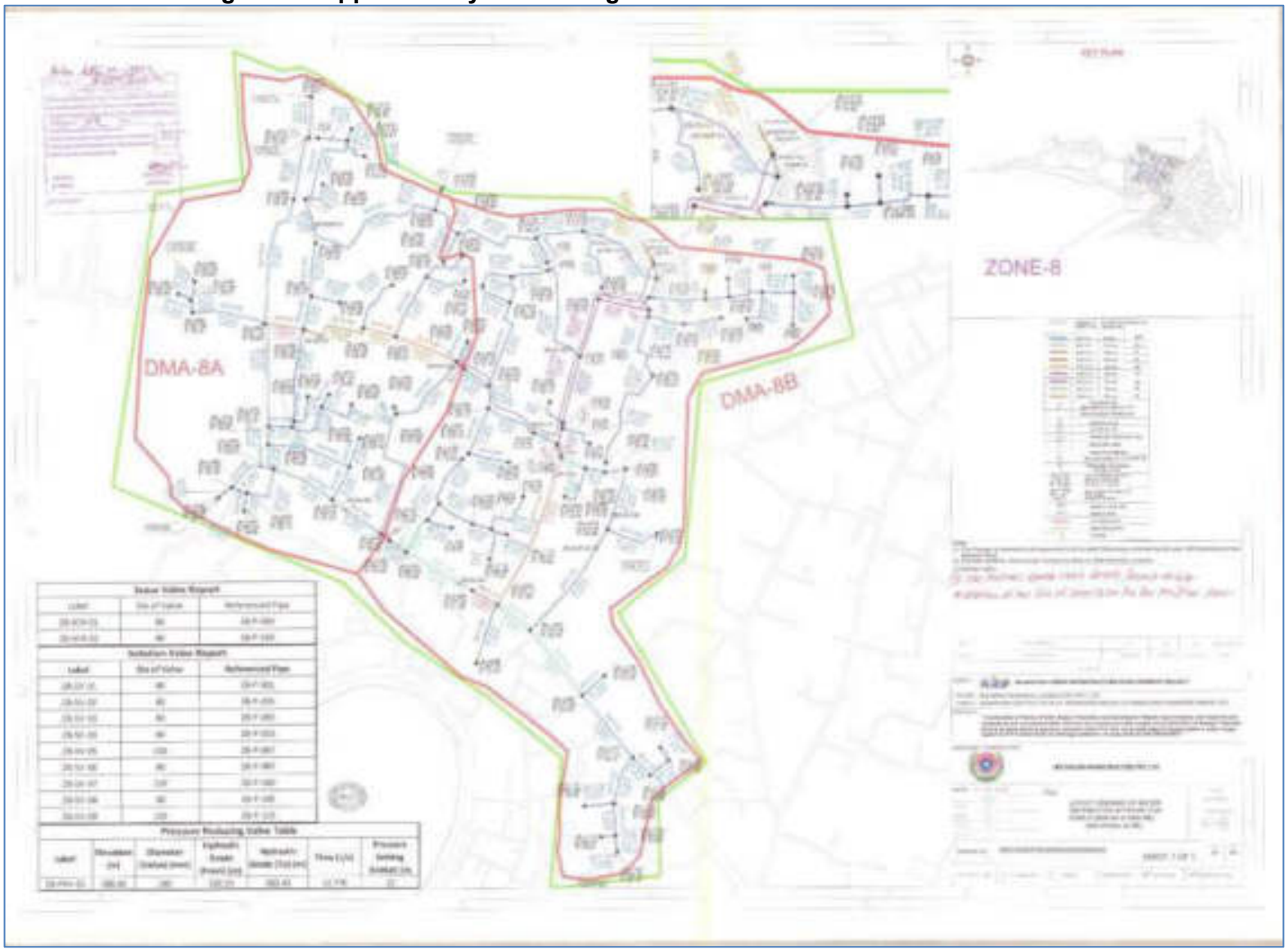


Figure 18 A: Approved Layout Drawing of Water Distribution Network for Zone-9

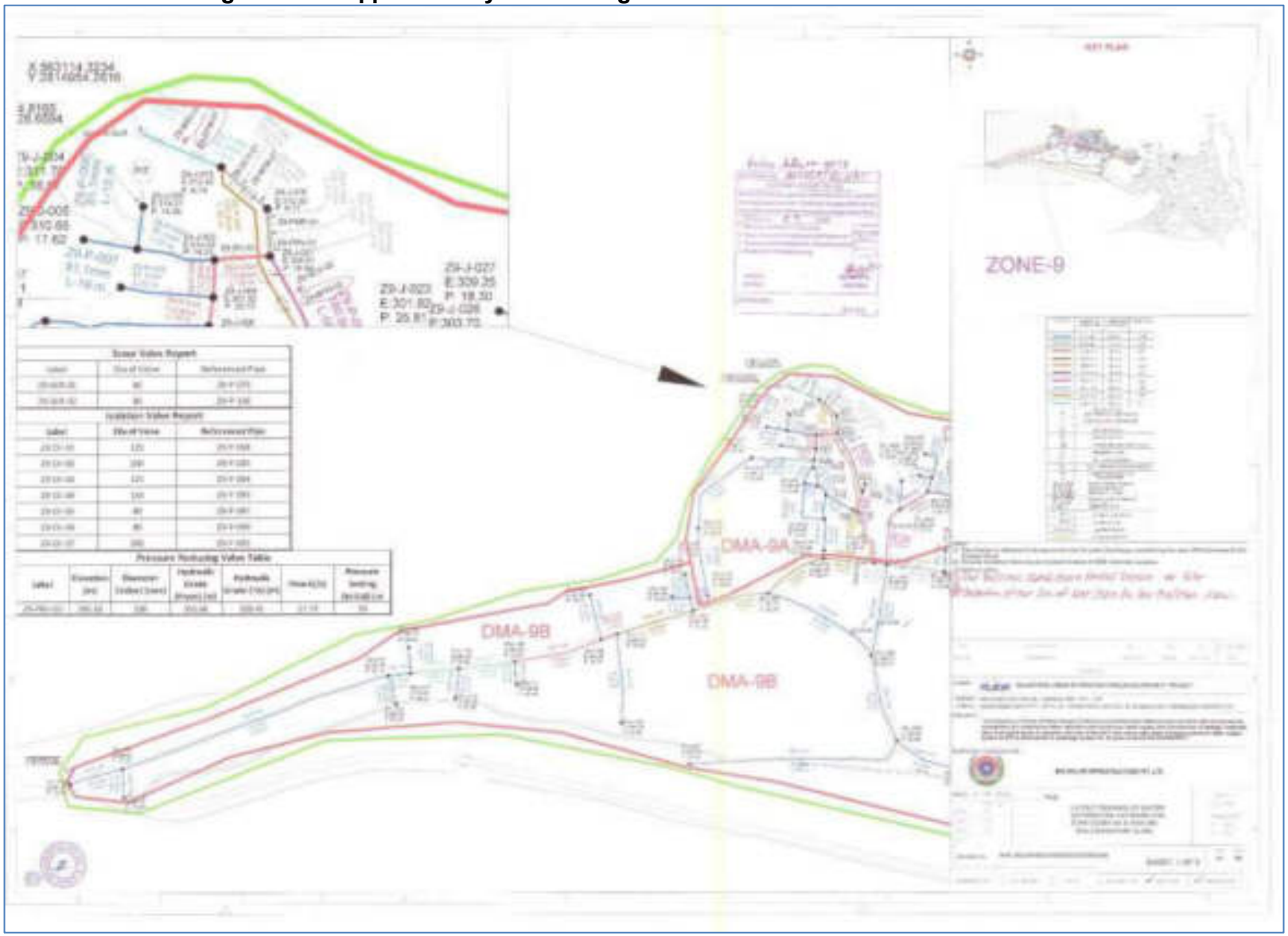


Figure 18B: Approved Layout Drawing of Water Distribution Network for Zone-9

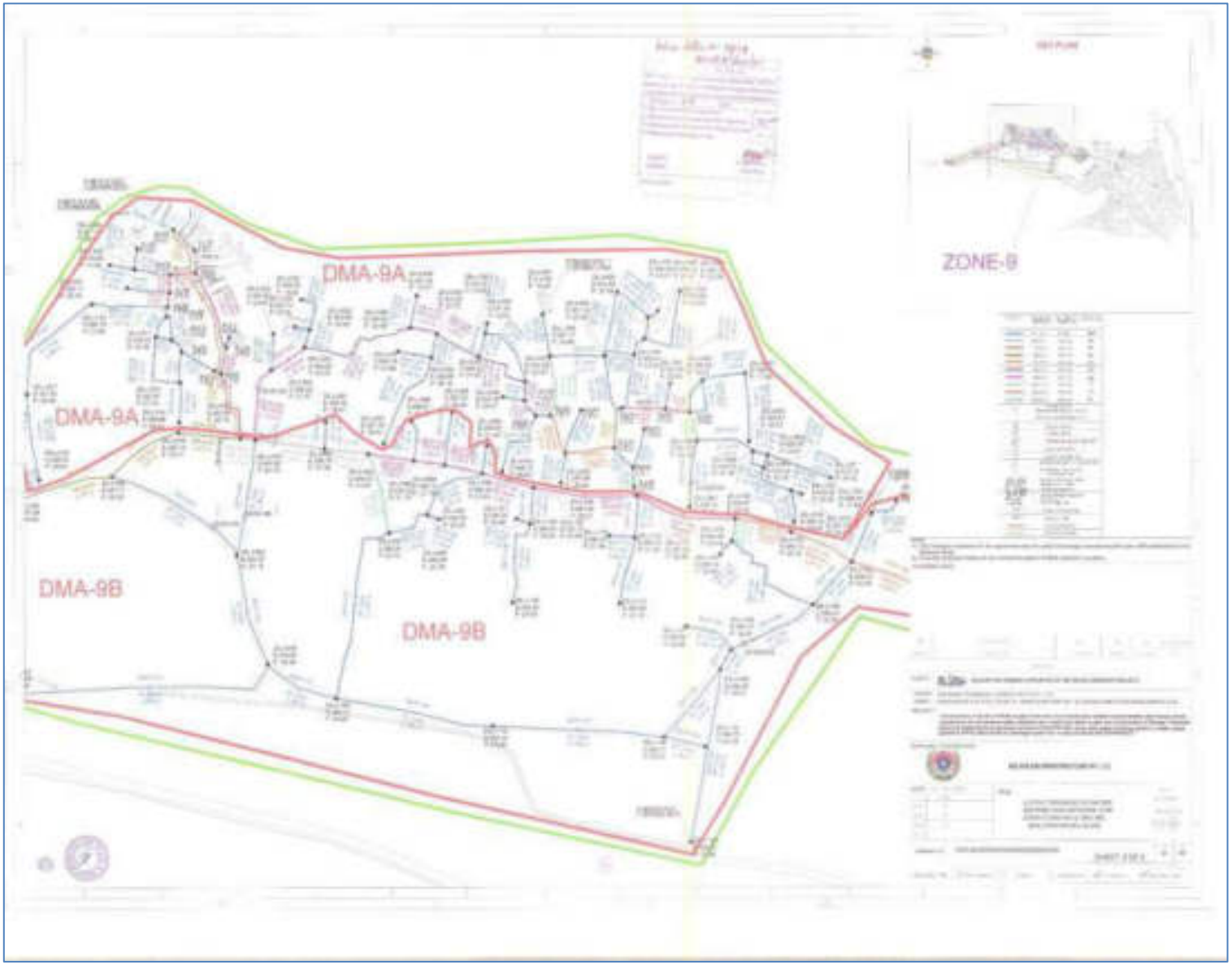


Figure 18C: Approved Layout Drawing of Water Distribution Network for Zone-9

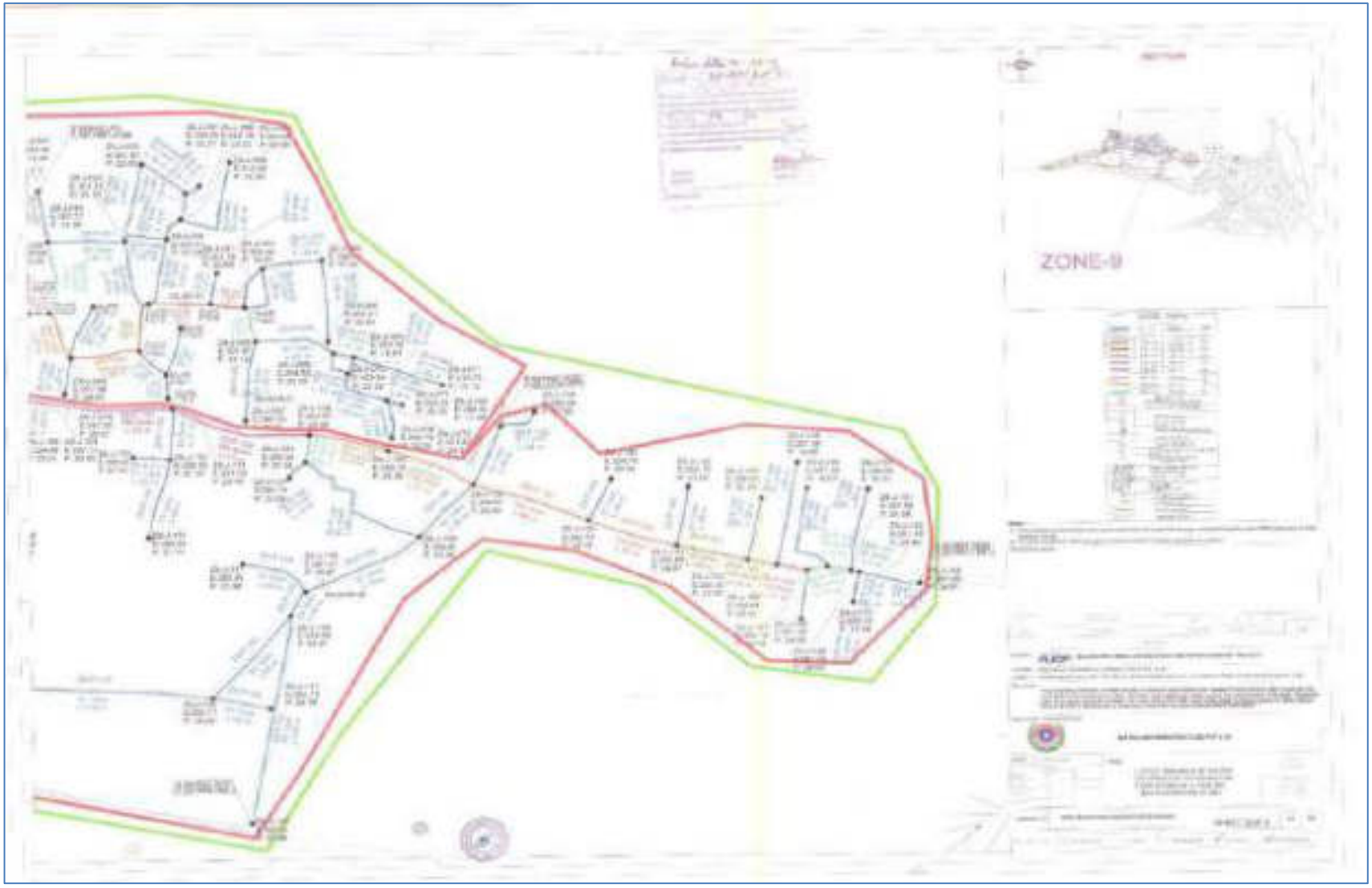


Figure 19: Approved Hydraulic Flow Diagram of Proposed 6.5 MLD STP

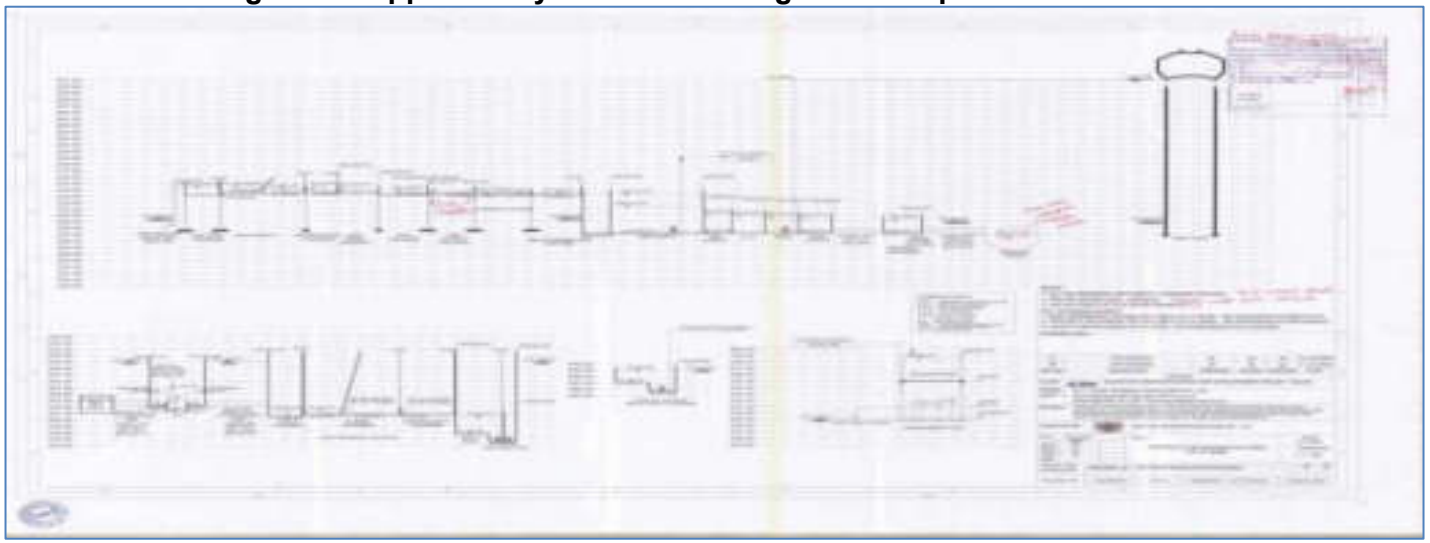


Figure 20: Approved Process Flow Diagram of Proposed 6.5 MLD STP

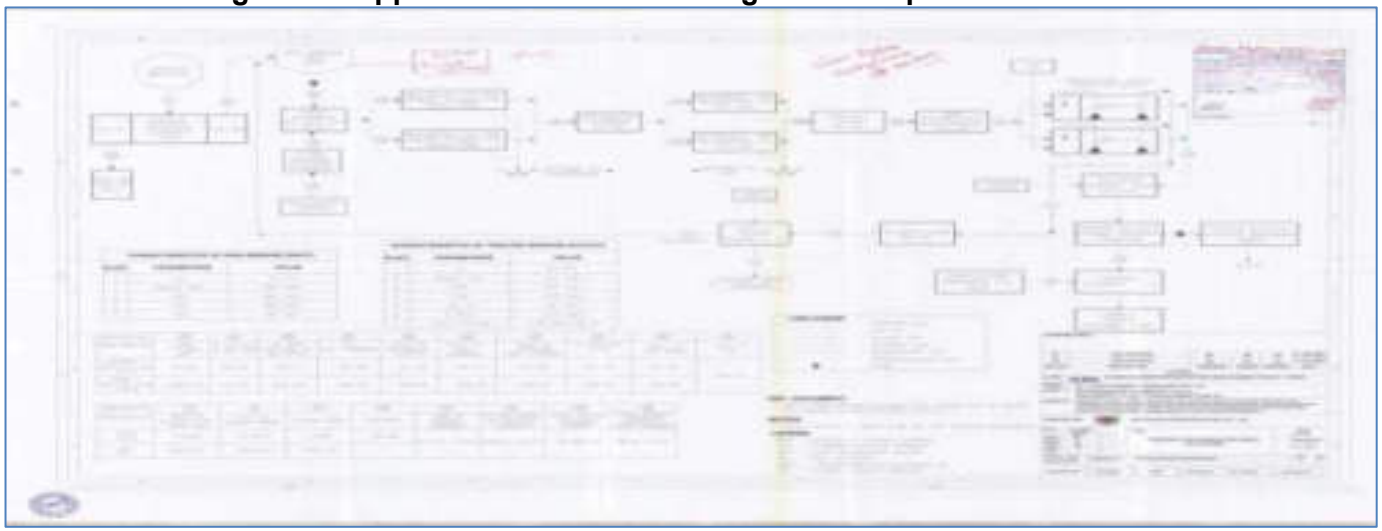
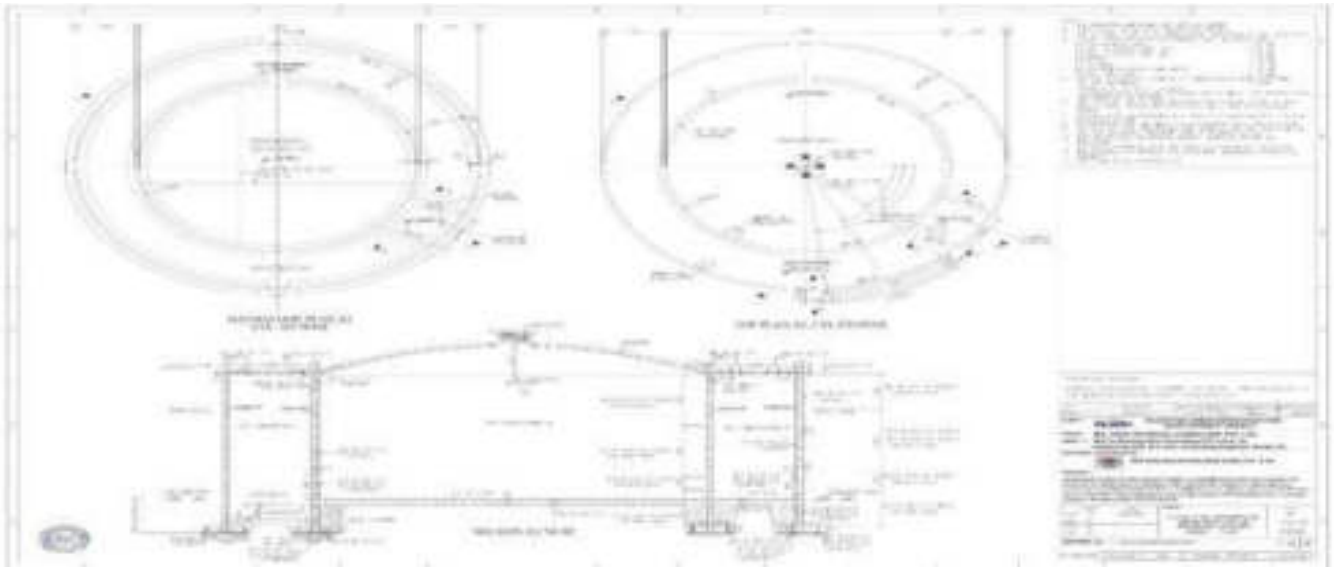


Figure 21: Approved Structural Drawing of Proposed CWR 1200 KL



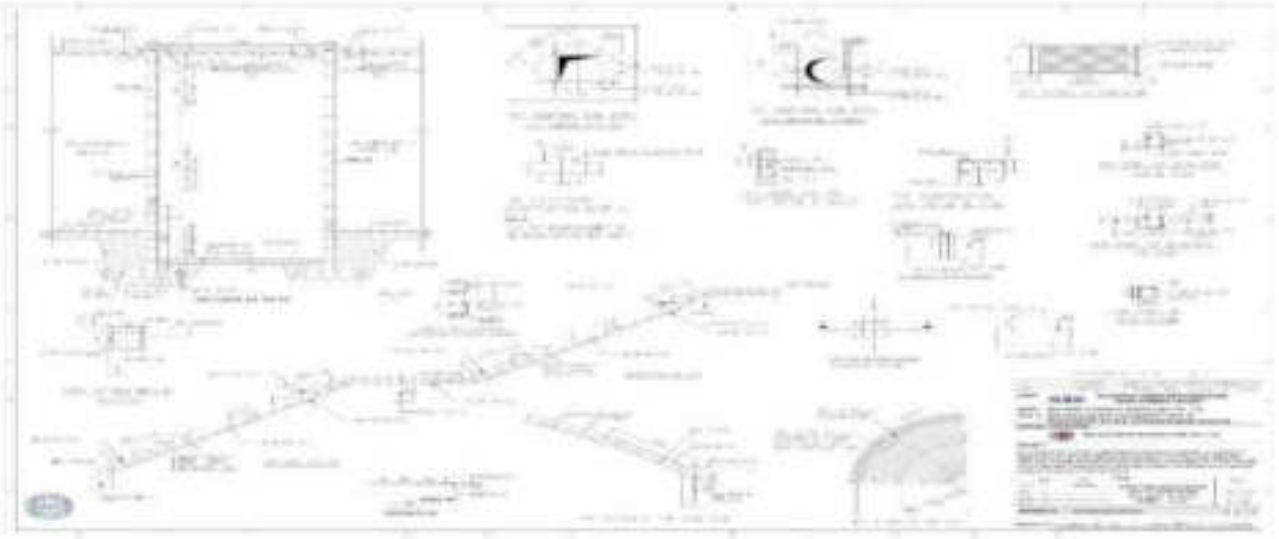
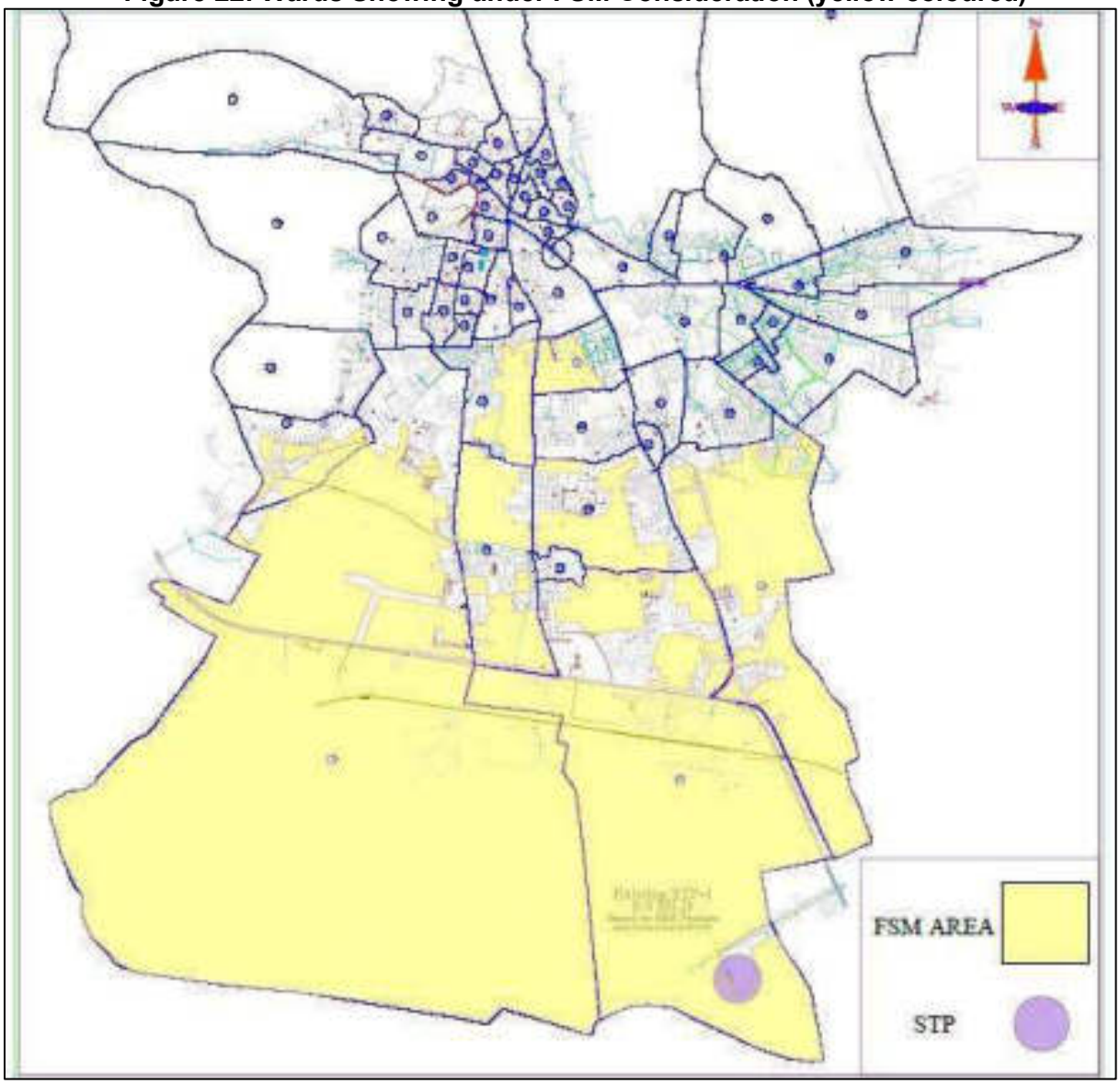


Figure 22: Wards Showing under FSM Consideration (yellow coloured)



E. Subproject Benefits

65. The subproject is primarily designed to improve environmental quality and living conditions of Bundi Town through provision of water supply. The subproject is primarily designed to improve environmental quality and living conditions of Bundi Town 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. Implementation Schedule

66. Subproject is proposed for implementation under DBO modality, wherein which the successful bidder will design the water supply and components (based on the feasibility/preliminary design/standards/guidelines provided in the bid document), construct, commission, and operate for 10 years, after which it will be transferred to PHED Bundi. Therefore, at the bidding stage, subproject was designed only in outline, and the details of components of the subproject provided in draft IEE are based on the preliminary designs. After the award of contract, the detailed design of components is conducted by the DBO contractor, and the IEE is updated.

67. After the completion of preliminary designs, bids may were invited and was awarded to successful bidder in month of December 2022. Project duration of Design Build is 36 months. After completion of construction and commissioning, the scheme will be operated by DBO contractor for 10 years, and after which the O&M will be carried out by PHED.

III. ANALYSIS OF ALTERNATIVES

68. The SPS requires an analysis of project alternatives to determine the best method of achieving project objectives (which is providing potable water to people, in Bundi Town, in this case) while minimizing environmental impacts. Alternative analysis provides an 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.

69. The proposed water supply subproject component in Bundi includes treated water conveyance, storage and distribution. Descriptions of various alternatives considered for critical components such as water source, treated wastewater disposal etc., are presented in the following **Table 13**.

Table 13: Analysis of Alternatives

1.	**Project Need – No Project Alternative**
Type of alternative	'No project' alternative
Description of alternatives	Bundi subproject is proposed to improve the service levels of basic infrastructure – water supply. Presently the source of water at Bundi town is surface water. The town is benefited from Kota Barrage in the Kota city. These are connected to existing WTP of capacity 26 MLD at Jakhmund and further supplied to Mangli H/W in the city & from there by pumping water is transferred to related various CWR to various overhead service reservoir & Direct pumping to Zone WDN. Total present production is approximately 26 MLD. The water transmission for raw water 9.9 kms and for treated water 70.14 kms of DI K-9 is already laid in town from WTP to Mangli Head works to various OHSRs located in the city. Dia of existing lines are from 100 mm to 600 mm. All the metallic lines has been utilized in the project.

1.	**Project Need – No Project Alternative**
	About 250.1 km of water distribution network is already laid in town. The existing distribution system with AC (30.6Km), DI (23.4 Km), HDPE (166.1Km) and UPVC (30km) pipes. AC pipes are very old and UPVC pipes are heavy leakages due to breakages and joints leakages due to ageing and hence need to be phased out except some newly laid HDPE Lines. The old Asbestos Cement (AC) & Polyvinyl Chloride (PVC) pipelines will be replaced by the new water mains of different sizes of HDPE pipes is 75 mm to 315 mm dia & DI pipes ie 100mm to 250mm dia. At present, an intermittent water supply system is running in the town with actual service level 135 LPCD (frequency once in a day) at consumers' end, which is at par with standard of 135 LPCD. The supply duration is about 1 to 1.5 hours twice a day with low pressure. The existing sewerage system of Bundi Town consists of the sewerage system by RUIDP in phase-II 13 km sewer line, 950 numbers of house sewer connection and an STP of 8 MLD capacity executed. 5% network was covered under this project. in AMRUT Yojana, Works of sewer network in Zones 1, 2, 3, 4, 5, 6, 8 & 9 and two STPs of 0.5 MLD capacity each in zones 8 and 9 respectively are in progress under AMRUT Yojna. At present, approx. 120 km length of sewer line has been laid (out of total 135 km), and 11916 nos. households have taken house sewer connection (out of total 7480 nos. households has been connected remaining are under progress). 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 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;
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 town 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	Presently source of water at Bundi town is surface water. The town is benefited from Kota Barrage in the Kota city. These are connected to existing WTP of capacity 26 MLD at Jakhmund and further supplied to Mangli H/W in the city & from there by pumping water is transferred to related various CWR to various overhead service reservoir & Direct pumping to Zone WDN. Total present production is approximately 26 MLD. The water transmission for raw water 9.9 kms and for treated water 70.14 kms of DI K-9 is already laid in town from WTP to Mangli Head works to various OHSRs located in the city. Dia of existing lines are from 100 mm to 600 mm. All the metallic lines has been utilized in the project

Selected Alternative	**Surface Water:** Existing surface water source, Kota Barrage with increased intake capacity of raw water The storage capacity of Kota Barrage is 98.67 MCUM, while the water requirement of ultimate year (2055) for the project is 45.94 MLD or 16.77 MCUMWTP has no DG set	Construction and operation

1.	**Project Need – No Project Alternative**		
	and STP has own DG set, with CTO valid till 30 June 2025 . All relevant forms, prescribed fees and procedures to obtain the CTE and CTO can be found in the RSPCB website (http://environment.rajasthan.gov.in) If ready mix concrete and hot mix bitumen is procured from third party, contractor must ensure that the plants, from where material is being purchased is having CTE/CTO and copy should be collected from third party and submitted in PIU		
Biodiversity Act of 2002	This Act primarily addresses access to genetic resources and associated knowledge by foreign individuals, institutions or companies, to ensure equitable sharing of benefits arising out of the use of these resources and knowledge to the country and the people.	Not Applicable	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, all subproject components are placed out the area of wildlife sanctuaries. Bundi district has 3 wildlife sanctuaries, the nearest one is Ramgarh Vishdhari Wildlife Sanctuary[1] is located 2 kilometres from Bundi on the Bundi-Nainwa road.	Not Applicable
Forest (Conservation) Act, 1980	The Forest (Conservation) Act prohibits the use of forest land for non-forest purposes without the approval of Ministry of Environment Forests & Climate Change (MoEFCC), Government of India	Not applicable; none of the components of the subproject are in forest.	Not Applicable
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,	There are rules / notifications that have been brought out under this Act, which are relevant to RSTDSP, and are listed below	Construction and operation

[1] Recently Ramgarh Vishdhari Sanctuary is declared at tiger reserve and eco sensitive zone notification is in draft format. Before start of construction subproject's components distance from wildlife sanctuary required to be reverified

1.	**Project Need – No Project Alternative**		
	noise, soil; discharge standards or allowable concentration limits for environmental pollutants, handling of hazardous substances, locating/prohibiting industries, etc.,		
Environmental Standards (ambient and discharge).	Emissions and discharges from the facilities to be created or refurbished or augmented shall comply with the notified standards	**Appendix C-2** provides ambient air quality standards; **Appendix C-5** provides emission limits for vehicle exhaust and **Appendix C-3** provides emission limits of DG sets and **Appendix C-4** provided emission stack height requirements for diesel generators	Construction and operation
Noise Pollution (Regulation and Control) Rules, 2000 amended up to 2010.	Rule 3 of the Act specifies ambient air quality standards in respect of noise for different areas/zones.	**Appendix C-6** provides applicable noise standards	Construction and operation
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 C-1** 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 burry 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	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.	Construction

1.	**Project Need – No Project Alternative**		
	(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. (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;	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	
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	Contractor to comply all the requirements of this Act during construction works.	Construction and operation

1.	**Project Need – No Project Alternative**		
	give to the operator of that facility, such specific information as may be needed for safe storage and disposal. (6) The occupier shall take all the steps while managing hazardous and other wastes to- 6 (a) contain contaminants and prevent accidents and limit their consequences on human beings and the environment; and (b) provide persons working in the site with appropriate training, equipment and the information necessary to ensure their safety.		
Wetlands (Conservation and Management) Rules, 2017	The Rules specify activities which are harmful and prohibited in the wetlands such as industrialization, construction, dumping of untreated waste and effluents, and reclamation. The Central Government may permit any of the prohibited activities on the recommendation of Central Wetlands Regulatory Authority.	Not applicable as subprojects components are not located in or near to designated wetland area.	Not applicable
The Rajasthan Monuments, Archaeological Sites and Antiquities Act, 1961; the Rajasthan Monuments, Archaeological Sites and Antiquities (amendment) Act 2007	Any construction/excavation work in the 'protected area' (as declared by GoR under the Act) requires priori permission of Department of Archaeology & Museums -Application under the Rules shall be submitted to Director, State Archaeological 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.	In case of chance finds, the contractor/ PIU will be required to follow a protocol as defined in the Environmental Management Plan (EMP Some of cultural assets in the form of religious places or historically important sites present in the project area are Shiv Temple, Inscription of Hamir and Raniji-ki-Baori. Raniji-ki-Baori having 270 m distance from nearest proposed distribution network. However, these cultural heritage sites may not come within the project influence area and utmost care will be provided to the nearby areas during constructional phase with adequate protection measures and by effectively implementing Environmental Management Plan.	Not applicable
Ancient Monuments and Archaeological Sites and Remains Act, 1958 and Ancient	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	There is no cause of impairment to historical/cultural monuments /areas and loss /damage to these sites and no cultural heritage site present near the proposed STP site.	Not applicable

1.	Project Need – No Project Alternative		
Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010.	"prohibited area" and any construction activity in the "regulated area" requires prior permission of the Archaeological Survey of India (ASI).	Wall painting of Hardoti school in the palace is nearest ASI protected monument about 421 m form proposed distribution network in Northern direction in Bundi.	
The Building and Other Construction Workers (BOCW) Act 1996 and Rajasthan Building and Construction Workers Rules 2009	**Employer shall-** • Provide and maintain, at suitable point, sufficient quantity of wholesome drinking water, such point shall be at least 6 meters away from any washing areas, urinals or toilets • Provide sufficient urinals and latrines at convenient place, easily accessible by workers • Provide free of charge, temporary living accommodations near to work sites with separate cooking place, bathing and lavatory facilities and restore the site as preconditions after completing the construction works • Provide crèche with proper accommodation, ventilation, lighting, cleanliness and sanitation if more than fifty female workers are engaged • Provide first aid facilities in all construction sites **For safety of workers employer shall provide-** • Safe access to site and workplace • Safety in demolition works • Safety in use of explosives • Safety in operation of transporting equipment and appoint competent person to drive or operate such vehicles and equipment • Safety in lifting 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	Contractors are required to follow all the provisions of BOCW Act and Rajasthan BOCW Rules. Salient features of Rajasthan BOCW Rules are- Chapter III, section 17- Registration of establishments Chapter VIII, section 61- Hours of works, intervals or rest and spread over, overtime Section 62- weekly rest Section 63- night shift Section 67- registers of workers Section 68- Muster roll, wages register Section 70- latrine and urinal facilities Chapter XI- Safety and Health Section 78- fire protection Section 79- emergency action plan Section 80- fencing of motors Section 81- lifting and carrying of weight Section 82- 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	Construction

1.	**Project Need – No Project Alternative**		
	• 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		
Contract Labor (Regulation and Abolition) Act, 1970; The Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979	Provides for 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. 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.,	• Applicable to all construction works in the project • Principle employer (RUDSICO-EAP) to obtain Certificate of Registration from Department of Labor, as principal employer • Contractor to obtain license from designated labor officer • Contractor shall register with Labor Department, if Inter-state migrant workmen are engaged • Adequate and appropriate amenities and facilities shall be provided to workers including housing, medical aid, traveling expenses from home and back, etc., **Appendix C-12** provides applicable labor laws including amendments issued from time to time applicable to establishments engaged in construction of civil works.	Construction and operation

1.	**Project Need – No Project Alternative**		
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 should 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 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
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 reserved or community forest areas.	Construction
IS codes for Asbestos Containing Materials			
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 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

1.	**Project Need – No Project Alternative**		
			
IS 11451: Safety and Health Requirements related to Occupational Exposure to Asbestos contaminated Products.	These standard details the occupational exposure allowable and safety at workplace to be enforced.	In the project the norms pertaining to limiting number of hours working with ACM will be 8.0 hrs/48 hrs a week and the medical examination must be periodic; the environmental monitoring must be done as per the protocol. The safety at workplace shall be enforced.	Construction
IS 11768: Waste Disposal Procedure for Asbestos Containing Products.	The protocol pertaining to disposal of the waste is emphasized.	The collection of ACM powered will be in permissible plastic bags, which will be twisted tight at the neck so that the wear and tear due to abrasion will be minimum and the transportation of the asbestos waste has to be done by the authorized vendor to the 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 Bundi. Not applicable to Bundi water supply subproject.	Not applicable
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973	India is a signatory of this convention which aims to control international commercial trade in endangered species	Not applicable in this project as no endangered species of wild fauna and flora is found in project town.	Not applicable

1.	**Project Need – No Project Alternative**		
Montreal Protocol 1992	India is a signatory of this convention which aims to reduction in the consumption and production of ozone-depleting substances (ODS), while recognizing differences in a nation's responsibilities. Ozone depleting substances are divided in two groups Chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbon carbons (HCFCs)	Not applicable in this project as no ODS are involved in construction works	Not applicable
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.	Not applicable
Convention on Migratory Species of Wild Animals (CMS), 1979 (Bonn convention)	CMS, also known as Bonn convention, was adopted in 1979 and entered into force on 1 November 1983, which recognizes that states must be the protectors of migratory species that live within or pass through their national jurisdictions, and aims to conserve terrestrial, marine and avian migratory species throughout their ranges. Migratory species threatened with extinction are listed on Appendix I of the Convention. CMS Parties strive towards strictly protecting these species, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them. Migratory species that need or would significantly benefit from international cooperation are listed in Appendix II, and CMS encourages the Range States to conclude global or regional agreements.	Not applicable to this project as no migratory species of wild animals are reported in the project areas.	Not applicable

70. **Clearances / permissions to be obtained prior to start of construction**. **Table 15** 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 15: Clearances and Permissions Required Prior to Start Construction Activities

S. N.	Construction Activity	Statute under which Clearance is Required	Implementation
1.	Land for project activity	Allotment and approval for specific land use	PHED
2.	Operation of existing WTP	Consent to operate under Water Act, 1974 from RSPCB	PHED
3.	Operation of existing STP	Consent to establish and consent to operate under Water Act, 1974 from RSPCB	Nagar Palika
4.	Pipe laying works	Permission from Nagar Palika and PWD (where applicable)	PIU
5.	Establishment of construction camps	Allotment and approval for specific land use	Contractor
6.	Construction of Proposed WTP	Consent to establish and consent to operate under Water Act, 1974 from RSPCB	PIU & Contractor
7.	Construction of proposed STP	Consent to establish and consent to operate under Water Act, 1974 from RSPCB	PIU & Contractor
8.	Tree Cutting	State forest department/Revenue (Tehsildar)	PIU
9.	Hot mix plants, Crushers, Batching plants and DG Set	Consent to establish and consent to operate under Air Act, 1981 from RSPCB	Contractor
10.	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
11.	Sand mining, quarries and borrow areas	Permission from District Collector/ State Department of Mines & Geology	Contractor
12.	New quarries and borrow areas	Environmental clearance under EIA Notification 2006	Contractor
13.	Use of vehicles and equipment	Pollution under control certificate (PUC) form RTO	Contractor
14.	Temporary traffic diversion measures	Temporary traffic diversion measure including use of alternate road from District traffic police	PIU/Contractor
15.	Use of highway ROW for construction area/ crossing	National Highway Authority of India	PIU
16.	Use of railway ROW for construction area/ crossing	Railways	PIU

71. 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.

IV. DESCRIPTION OF ENVIRONMENT

A. Physical Resources

1. Location, Area & Connectivity

72. Bundi Town is a district headquarter of Bundi district in state of Rajasthan. Bundi is

situated in the south-east of Rajasthan. Bundi is a small city in the Hadoti region of Rajasthan, which is famous for its beautiful forts and palaces, and step-well reservoirs (local name: Baoris). Bundi District is situated at about 210 km from Jaipur, the capital of Rajasthan. The total area of the district is 5776 sq.km. This accounts for 1.68 % of the total area of Rajasthan. Bundi lies between 24°59'11"& 25°53'11" north latitude and 75°91'30" & 76°19'30" east longitudes.

73. It is bounded in the north by Tonk district, and in the south by Chittaurgarh District. The river Chambal forms the south-eastern boundaries and separates Bundi from Kota. A double line of hills (Vindhyan rocks) running through the district in the north-east and south-west directions. It is varying in height between 300 and 1,793 feet above sea level.

74. Bundi Town is very famous for its Baoris (waterworks or stepwells), havelis (Rajasthani houses), temples and chhatris (elevated, dome-shaped pavilions) with carved pillars. The mural adorned palaces, the forts and the monuments tell tales about the glorious past of the town. A picturesque lake where the entire town and the palaces get reflected in the lake adds a stunning quality to the place. In the past, a tribe called Meena inhabited this region and Bundi derived its name from the tribe' chieftain's name - Bunda Meena. In the 12th century Bundi came under the dominion of the Chauhans and reached its highest glory in the medieval times. The glory of Bundi declined with the Mughal rule and later became an independent state. Hindi, Urdu, Rajasthani and Mewadi are all spoken in Bundi, as well as several local languages.

Figure 23: Location of Bundi Town in Rajasthan State Map

2. Topography, Soils and Geology

75. **Topography**. The topography of the district is characterized by flat to undulating terrain with small, isolated mounds. It is divided in almost two equal parts by NE-SW trending Vindhyan Range. The general topographic gradient is from southwest to northeast in the southern part of

the Range whereas to the northern part of the ridge the gradient is generally from west to east. High elevation hills are found in the southern part of the district around Budhpura and to the west of Bundi city. Chambal is the most prominent River in the district and there are some important tributaries like Dungari, Bhimlat, Mej, Bajian, Sugll and Kupal etc. The general topographic elevation in the district is between 250 m to 300 m above mean sea level. Elevation ranges from a minimum of 200 m above mean sea level in Keshorai Patan block in the south-eastern part of the district and maximum of 547.1 m above mean sea level In Talera block in southern part of the district

76. **Soils**. Soil quality monitoring in pre-construction phase was monitored on 19.01.2023 in Bundi town. All soil samples were alkaline and pH ranges between 7.14 to 7.85. Soil texture was sandy loam in all samples. Soil Nitrogen (Total nitrogen) ranged between 522.34 mg/lg and 627.45 mg/kg,. Phosphorus concentration in soils ranged between 156.80 mg/kg and 295.45 mg/kg. The laboratory test results of soil samples are given in Table 16.

Table 16: Soil Monitoring in Bundi

Test Laboratory			**Nakshatra Enviro Services, Jaipur**				
Sample Collected By			**NES representative**				
Date of Sample			**29.01.2023**				
Village/Town			**Bundi**				
Sr. No	**Parameters**	**Unit of Measurements**	**Location of Source**				
			CWR Nainwa Road Pump House	**STP Site Ramganj**	**WTP Site Jakhmun**	**PHED Kagji - Dewara**	**PHED Vikash Nagar**
1	**pH**	**-**	7.85	7.14	7.52	7.41	7.52
2	**Electrical Conductivity**	**µS/cm**	875.42	722.65	761.40	685.24	697.40
3	**Moisture content**	**%**	32.54	28.45	26.50	19.52	25.43
4	**Texture**	**-**	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam
	Sand	**%**	61.24	70.14	63.50	62.85	64.20
	Slit	**%**	8.45	12.34	13.52	16.52	13.85
	Clay	**%**	30.31	17.52	22.98	20.63	21.95
5	**Calcium as Ca**	**mg/kg**	15.82	9.75	13.65	9.98	14.85
6	**Magnesium as Mg**	**mg/kg**	10.24	6.34	22.45	18.74	5.24
7	**Permeability**	**cm/hr**	7.40	8.50	8.50	10.40	9.10
8	**Total Nitrogen as TKN**	**mg/kg**	627.45	594.72	522.34	622.80	597.42
9	**Sodium as Na**	**mg/kg**	90.58	95.42	75.24	95.23	75.80
10	**Phosphorous as P**	**mg/kg**	295.45	156.80	189.63	167.85	194.74
11	**Potassium as K**	**mg/kg**	131.56	75.26	85.42	63.74	68.95
12	**Organic matter**	**%**	0.64	0.68	0.62	0.72	0.63
13	**Oil & Grease**	**mg/kg**	BDL	BDL	BDL	BDL	BDL

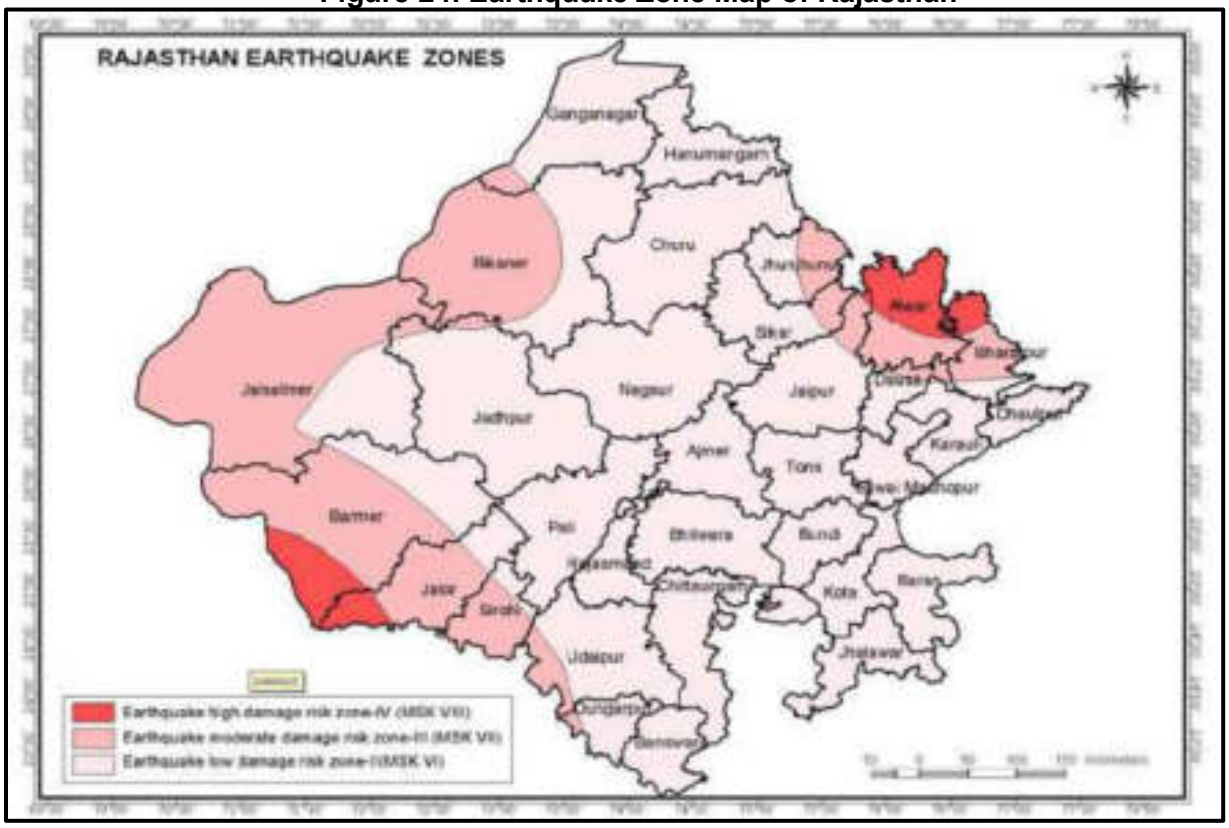
Source - Lab test report January-2003 by Nakshatra enviro services
BDL- Below Detection Limit

77. Rock types exposed in the area belongs to the Bhilwara Supergroup (Archaean) and the Vindhyan Supergroup (Middle to Upper Proterozoic). The Bhadesar shale ,slate , phyllite, quartzite and dolomitic limestone belonging to the Hindoli Group of the Bhilwara Supergroup are exposed mainly near Hindoli and Khinia in the northeren part. These are intruded by the Kaimur ,the Rewa and Bhander Groups , in decreasing order of antiquity .The kaimur Group is represented by conglomerate and Akoda Mahadeo Sandstone. The Bhander Group of rocks are best exposed between Bundi and Lakheri. The contact between the Hindolis and the Vindhyans is marked by thrusts and faults.

78. Limestone is the most important mineral of the district. Deposits have been located near Bundi, Lakheri, and Satur. Limestone occurs sandwiched between the Ganurgarh Shale and the Lower Bhander Sandstone. An indicated reserves of 850 million tons with 42.73 % calcium oxide (CaO) has been estimated. Glass sand occurrences are located near Barodia and Satur. Barytes near Umar occurs as small veins at the contact of limestone and schist. Minor occurrence of copper near Barodiya, marble at Umar and iron near Manak Chawk have also been reported.

79. **Seismology**: Many parts of the Indian subcontinent have historically high seismicity. Seven catastrophic earthquakes of magnitude greater than 8 (Richter scale) have occurred in the western, northern and eastern parts of India and adjacent countries in the past 100 years. Approx. 59 % of the land area of India is liable to seismic hazard damage. In India, seismic zones are divided into four zones i.e., V, IV, III and II. As per the seismic zoning map of India, Bundi Town falls under the Zone II, which is the lowest earthquake risk zone in India. This zone is termed as “low damage risk zone” (Figure 24). Hence the risk of earthquake at the proposed sites is minimal and so the site is safe.

Figure 24: Earthquake Zone Map of Rajasthan



Demographic Profile

Table 17 Population growth Bundi, Rajasthan			
Census	**Population**	**Decadal Growth (Increase in Population per Decade)**	**% Increase in Population per Decade**
1981	48,027		
1991	65,047	17,020	35.44%
2001	88,871	23,824	36.63%
2011	103,286	14,415	16.22%

Climatic Conditions

80. The city has a dry climate except in the monsoon seasons. The winter season runs from mid-November to February and summer season runs from March to mid of June. The period from mid of June to September is the monsoon season followed by the months October to mid of November constitutes the post monsoon or the retreating monsoon. The average rainfall in the district is 850 mm. January is the coldest month with the average daily maximum temperature of 24.3 degree C and the average daily minimum temperature of 10.6 degree C. The project area has got a sub-tropical climate with moderate to hot temperatures, ranges between 7 degree C to 45 degree C and relative humidity drops to about 20 % during March, April and May. July-August is most humid period averaging 70% to 80% humidity.

Surface Water

81. The main Bundi Rivers include Chambal and Kushal. The Chambal River dissects the two districts of Bundi and Kota and forms the southern boundary of the Bundi District. Chambal River is not only the Perennial River among the rivers of Bundi but among the rivers of Rajasthan. The length of the river is 165 km. Chambal River flows about 376 km in Rajasthan. The major town of Keshorai Patan lies on the bank of the Chambal River. Kushal River is also another small river in Bundi. There are 3 famous lake situated in surroundings of Bundi 1) Jait Sagar lake, 2) Kanak Sagar lake & 3) Nawal Sagar Lake

82. Jait Sagar lake is located at a distance of three kilometers from Bundi. Mountains surround the lake from all sides. The lake was built by Jaita Meena the ruler of Bundi in 14th century AD. Later got repaired by Gehlotni Jayvanti, the mother of Rao Raja Sarjan Singh. The beautiful fountain in the lake presents a beautiful sight to the spectators at night.

83. Kanak Sagar is a historic lake at the Dugari town of the Bundi district . It is famous for migrated birds around the year. The lake is about 67 km away from the main city of Bundi. Kanak Sagar has covered a total area of 44.85 Hectares.

84. This lake is famous for water animals and birds. The lake accords home to Pelicans, Black-tailed Godwit, Little Ringed Plover, Snail bird, Common Sweeper Bird, and Common Gull Bird. This lake is also famous for the Indian Screamer bird, Bar-Headed Goose.

85. Nawal Sagar Lake is a huge, manmade lake that can be seen from the Talagarh Fort. This lake has more than a few small islands. This lake is in the middle of the city. The mirror image of the entire city of Bundi falls on the serene waters of this lake making it a unique tourist destination.

86. **Rivers in Bundi district**. Chambal river's name is based on the ancient mythological river Charmawati. The river starts from Manpur near Mhow in Madhya Pradesh. It is covered a total area of 965 km and flows through a long narrow and steep gorge at Chaurasigarh. Where the Chambal River falls from 884.4 meters at its source to 505 meters. Again, Chambal River enters the gorge from about 113 km and leaves it near the Kota district of Rajasthan.

87. The Chambal stream runs north for about 257 km and crossed the Jawahar Sagar sanctuary. Chambal river makes the boundary between Kota and Bundi districts of Rajasthan. Its total length is 376 km and depth 50 meters.

88. After crossing the Kota district, the Chambal river flows the boundary of Sawai Madhopur and Dholpur Districts with the Madhya Pradesh state of India. Then, it finally enters in the Uttar Pradesh and engaged with the Yamuna River near Etawah. Chambal is the only river of Rajasthan which flows all over the year. It has beautiful sites and excellent resources for the development of cheap hydel power and irrigation facilities.

89. The Chambal River is famous for wildlife, Dams, endangered species, and for history. It has two wildlife sanctuaries in Rajasthan Jawahar Sagar Wildlife Sanctuary in Kota and National Chambal Sanctuary in Dholpur. Red-crown turtles and Gangetic River Dolphins are endangered species only found in the Chambal River. And Indian Skimmers are only seen around Chambal River between Kota to Dholpur district. Chambal river has a total of four dams and all are in Rajasthan like Gandhi Sagar Dam, Jawahar Sagar Dam, Rana Pratap Sagar Dam, and Kota Barrage.

90. **Kota Barrage** is the fourth construction in the Chambal Valley Project over River Chambal, perineal river of Rajasthan. It was built to store water, release by the three upstream dams of the Chambal Valley project i.e. Gandhi Sagar Dam, Jawahar Sagar Dam and Rana Pratap Sagar Dam, and then channelize it to the dry areas of Rajasthan and Madhya Pradesh for irrigation purposes via canals. At present, it helps in agriculture in around 20,000 acres of land. The 19-gate long barrage forms a bridge over River Chambal at Kota.

91. The Kota Barrage has its roots in scarcity and necessity of water distribution. It was in the 1950s and water was being harnessed at the Gandhi Sagar Dam, Jawahar Sagar Dam and Rana Pratap Sagar Dam - the three dams of Chambal River of Rajasthan, for hydroelectricity. However, the authorities realized that this water was not getting enough channelization and that agriculture in parts of both Rajasthan and Madhya Pradesh was suffering because of water scarcity. That is when a barrage was set up in Kota to hold huge amounts of water and further regulating and diverting them to the areas in need of water via canals.

92. After the completion of construction in 1960, the Kota Barrage started discharging water to both the states. According to an agreement, 50% water of Kota Barrage goes to Madhya Pradesh. At present, almost 20,000 acres of land are being benefitted by water irrigated by Kota Barrage, of which 11,300 acres are in Madhya Pradesh.

93. Kota Barrage stretches for a catchment area of 27,332 sq. Km in total. The primary support of the barrage is the Jawahar Sagar dam which holds 99 million cubic metres. The concrete spillway leads to a 188 cubic metres discharge capacity canal on the right and 42 cubic metres one on the left. Like a typical barrage, it obviously serves as a bridge over River Chambal between the two sides. The barrage operates through 19 gates to control the flow of water and regulate it accordingly.

94. **Mangli River**. Mangli River originates in Bundi District itself and is a tributary to Mej River, which in turn is a left bank tributary of Chambal River and joins Chambal River in Kota District. Thus, the Mej River Catchment extends over Bundi District while two other districts also form its catchment and these are Bhilwara District and Tonk District. The famous Bhimtal waterfall is also situated in Mangli River, which is upstream to Bundi City.

95. Surface water quality monitoring results show that all physical and chemical parameters fall within the permissible limit of water quality for Indian Standards as well as WHO's prescribed limits, except for turbidity which is higher than acceptable limits. Permissible limits for water quality are attached with this IEE Report as Appendix C-1.

Table 18: Surface Water Quality of Kota barrage (Source: PHED, Bundi on dated 19 August 2019)

National Standards for Drinking Water			WHO Guidelines for Drinking-Water Quality, 4th Edition, 2011[b]	Sampling sites								
Parameter	Unit	Max. Concentration Limits		Surface Water								
				Kota barrage	Kota barrage	CF Water	Inlet Chamber No. 1	Inlet Chamber No. 2	Inlet Chamber No. 4	CWR NR WTP	CWR NR Pump House	CWR At Mangli
Date of Sample				30.07.2019	03.12.20	19.08.19	19.08. 19	19.08. 19	19.08. 19	19.08. 19	19.08. 19	19.08. 19
Turbidity	NTU	1 (5)	-	5.65	2.40	9.22	1.00	1.70	2.92	7.18	5.56	6.98
pH		6.5 – 8.5	none	7.23	7.73	6.04	---	---	---	7.43	6.74	7.21
TDS	mg/l	500 (2,000)	-	208	182							
Chloride	mg/l	250 (1,000)	none established	30	30	---	---	---	---		---	---
Nitrate	mg/l	45	50	7	1	---	---	---	---	---	---	
Total Alkalinity (as $CaCO_3$)	Mg/l	200 (600)		90	100							
Total Hardness	mg/l	200 (600)	-	100	96	---	---	---	---		---	---
Residual Chlorine	mg/l	0.2	5			2.0	1.5	1.5	1.5	5.0	5.0	---
Fluoride	mg/l	1 (1.5)	1.5	0.249	0.244							

Bureau of India Standard 10500: 2012.

- Health-based guideline values.
- Figures in parenthesis are maximum limits allowed in the absence of alternate source
- BDL – Below detectable level

Groundwater

96. Ground water occurs under water table conditions both in unconsolidated and consolidated formations. Its occurrence is controlled by topography, physiography and structural features of the geological formations. The movement of ground water in hard rock areas is governed by size, openness, interconnection and continuity of structurally weak planes while in unconsolidated rocks, ground water movement takes place through pore spaces between grains. The district is characterized by five types of soils given below (a). Lithosol and regosols of hills, (b), Yellowish – brown soils of foothills, (c). Recent alluvium (d), Brown soils-saline phase and (e) Black soils.

97. Geologically the district consists of diverse rock types belonging to oldest Archaean metamorphic of Bhilwara supergroup in the northern part and upper Proterozoic sedimentary of Vindhyan supergroup in the southern part. Quaternary alluvium is observed along main river courses and in shallow depressions in the south-western belt of the district. Depth to water level varies widely before monsoon, depending upon topography, drainage, bed rock, geology etc. Depth to water level ranges from 9mbgl (Rajgarh block) to 81.20mbgl (Behror block) in Bundi District. In Budi area the depth to water level is between 5 to 10 m during pre-monsoon while 2 to 5 meter during post monsoon.

98. **Groundwater Utilization.** Central Ground Water Board and Ground Water Department, Government of Rajasthan have jointly estimated the ground water resources of Bundi district based on GEC-97 methodology. Net annual ground water availability in the district has been estimated as 349.3267mcm. The annual ground water draft for all uses in the district has been assessed to be 331.9884 mcm with overall stage of ground water development at 95.04%.

99. **Groundwater Quality.** Pre-construction stage ground water quality monitoring was done on 28.01.2023 to 29.01.2023 in Bundi at five locations. The groundwater quality of tube wells in Bundi is presented in Table 19. Groundwater is alkaline in nature with pH ranging from 7.14 to 7.52, and within the acceptable range of drinking water quality. Most of the tested parameters are well within the desirable limits of drinking water standards (IS 10500-2012) and WHO guidelines for drinking water inducing the Fluoride content. Total hardness of water samples at two sampling sites was higher (STP and CWR sites) but was below the maximum concentration limits. Pre-construction stage monitoring was done on January 28, 2023 to January 29, 2023 and baseline monitoring data has been generated Tube well water sample taken at PHED Kagji-Dewara Road, PHED, Vikas Nagar, Intake of Kota barrage, STP Site Ramgunj and CWR, Nainwa road in Bundi Town.

Table 19: Ground Water Quality of Bundi

Date of Sample			**28.01.2023 to 29.01.2023**					
National Standards for Drinking Water			**WHO Guidelines for Drinking-Water Quality, 4th Edition, 2011[b]**	**Location of Source**				
Parameter	**Unit**	**Max. Concentration Limits**		**PHED Kagji-Dewara**	**PHED Vikas Nagar**	**Intake Kota Barrage**	**STP site Ramgunj**	**CWR Nainwa road**
Turbidity	NTU	1 (5)	-	< 01	<01	<01	<01	<01
pH		6.5 – 8.5	none	7.25	7.21	7.14	7.48	7.52
Total Alkalinity				236.39	225.64	161.77	365.35	408.31
Colour	Hazen	5 (15)	none	---	---	-------	-----	----
Taste and Odor		Agreeable	-	---	---	------	-----	----
TDS	mg/l	500 (2,000)	-	624.20	571.50	410.50	1371.50	1114.20
Iron	mg/l	0.3	-	0.05	0.04	0.14	0.11	0.11
Manganese	mg/l	0.1 (0.3)	-	BDL	BDL	BDL	BDL	BDL
Arsenic	mg/l	0.01 (0.05)	0.01	BDL	BDL	BDL	BDL	BDL
Cadmium	mg/l	0.003	0.003	BDL	BDL	BDL	BDL	BDL
Chromium	mg/l	0.05	0.05	--	---	---	---	---
Cyanide	mg/l	0.05	none	BDL	BDL	BDL	BDL	BDL
Fluoride	mg/l	1 (1.5)	1.5	0.12	0.08	0.26	0.21	0.21
Lead	mg/l	0.01	0.01	BDL	BDL	BDL	BDL	BDL
Ammonia	mg/l	0.5	Not established	--	---	----	---	----
Chloride	mg/l	250 (1,000)	Not established	80.99	85.76	52.40	200.11	152.46
Sulphate	mg/l	200 (400)	none	25.54	15.60	60.04	45.73	45.73
Nitrate	mg/l	45	50	21.15	21.14	15.84	33.08	38.52
Copper	mg/l	0.05 (1.5)	2	BDL	BDL	BDL	BDL	BDL
Total Hardness as (CaCo3)	mg/l	200 (600)	-	293.40	242.80	182.10	580.45	536.20
Calcium	mg/l	75 (200)	-	81.03	72.93	36.46	190.42	149.91
Zinc	mg/l	5 (15)	Not established	0.11	0.01	0.10	0.03	0.03
Mercury	mg/l	0.001	0.006	BDL	BDL	BDL	BDL	BDL
Aluminium	mg/l	0.1 (0.3)	Not established	BDL	BDL	BDL	BDL	BDL
Residual Chlorine	mg/l	0.2	5	BDL	BDL	BDL	BDL	BDL
E-coli	MPN/100ml	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	---	---	-----	-----	------

BDL= Below Detection Limit

Source - testing and sampling done by Nakshatra Environ Services, Jaipur

Air Quality

100. Pre-construction air quality monitoring was done on January 28, 2023 to January 29, 2023. The air quality data are provided in Table 20. PM10 as well as PM 2.5 were recorded well below the NAAQS but exceeded the WHO guidelines in all sampling stations. SO2, NOx and CO were detected within the WHO guideline limits.

Table: 20. Ambient Air Quality Monitoring in Bundi

Test Laboratory				**Nakshatra Enviro Services, Jaipur**				
Sample Collected By				**NES representative**				
Date of Sample				**28.01.2023**				
Village/Town				**Bundi**				
				Location of Source				
Parameter	**Unit**	National Standards for Ambient Air quality (NAAQS)	WHO Global Air Quality Standards - 2021	PHED Kagji-Dewara Road	PHED, Vikas Nagar	WTP site Jakhmund	STP site Ramgunj	CWR Nainwa road
PM10	µg/m^3	100	45	**77.02**	**75.49**	**79.62**	**83.65**	**80.22**
PM2.5	µg/m^3	60	15	**31.65**	**30.26**	**34.25**	**39.52**	**35.26**
Sulfur Dioxide (SO2)	µg/m^3	80	40	7.85	7.16	7.96	8.54	8.71
Oxides of Nitrogen(NOx)	µg/m^3	80	25	20.65	21.34	23.69	24.51	23.04
Carbon Monoxide(CO)	µg/m^3	2.00	4	0.53	0.50	0.51	0.52	0.53

Noise Quality

101. Noise level monitoring was conducted in Bundi town on 29.01.2023. Day time noise levels when compared with National standards and WHO guidelines were within the range of industrial area but higher than the limits set for commercial in National standards in one sampling point (WTP site) but within the WHO limits in all locations . Night time noise levels well within standards except for one location, i.e. CWR Nainwa Road. The noise level data of monitoring are provided in Table 21.

Table: 21. Noise Level Monitoring in Bundi

Test Laboratory			**Nakshatra Enviro Services, Jaipur dated** 29.01.2023				
Sample Collected By			**NES representative**				
National Standards for Noise Level			**Location of Source**				
Parameter	**Unit**	**Limits (Commercial)**	**PHED Kagji-Dewara Road**	**PHED, Vikas Nagar**	**WTP site Jakhmund**	**STP site Ramgunj**	**CWR Nainwa road**
Noise Level Day Time (6 am to 10 pm)		65	58.4	56.0			
Noise Level Nighttime (10 pm to 6 am)		55	42.0	42.8			

Parameter		Limits (Industrial)					
Noise Level Day Time (6 am to 10 pm)	dB(A)	75			68.8	61.8	61.2
Noise Level Nighttime (10 pm to 6 am)	dB(A)	70			43.5	44.0	47.5

Categories of Zones	Leq in dB (A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

B. Ecological Resources

102. ADB's SPS, 2009 requires demonstration that the project will not adversely affect the identified critical habitat. ADB SPS, 2009 states that projects should not be developed within critical habitat areas unless all of the below criterion are met (i) there are no measurable adverse impacts, or likelihood of such, on the critical habitat which could impair its high biodiversity value or the ability to function; (ii) 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 host ecosystem be compromised; and (iii) any lesser impacts are mitigated

Forest areas

103. The urban area in Bundi is surrounded by land converted for agricultural use. There is no natural habitat in the town, and the flora is limited to artificially planted trees and shrubs, whereas the fauna comprises of domesticated animals (cows, goats, pigs and chickens), plus other species able to live close to man (urban birds, rodents and some insects). There is no protected area nearby the subproject site.

104. Vegetation is sparse and comprises mostly of domesticated species, with limited fauna. There are fishes in most of the rivers and irrigation tanks outside the towns, but no aquatic areas is protected; Rohu (Labeo rohita) and sanwal are the most common fish species.

105. As per the year 2021 assessment of the India State of Forest Report 2021 published by Ministry of Environment, Forests and Climate Change (MoEFCC), Bundi district has about 5,776 sqkm area out of which 564.35 sqkm is total forest area. Out of which, one sqkm area is covered with very dense forest, 138.98 sqkm area is covered with moderate dense forest and 424.37 sqkm is open forest. The forest area in district has been increased from 7.17 % in 2019 to 9.77% in 2021. About 172.67 sqkm area of Bundi is also covered with scrub forest.

106. The Bundi Town in its immediate surrounding are covered many forest blocks these are Kanti Astoli Reserved Forest and Borkhandi Phoolsagar Protected Forest and Bundi ki Nangi Pahadiya Protected Forest at Northwest. Shirkaburj and Ramgarh Vishdhari Wildlife Sanctuary at Northeast. Ramganj Forest block at South of Bundi surrounding STP site. The figure below shows the proposed components and forest area in Bundi town.

Figure 25: Forest Map of Bundi Showing Project Components

RF-reserved forest; PF - protected forest

107. As per the Champion and Seth Classification system, these forest have tropical dry deciduous (1) Dhok (2) Mixed forest of Dhok and Khai as per forest working plan in year 2011-12 these forest has 57 species of tree, 8 species of Shrubs, 11 species of Climbers, 36 species of Grasses , 35 species of Herbs, 29 species of Mammals, 23 species of Reptiles, 8 species of Fishes , species of 4 species of Amphibians and 86 species of Aves.

3. Common flora and fauna of these forests

108. **Trees** - *Emblica officinalis Alangium salvifolium, Buchanania lanzan, Morinda tinctoria, Mangifera indica, Cassia fistula,, Hardwickia binata, Acacia leucophloea, Aillanthus excelsa, Sapindus emarginatus, Polyalthia longifolia, Tamarindus indica, Bauhinia variegate, Anthocephalus cadamba, Mitragyna parvifolia, Terminalia arjuna, Pongamia pinnata, Flacourtia indica, Feronia limonia, Lagerstromia parvifilora, Bridelia retusa, Kydia calycina, Sterculia urens, Miliusa tomentosa, Ficus hispida Linn*. Etc

109. **Shrubs** - *Zanthium strumarium, Calotropis procera, Calotropis gigantea, Achyranthes aspera, Cassia auriculata, Clerodendrun Viscosum, Adhatoda vasica, Calotropis procera, Grewia flavencens, Securinega leucopyrus, Capparis Spinosa, Capparis sepiaria, Capparis decudua, Carissa spinarum, Periploca aphylla* etc

110. **Climbers** - *Mucuna pruriens, Cayratia carnosa, Viscum orientale, Oxalis corniculata, Ichnocarpus frutescens, Millettia auriculata, Cissampolos pareira, Butea parviflora, Celastrus paniculatus, Cryptolepis buchanani, Asparagus dumosus; Tinospora cordifolia, Abrus precatorious* etc

111. **Reptiles** - Magger crocodile, Indian sawbaok Indian mud turtle, Starred tortoise, Northern house geeko, Fat tailed gecko, Common garden lizard, Indian chameleon, Common indian monitor, Johr's earth boa, Indian python, Common rat snake, Common indian krait, Indian cobra, Russell's viper, Spiny tailed lizard, Krait, Pitviper

112. **Amphibians** - Common Indian Toad, Marbled Toad, Indian Bull Frog and Burrowing Frog.

113. Other than timber, fuel wood, fodder and the main forest products from these forest blocks are, Tendu leaves, Gums of Salar, Gurjan, Babool, Karaya, Khair Dhok, Safed Dhok (Dhavda)

114. Bundi STP site is surrounded by Ramganj protected forest block, this forest block has typical wild flora and fauna of Bundi district as describe in above paragraphs. The figures below showing proposed networks and forest block boundaries maps.

Figure 26: Google Earth Imgery Showing Proposed Replacement of Water Supply Networks in Zone 5B (blue ink) and Forest Boundary (red ink)

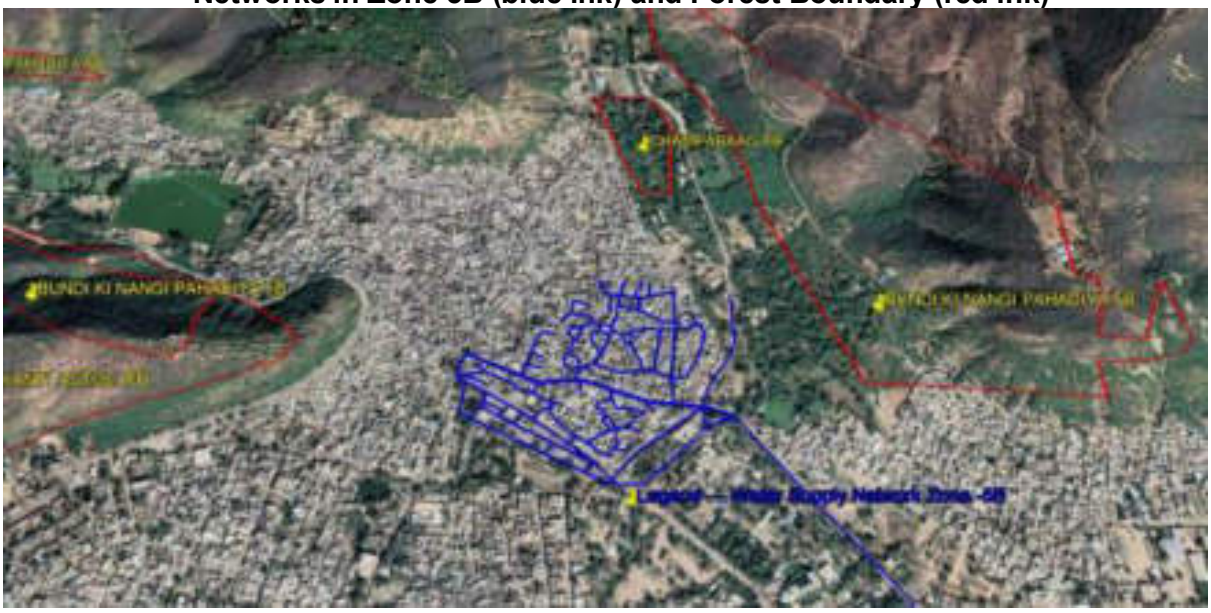


Figure 27: Google Earth Imgery Showing Proposed Replacement of Water Supply Networks in Zone 7 (blue ink) and Forest Boundary (red ink)

Figure 28: Google Earth Imgery Showing Proposed Replacement of Water Supply Networks in Zone 8 (blue ink) and Forest Boundary (red ink)

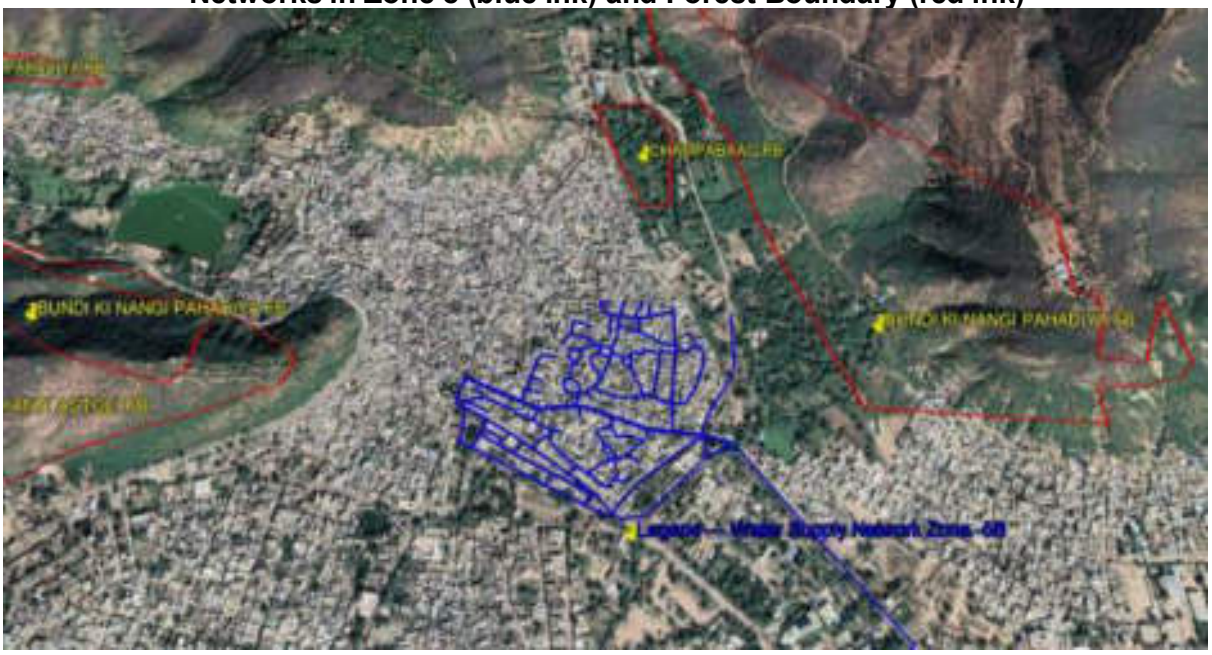


Figure 29 : Google Earth Imgery Showing Proposed Replacement of Water Supply Networks in Zone 9 (blue ink) and Forest Boundary (red ink)

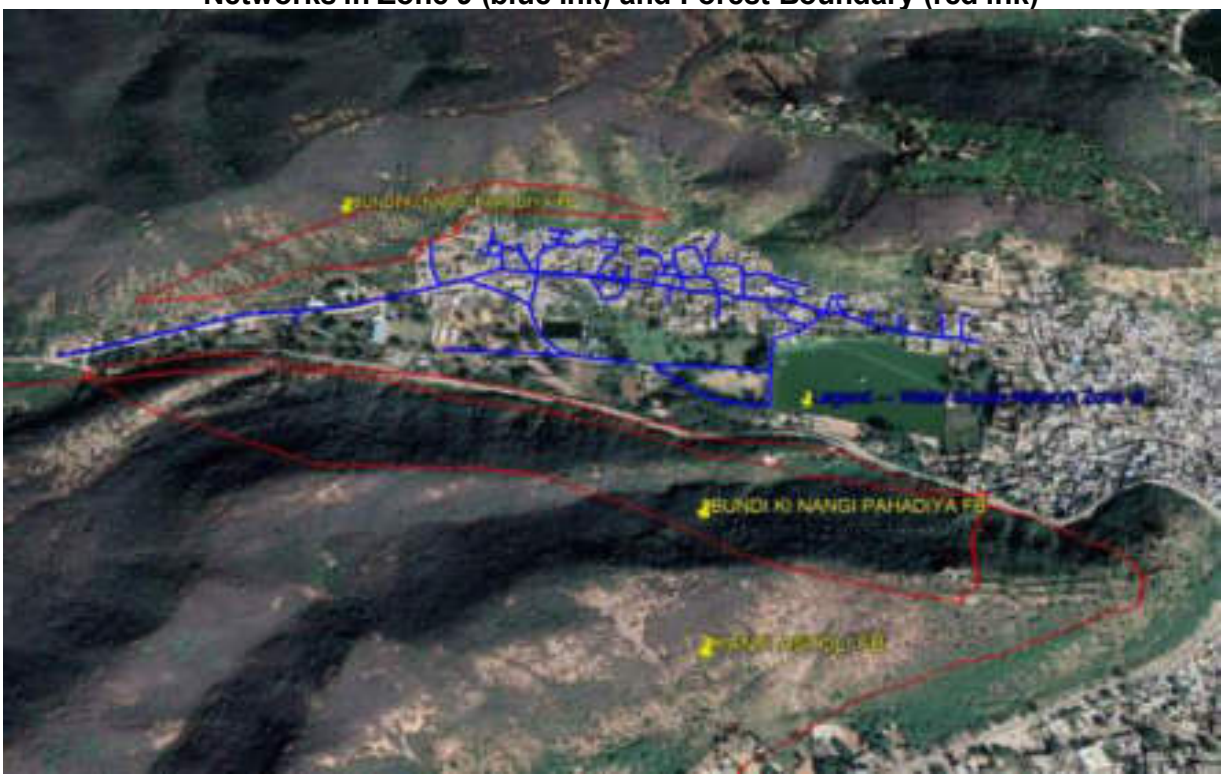
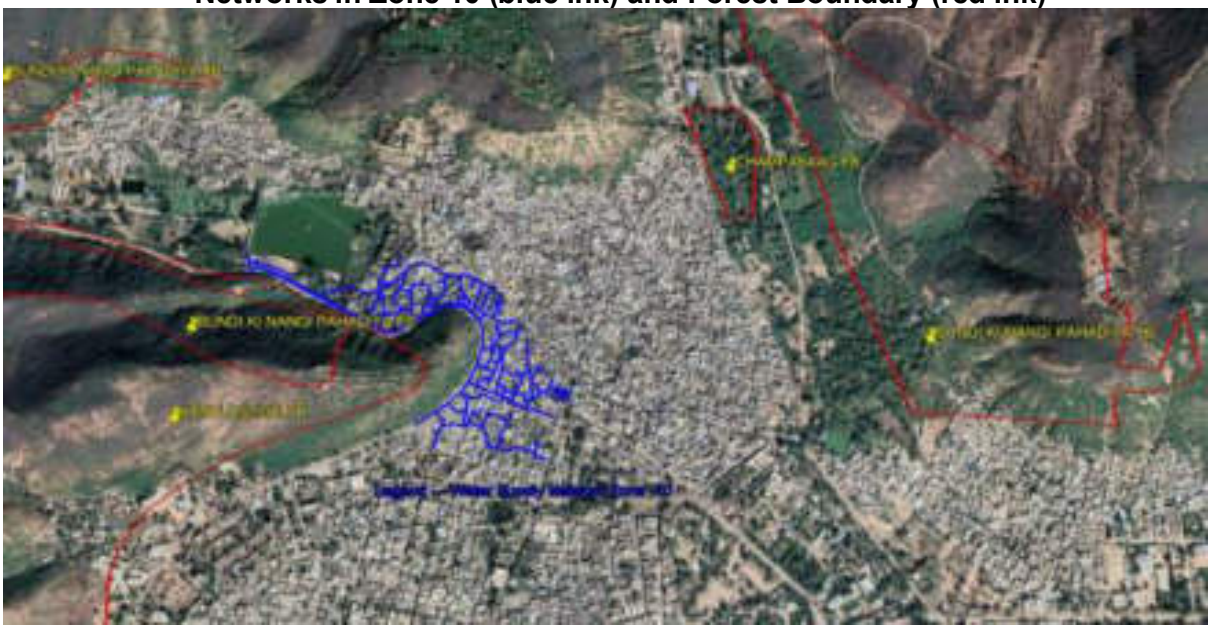


Figure 30: Google Earth Imgery Showing Proposed Replacement of Water Supply Networks in Zone 10 (blue ink) and Forest Boundary (red ink)



4. Protected Areas: Three wildlife Sanctuaries has boundaries in Bundi District

115. The Sanctuary is located at North to northeast side of town about 2 km distance from proposed CRW. Ramgarh Vishdhari Wildlife Sanctuary acts as a buffer for Ranthambore National Park, which is one of the most famous wildlife sanctuaries in India. It covers an area of about 252 square kilometer. It is rich in biodiversity & is home to various kinds of wild animals. The Government of Rajasthan declared it a sanctuary on May 20, 1982 under Section 5 of the Rajasthan Wildlife and Bird Protection Act, 1951. Various types of wild animals like Indian wolf, leopard, striped hyena, sloth bear, golden jackal, chinkara, nilgai and fox can be seen in Ramgarh Vishdhari Wildlife Sanctuary. Featured by dry deciduous forest on Vindhyan formations with the plenteous number of trees like Khair, Salar, Khirni, Ber, Babool, Mango and Dhok. This Sanctuary is present in the range of Aravali Mountains and one of the major attractions of tourism in Bundi. Recently Ramgarh Vishdhari Sanctuary is declared at tiger reserve and eco sensitive zone notification is in draft format. Before start of construction subproject's components distance from wildlife sanctuary required to be reverified

116. **The National Chambal Sanctuary** – The Sanctuary is located 15 km eastern directed from existing intake at Kota Barrage. The Sanctuary is located at Southeast direction to Bundi Town and was set up in 1979 as a riverine sanctuary along an approximately 425 km length of the Chambal River and its ravines stretching over 2-6 km wide along the river. The Project is managed by the Wildlife wing of the Uttar Pradesh Forest Department and is head-quartered at Agra. National Chambal Sanctuary is the main area for the species reintroduction program of the crocodilian species Gavialis gangeticus (Gharial). One of the few places to spot the *Platanista gangetica* - Gangetic Dolphins. (National Aquatic Animal) Only known place where nesting of Indian Skimmers is recorded in large numbers. Chambal supports 8 rare turtle species out of the 26 found in the country. Chambal supports more than 320 resident and migrant birds, NCS is a Tristate sanctuary with an area of 635 sq. kms in Uttar Pradesh, spread over Agra and Etawah districts. Part of the NCS also lies in Madhya Pradesh and Rajasthan, The National

Chambal Sanctuary is listed as an important bird area (IBA) IN122 and is a proposed Ramsar site.

117. **Jawahar Sagar is a wildlife sanctuary** – The sanctuary is located at Southwest direction to town about 70 km from Bundi town and 22 km from nearest project component i.e Kota barrage. This Sanctuary is in the Kota and Bundi district of Rajasthan. Gandhi Sagar Dam was built on the Chambal River in 1972 to protect crocodiles and Gadiyals. Gandhi Sahar Dam extended to Jawahar Sagar Sanctuary. It covers an area of 154 sq. km. This sanctuary is part of Mukandra Tiger reserve.

118. The sanctuary is house of plant species like Khair, Dhok, Tuberous, Angiosperm, Pteridophytes, Climbers, Fungi, verities of Algae, Bryophytes etc.

119. Jawahar Sagar is also famous for wildlife, and it has huge varieties of wild animals. The Jawahar Sagar Sanctuary is the home of wild animals. Like Blackbuck, Chinkara, Caracal, Wild Wolf, Sloth Bear, Panther, Hyena, Wild Boar, Chittal, Sambar Deer, Gavial, Crocodiles, Jackal, Porcupine, Nilgai, Hare, Civet, Crane, Four-horned Antelope, Wild Cock.

Table 22: Distance from nearest Wildlife Sanctuaries to Project Components

Component	Wildlife Sanctuaries and distance from proposed components		
	Ramgarh Vishdhari Sanctuary	National Chambal Gariyal Sanctuary	Jawahar Sagar Sanctuary
Intake near Kota Barrage	36km	15 km	22 km
WTP at Jakhmund Campus	28 km	16km	24km
450 KL OHSR at Vikas Nagar	2 km	36 km	73 km
CWR (1200 Kl) at Nainwa road HWs	2 km	63 km	74 m
Nearest transmission main	2 km	61 km	73 km
Nearest Water supply distribution network	2.5 km	65 km	70 m
STP Campus	6.9km	58 km	64 km
Discharge point	6.8 km	59 km	64 km

120. Biodiversity Assessment Report (IBAT Analysis) for Water Supply (CWR) and Sewerage system (STP located at Ramganj Balaji at Bundi Town has been attached with this report as **Appendix 8**. The screening study for critical habitation indicates that within the area of analysis (AOA) there are no known species which would qualify the area as critical habitat under the set criteria (criterion 1–5, as presented in the report). As per IBAT report; within 50 km radius of STP. there are 17 species (EN & CR) concern fauna listed as IUCN Red list, which are wild species and not reported in urban areas of Bundi. The nearest protected area is Ramgarh Vishdhari wildlife sanctuary within 2 km from Proposed OHSR and CWR site. IBAT assessment shows three Key biodiversity areas Bandha Dam, Jawahar Sagar Sanctuary & Ramsagar lake are located about 50 km far from proposed projects locations. (Appendix 8). Ramgarh Vishdhari Wildlife Sanctuary is located about two km in north and northeast direction from nearest

proposed components that are CWR and OHSR, which is not reflected in IBAT checklist.

C. Economic Development.

121. **Land Use:** Municipal area of Bundi encompasses 21.85 sq. km. About one fifth of the land area is urbanized and the rest consists of hills, water bodies and agricultural land. Even within a contiguous urbanized area, only 65% is developed and the remaining are water bodies, agricultural land, and pockets of vacant land. About 44% of developed areas are under residential use and 23% under public and semi-public. The high percentage of public and semi-public uses is due to spacious parade and play fields attached to schools.

Table 23: Existing Land Use of Bundi

S. No.	Land Use	Area	% of developed area	% of urban area
1.	Residential	310	41.38	32.62
2.	Commercial	60	7.48	5.90
3.	Industrial	35	19.03	15.00
4.	Government	20	1.68	1.31
5.	Recreation	20	3.02	2.38
6.	Public / semi public	160	9.14	7.20
7.	Circulation	95	18.27	14.40
8.	Total developed area	1280	100	78.81
9.	Vacant and agricultural land	205		21.19
10.	**Total urban Area**	**2185**		**100.00**

***Source:** *Bundi Master Plan 2009-2031*

122. **Major Crops**: The main crops grown in the Kharif are Rice, Jowar, Maize, Seasamum and other Kharif pulses, Soyabeen and Groundnut. The main Rabi crops are wheat, gram, other rabi pulses, rape & mustard, taramira, coriander in recent years there has been substantial increase in the area under rice, soyabeen and rape & mustard.

123. **Industrial Area:** Rajasthan state industries development & investment corporation Ltd. RIICO is developing industrial areas in the state. There are 6 industrial areas at present in the district. There are located at Bundi bypass road. Bundi Nainwa Road Bundi. Chittorgarh Road, Govindpur Bawari, Indergarh and Hattipura. Total Industrial area in Bundi is 208.37 acre. District has 7 Operational large-scale industries, 3 operational medium scale industries and 6665 small scale and Micro Enterprises filed memorandum up to March 2019 is in which 22992 persons are employed and fixed Investment in total Enterprises is 35794.24 Lakh.

124. **Industrial Effluents**: Industries exist under Rajasthan State Industrial Development & Investment Corporation Ltd (RIICO), which are outside the town area and small amount of effluent disposed scattered in local *nallahs*. As reported by the local MC, the responsibility of effluent disposal is under RIICO's own and it's connected with existing sewer network. The individual industry should treat their effluent to bring it to the required standard before final disposal.

125. **Solid Waste management:** Bundi Nagar Palika practices door-to-door waste collection in the part of the town, and in other parts waste is collected through community dust bins located in various places. Regular sweeping is carried out by Bundi Nagar Palika. Waste from houses, dust bins and other areas are collected, and transported to Kanjri Silore landfill site four km from Bundi. Landfill site is owned and managed by Nagar Nigam Bundi

126. **Power Supply**. In Bundi District, the distribution of power is controlled through 8 Big 132 K.V. sub-stations. These sub stations are in Bundi and Lakheri from these substations 33 K.V. line has been erected 77 sub- substations for supplying electricity. To strengthen and make regular power supply, a new substation is being constructed at village Namana, Panchayat Samiti Talera.

5. Transport: Bundi is well connected through air, rail and road network.

127. **By Air:** Nearest airport to Bundi Town is Kota airport about 45 km from Bundi which operates only form medical or VIP services. The Sanganer Airport of Jaipur is the nearest commercial airport to Bundi. The Sanganer Airport is at approximately 200 kilometres from Bundi. Taxi services are available between Bundi to Sanganer airport. This airport is well connected with various major cities of India through frequent flights.

128. **By Rail:** Kota Railway Station is the nearest railway station to the city. It is at 35 kilometres. Various trains play between Kota railway station and other railway stations of major Indian cities. One can take taxi or bus to reach Kota railway station.

129. **By Road:** Bundi is well connected through a network of roads. It is at 35 kilometres from Kota and nearly 200 kilometres from Jaipur. Other important cities that are accessible from here include Jaipur, Ajmer, Agra and New Delhi, which are situated at a distance of 170 KM, 155 KM, 310 KM and 390 KM respectively. The state transport buses connect the city with major cities in the state of Rajasthan. The total length of road in district in 2019-20was 2841.7 Kms.

D. Socio Cultural Resources

1. Demography

130. The Bundi city is in Rajasthan state of India. As per provisional reports of Census India, population of Bundi in 2011 is 103,286; of which male and female are 53,628 and 49,658 respectively. Although Bundi city has population of 103,286; its urban / metropolitan population is 104,919 of which 54,485 are males and 50,434 are females. Males constituted 52% of the population, while females made up 48%. Bundi had an average literacy rate of 82%, higher than the national average of 73%, with male literacy of 89.77% and female literacy of 73.77%. 12% of the population was under 6 years of age.

2. History, Culture and Tourism

131. Bundi is the ancient capital of the legendary Hada dynasty of rulers. It is described as the heart of Hadoti and it was founded sometime in the 13th century. It was vested by Rudyard Kipling. It is the first destination, in Hadoti that is reached from Jaipur by road. Set in a narrow encircling gorge, the palaces and fortress of Bundi have a fairy tale like quality about them. Few other palaces in India have such a picturesque location. Isolated and independent, the entire township arrears like a miniature painting, frozen in time for the traveler.

132. The Bundi Palace, built of locally quarried stone, presents one of the finest examples of Rajput architecture. Intricately carved brackets, pillars and balconies and sculpted elephants are used liberally. Of special interest here are the Diwan-I-Am, Hathi Pol and the Naubat Khana. Also located in the palace is the famous Chitra Shala which provides a colourful glimpse of history - the walls and ceiling of this palace are completely covered with paintings of the Bundi school. Hunting and court scenes, festivals, processions, animal and bird life and scenes from Lord Krishna's life are still in very good condition.

133. Bundi has other palaces and hunting lodges like the Phool Sagar Palace, Sukh Mahal and Shikar Burj. Each palace has its own historical importance Phool Sagar houses a collection of murals: done by the Italian prisoners of war who were held here; Sukh Niwas Palace evokes memories of Rudyard Kipling who not only stayed here but is believed to have found inspiration for his famous work Kim from the scenes that he saw here. Kshar Bagh, though not a palace, is interesting for its locations as well as the carvings on the 66 royal cenotaphs.

134. Bundi is also known for its baories or stepwells. Unique to Rajasthan and Gujarat, the stepwells served as water reservoirs for the months of summer when there was a scarcity of drinking water.

135. At one time, there were over fifty such wells in Bundi but most of them have suffered the ravages of time. One very good example still to be found in the heart of the town is called Raniji-ki-Baori. It has exquisitely carved pillars and ornate archways - even the simple function of drawing water from the well became a special occasion for the womenfolk, they dressed up in their finery to visit these elaborate structures. On the road to Kota is a splendid 17th century monument - the 84 pillared chhatri still in extremely good condition and worth a visit.

136. The Bundi district of Rajasthan has been an important tourist destination for both the foreign and domestic tourists. The place offers a unique culture with baoris, palaces & forts, lakes and the beautiful natural surroundings. The apparent tourism potential of this place inspired many to organize fairs and festivals to give a boost to the tourism resources. Efforts were made for vital efforts to streamline tourism and make it an important agent for the growth and development of this area. Unfortunately, this could not take the shape of a people's movement and the zeal and enthusiasm faded out slowly and the inputs more or less could not be sustained. At the same time the place needs efforts on our parts if we want to make it and important tourist destination .The rainy season is very special with the Kajli Teej Festival. The weather is generally pleasant except for a patch of the hot summer. During the monsoons in Bundi a local festival called Kajli Teej is uniquely celebrated here. A local fair is also held on this occasion exhibiting lot of local handicraft items including Katar (dagger), paintings and bangles etc. Both the urban and the rural people join this festive occasion. Besides the Kajli Teej a drive into the countryside across with the water streams crossing at innumerable places, camels grazing the green pastures and the peacock hanging around makes it a special monsoon drive. The cool temperament of this pollution free destination makes it a wonderful experience. A taste of the local maize (Bhutta) roasted in coal oven and served with salt n lemon gives a special delight in the monsoons. Although the local Kuttha Baati (food) is quite popular in the region. The Bundi miniature paintings attracts the traveller and from the highway it seems as if the town itself is a miniature painting frozen in time.

137. Bundi has moderate tourist inflows with main attractions being Ratan –Daulat , Chhatra Mahal, Chitra Shala, Char Bhujaji , Jain Temple at Naharji Ka Chauhatta, Laxminath Temple in Sadar Bazar, Damdame ki Maszid.

3. Tourist attractions and Historical places in Bundi

138. The tourist attractions in Bundi include glorious medieval forts, temples, havelis and magnificent palaces. The tourists will love to visit Bundi because of its serene atmosphere and strikingly expressive landscape. Bundi is located at the foothills of a large hill with a splendid lake at the center of city.

139. **Taragarh Fort** is the prime attraction in the city of Bundi. This fort was constructed in the 14th century. The visitors will find a large battlement (Bhim Burj) inside the fort. One will also see a cannon and a large reservoir. The reservoir was carved by a single piece of rock.

140. **The Bundi Palace** is another place of attraction, located near the Taragarh Fort. One will see some exquisite murals that typify the glorious era of Indian royalty.

141. Bundi is also famous for its large number of age old stepwells (locally called baoris). The stepwells that have been maintained till today are the Nagar Sagar Kund, Raniji ki Baori, and Nawal Sagar.

142. One of the prominent tourist attractions is a temple of Lord Varuna (God of Rains), half submerged in the water of the **Nawal Sagar lake**. The visitors, uses boat to reach temple.

143. **Dabhai Kund** in Bundi is one of the largest kunds in Bundi. It is one of the most popular and frequented places of attractions in the city. These kunds are nothing but steep wells that were constructed by the Rajput royal kings.

144. Prithviraj Chauhan constructed Dabhai Kund in Bundi. The steep wells stand evidence to the glory of such Rajput kings and royal members. Also known as the Jail Kund, this is a must visit destination for tourists frequenting Bundi.

145. The level of the water in the steep wells was quite deep. There are many steps that lead to the Dabhai Kund at Bundi. There are many intricate carvings that can be seen on the staircases that ultimately lead to the Dabhai Kund, Bundi. Apart from Dabhai Kund you can also visit other famous tourist attractions of the city such as Sukh Mahal, Taragarh Fort, Nawal Sagar Lake,

146. **Ratan Daulat** is a major spot of attraction in the small yet elegant city of Bundi. The grand monument in Bundi stands as a testimonial to the chivalry and grand achievements of the great Rajput rulers. Raja Rao Ratan Singh, who was one of the noble and brave Rajput kings, constructed Ratan Daulat in Bundi.

147. Ratan Daulat at Bundi stands as an exceptional monument for the innovation that is involved in its construction and design. The Rajput king had immense talent and vision and that is reflected in the architecture of the structure.

148. Ratan Daulat, Bundi has a stable that can accommodate nine horses. A royal look had been imparted to the entire structure. There are beautiful and complex carvings on the coaches in the stable, with a horse in front of each of them. The Hatia Pol is another important feature of the Ratan Daulat of Bundi.

4. Other important places in Bundi

149. **City Gates (7 nos)** - Situated at the entrance of the different locations of Bundi Town and popular with tourists and locals for its view of Bundi Town

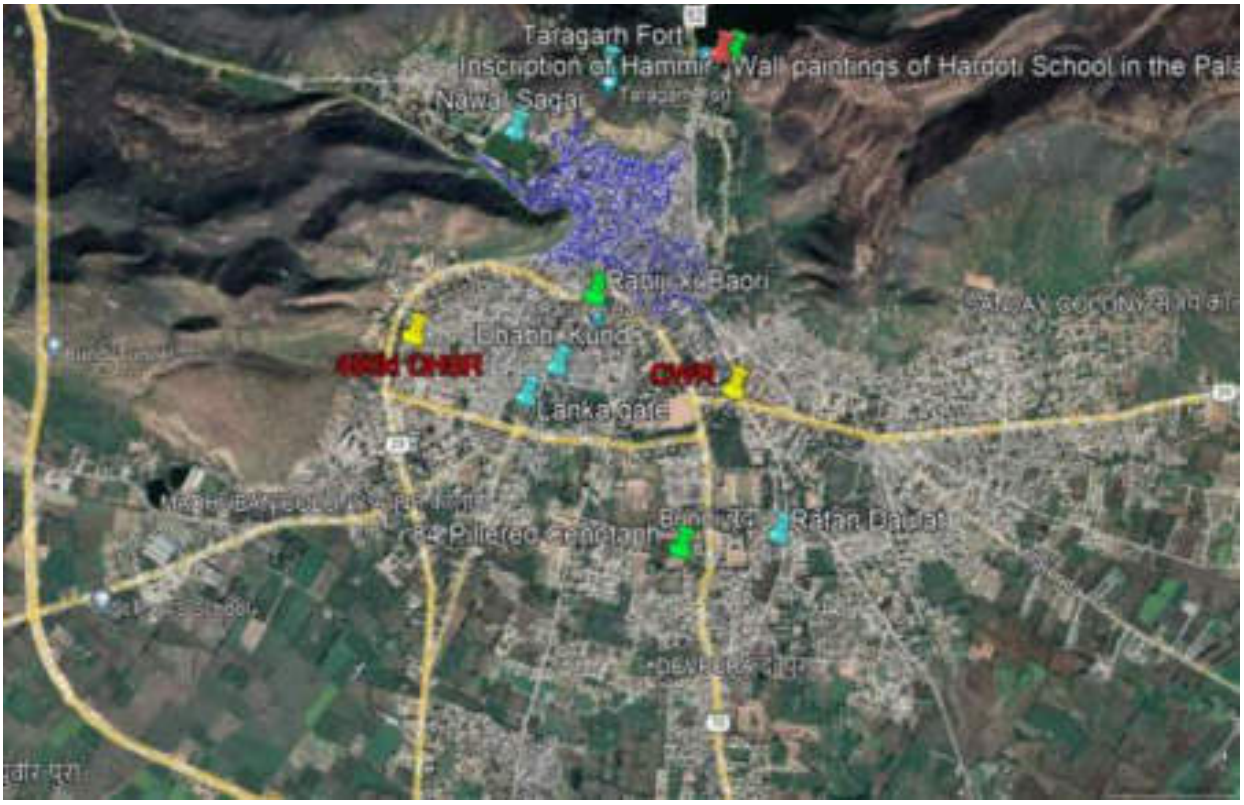
150. **Nagar Sagar Kund** - The kunds (pair of matching stepwells) are located near to Indira Market and Azad Park - Nagar Sagar is an artificial lake which tends to dry up if the monsoon is poor. In the centre of the lake is a temple for the Aryan god of water.

151. **Naruki Baori** - The Baori is located in the heart of mohallas in ward no.36 in the northern part of the city and Shukl Baori gate is the closest heritage structure to the baori

152. **Nahardhos ki Baori** - located in the southern part of the town near Khoja Gate, the closest heritage structure to the baori

153. **Naval Sagar Lake** - The lake is located on the right side to the approach road of Taragarh Fort in the western part of the city

Figure 31: Google Earth Imagery Showing ASI Protect Monument (Red) State Protected in (Green), Other Important Tourist Places in light blue) and Proposed Subproject Components in Bundi (distribution line in Blue and OHSR and CWR in Yellow)



5. Protected Monuments

154. Bundi Town has three state Protected Monuments, Raniji Ki Bawari (step well), 84 Pillared Cenotaph (Shiv temple) and Inscription of Hammir and one ASI monument (Wall Paintings of Hardoti School in the Palace). All project components are located outside the subproject component area.

155. **Wall Paintings of Hardoti School in the Palace**: Is one ASI protected monument in Bundi Town, The nearest components is distribution network located about 421 m form this protected monument. Some of the old wall paintings (murals) in the Garh Palace of Bundi form a Monument of National Importance. They are examples for one of the Rajput painting art schools, which is named after the historical Hadoti Region, especially for the Bundi style. Located Inside the fort is a small palace named Dudh Mahal which has beautiful frescoes and a portion of the palace changed into a Rang Shala (art gallery). For centuries, Bundi remained an important school of the Rajasthani style of miniature paintings. The site is one of the rock art sites discovered in the Bundi-Bhilwara-Tonk Region of Rajasthan and Rock paintings discovered are from various eras such as the Mesolithic, Chalcolithic, Metal Age and even prehistoric.

156. Raniji ki Baori, Shiv Temple and Chaurasi Khambon ki Chhatri & Inscription of Hammir are state protected monuments in Bundi and all subproject components are located outside these monument boundaries. The nearest component is the distribution network located about 270 m form Rani ji ki Bauri.

Raniji ki Baori: The town of Bundi is renowned for its baoris, or stepwells. Raniji ki Baori is a noted stepwell situated in Bundi town in Rajasthan state in India. It was built in 1699 by Rani Nathavati Ji Solanki who was the younger queen of the ruling Rao Raja Anirudh Singh of Bundi. It is a 46 meter deep stepped well with some superb carvings on its pillars..

157. **Shiv Temple and Chaurasi Khambon ki Chhatri** or 84 Pillared Cenotaph is a famous temple type structure which is devoted to Shiva and was built by Maharaha Anirudh Singh or as they call in Hadoti language Rao Raja Anirudh Singh.

158. The structure is as tall as a three-storey house and built in the year 1683 AD. The main attraction of this site is its 84 pillars. It is said that a soul gets 84, 00,000 chances to take birth on planet Earth as got created the same number of species.

Figure 32: Google Earth Imagery Showing ASI Protected Wall Paintings and State Protected Inscription og Hammir

Figure 33: Google Earth Imagery Showing State Protected Rani ji KI Baori and Nearby Area

Figure 34: Google Earth Imagery Showing State Protected 84 Pillered Cenotaph and Nearby Area

Table 24: Distance of Nearest Protected Monument and Proposed Components

	Monument	Distance from CWR	Distance from Distribution Network	Distance from Transmission Main	Distance from OHSR	STP	WTP
ASI Protected	Wall paintings of Hardoti School in the Palace	1639 m	421 m	2160 m	2192 m	6.4 km	27 km
State protected	Raniji ki Baori	858 m	270 m	981 m	995 m	5.4 km	26 km
	84 Pillared Cenotaph, Devpura Bundi	917 m	917 m	1839 m	1812 m	4.1 km	25 km
	Inscription of hammir	1662 m	448 m	2198 m	2238 m	6.7 km	28 km

159. In Tranche 3 of Phase II of RUIDP works for restoration and preservation of the folloing heritage structures were conducted in Bundi town: the city gates (7nos), Nagar-Sagar Kund, Nawal Sagar lake with chattri and temple inside the lake, Nahar Dhos ki Baori, Naruki Baori and 84 Pillared Cenotaph, which includes (a) Covering of the existing drains and nallah; (b) Construction of walkways; (c) Improvement of road surfaces by paving; (d) Construction of storm water drains; (e) Repair of damaged walls; (f) Up gradation of toilet facilities; (g) Construction/Up gradation of drinking water hut; (h) construction of platforms; (i) Creating open parking spaces; and (j) Provision of benches, dustbins, lights, signages etc.

6. Fairs and Festivals

160. **Teej -** Teej is a fasting festival for Hindu women. It takes place on the third day of the Shukla Paksha of the Sawan month of the Hindu which normally falls between late July to early September. This festival is dedicated to Goddess Parvati and celebrates her return to Lord Shiva. Teej is in praise of marital bliss and the well-being of spouse and children. Falling in the Hindu month of Bhado, Teej also celebrates the arrival of the long-awaited monsoon after a brutally hot summer. The festival is a three-day celebration which includes both rigid fasting and scrumptious feasting. According to Hindu mythology, after the self-immolation of Sati, Lord Shiva became grief-stricken and went into a meditative state. It is believed, it took Sati 108 subsequent births to bring Lord Shiva out of his meditative state. Her 108th birth was in the form of Parvati. Thus, married women seek the blessings of Goddess Parvati on Teej Festival for marital bliss.

161. On Teej Festival, women observe a fast and pray through the night. In the morning, they bathe and dress in red sarees and fine jewellery to worship Goddess Parvati. The major attractions of Teej Festival are the swings that are fixed to the branches of large trees, on which the women take turns to enjoy swinging. Special songs are sung, and the women decorate their hands with henna. Married daughters are presented with sweets and clothes by their mothers. The girls engaged to be married receive gifts of henna, bangles, clothes, and sweets from the in-laws.

162. Though Teej is celebrated all through the state but in Bundi it is celebrated on the 3rd day of Bhadra whereas at the other it is celebrated on the third day of Sharavana in other places. The festival starts with the traditional procession of goddess Teej in a decorated palanquin from

the Naval Sagar. The procession has decorated elephants, camels bands artistes and cultural groups depicting the place

163. **Lohri -** Lohri marks the culmination of winter and is celebrated on the 13th day of January in the month of Paush or Magh, a day before Makar Sankranti. Lohri celebrates fertility and the spark of life. People gather around bonfires, throw sweets, puffed rice and popcorn into the flames, sing popular songs and exchange greetings.

164. On this day children go from door to door to collect funds for community bonfires which are lit up in the evening. The gatherings and celebrations make Lohri a community festival. An extremely auspicious day, Lohri marks the sun's entry into the 'Makar Rashi' (northern hemisphere). The period, beginning from 14 January lasting till 14 July, is known as Uttarayan. It is also the last day of the month of Maargazhi, the ninth month of the lunar calendar. The festival marks the winter solstice and is the day of celebrations. Astronomically after Lohri, the length of days starts increasing as the sun begins to progress northwards. The Bhagawad Gita deems it an extremely sacred and auspicious time when Lord Krishna manifests himself most tangibly.

165. The festival though connected to Punjabi roots is seen to widen its presence and is celebrated with all the joy and fervour in Rajasthan. It's a nice warm way to say goodbye to the harsh winters of North India**.**

166. **Makar Sankranti** (**The Kite flying festival**) - Makara Sankranti is one of the few ancient Indian festivals that has been observed according to solar cycles, while most festivals are set by the lunar cycle of the lunisolar (चंद्र – सौर) Hindu calendar. Being a festival that celebrates the solar cycle, it almost always falls on the same Gregorian date every year (January 14/15).

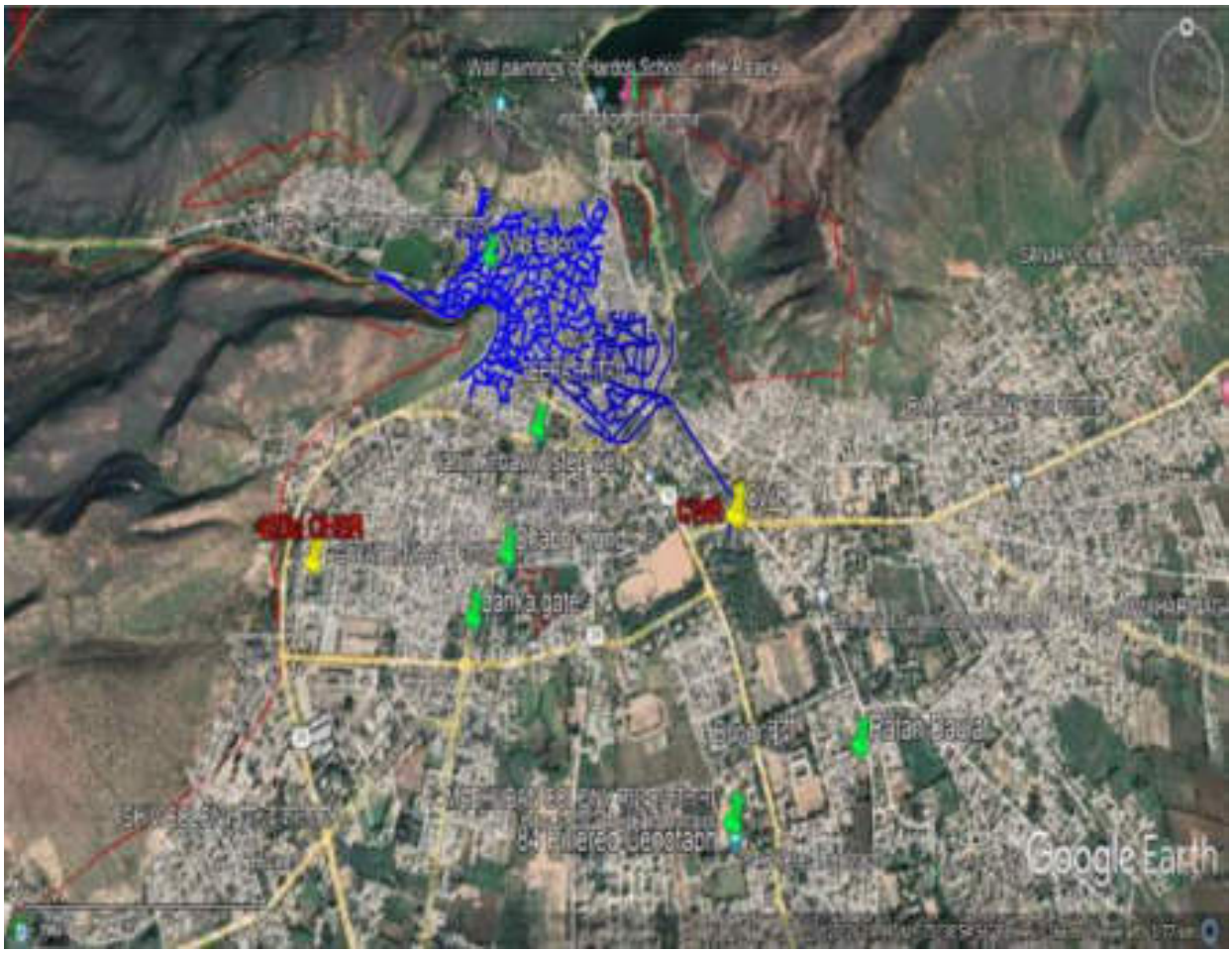
167. "Makar Sankranti" or "Sakraat" in the Rajasthani language is one of the major festivals in the state of Rajasthan. The day is celebrated with special Rajasthani delicacies and sweets such as pheeni (either with sweet milk or sugar syrup dipped), til-paati, gajak, kheer, ghevar, pakodi, puwa, and til- laddoo.

168. Especially, the women of this region observe a ritual in which they give any type of object (related to household, make-up or food) to 13 married women. The first Sankranti experienced by a married woman is of significance as she is invited by her parents and brothers to their houses with her husband for a big feast. People invite friends and relatives (especially their sisters and daughters) to their home for special festival meals (called as "Sankrant Bhoj"). People give out small gifts such as til-gud (jaggery), fruits, dry khichadi, etc. to Brahmins or the needy ones.

169. **Vasant Panchami** - Vasant Panchami is an important Indian festival celebrated every year in the month of Magh according to the Hindu calendar. Celebrated on the Fifth dag of Magh, the day falls somewhere in February or March according to the Gregorian calendar. The significance of the day lies in the worship of Goddess Saraswati, the symbol of wisdom and the onset of the spring season. According to the popular belief, the origins of this festival lie in the Aryan period. Aryans came and settled in India through Khyber Pass, crossing the Saraswati River among many others. Being a primitive civilization, most of their development took place along the banks of the Saraswati River. Thus. River Saraswati began to be associated with fertility and knowledge. It is then that the day began to be celebrated. According to mythology, After Kalidasa was married off to a beautiful princess through trickery, the princess kicked him out of her bed as she learned that he was foolish. Following this, Kalidasa went to commit suicide,

upon which Saraswati emerged from the waters and asked him to take a dip there. After taking a dip in the holy waters, Kalidasa became knowledgeable and began writing poetry. Thus, Vasant Panchami is celebrated to venerate Goddess Saraswati, the goddess of education and learning. In today's times. The festival is celebrated by farmers as the on-coming of the spring season. The day is largely celebrated in northern parts of India. Here, people offer food to the Brahmins and organize rituals in the name of Goddess Saraswati. The colour yellow is the predominant colour associated with the festival, the origins of which are supposed to be the fields of mustard which can be seen in Punjab and Haryana during this period. Kite Flying is also commonly associated with this Festival. Children, as well as adults, fly kites on this day to celebrate freedom and enjoyment. Another tradition associated with this day is that of initiating studies in the young. Young children often begin learning on this day, which is believed to be the reason why the school sessions start in March. Sweets with a yellow hue are also distributed on this day and people can also be seen donating books and other literary material to the poor.

Figure 35: Google Earth imagery Showing Important Tourism Places (Green) and Proposed Components (Yellow) in Bundi



E. Environmental Settings of Investment Program Component Sites

170. The subprojects include laying of Water Supply and Sewerage pipes and construction of structures in the municipal area of Bundi Pipes for water supply and sewerage will be laid along the roads/streets in the town within the road right of way (ROW). In wider roads pipes will be laid in the road shoulder beside the tarmac, and in narrow roads, where there is no space, pipes will be laid in the road carriage way by break opening the tarmac/CC. Roads in some part of the town are narrow. Roads are lined both sides with open drains. In narrow roads pipes will be laid in the middle of the road, which may affect the traffic. Bigger diameter strategic water mains 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 pipelines in these roads.

171. For construction of WTP, Pumping Station and Clear water reservoir sufficient vacant Govt. land is available under jurisdiction of PHED department There are about four numbers of trees of various species and ages present at this land.

172. Site environmental features of all subproject sites and photographs are presented in the following **Table 25.** Photographs of Proposed Component Locations and Existing components are given in **Appendix 5** of this report.

Table 25: Environmental Features of Project sites

S. No	Subproject component	Environmental Features of the Site	Photographs
1.	Water Treatment Plant (WTP- 8 MLD)	The Proposed site for new WTP is located at existing 26 MLD WTP campus at Jhakmud in the Southeast of the town. Area available area for construction of new WTP at site is 10,000 sq. m, of which 4,000 sq. m will be utilized for new WTP. Site is owned by PHED Bundi. No habitations exist within 500 meters of the proposed project site. Site is predominantly flat, vacant, and sparsely covered with few local trees, shrubs and bushes. There are four trees 1-Sisam (*Dalbergia sissoo*), 1-Neem (*Azadirachta indica*), and 2-Safeda (Eucalyptus sp.) species in the site. Site is connected through single Gravels Road and its surrounded by agriculture fields. No wild fauna is reported on site. The site is located at Southeast of Bundi town, in village Jakhmund, the Nearest forest blocks is at distance of 960 m from site. WTP site is 26 km away from nearest protected monuments.	 1. Location of New proposed WTP. Latitude: 25°13’55.05”N Longitude:- 75°46’13.08”E

S. No	Subproject component	Environmental Features of the Site	Photographs
2.	Clear Water Reservoir (CWR) 1200 kl	Replacement of CWR of 1200 KL at Nainwa road Proposed site is in PHED Campus at Northwest side of town. There are Few PHED Staff quarters & Old Bawadi within 100 meters from the proposed project site. 3 Nos of Trees of local species exist at site. Due to alignment change of CWR in same campus. Cutting of one Neem tree (*Azadirachta indica)* was required. And same has been done after getting the approval of concerned authority. New plantation will be done as per the approval in the ratio of 1:3 (Appendix:12) Road connectivity of the proposed CWR at Bundi town via single lane Bituminous Road. Surrounding Land area mostly used in habitation purpose in area. No wild fauna is reported on site The existing CWR will be dismantled and replaced with new CWR. Area Available: - 1500 (Sqm) Area Required: - 900 (Sqm)	 2.Locations of CWR 1200 KL Latitude: 25°46'03.52"N Longitude:- 75°51'37.42"E
3	Replacement of 1193 m clear water transmission line and distribution network of about 30.884 km in 05 Zones will be covered in subproject.	Transmission mains and distribution lines will be mostly laid along the main roads and wider roads in the town. Pipes will be laid underground along the roads/streets in the towns within the existing road's Right of Way (ROW). In wider roads pipes will be laid in the road shoulder, and in narrow roads, where there is no space, pipes will be laid in the road carriage way. Water pipes will be laid mostly in the edge of the road. Roads in the old part of the town are quite narrow (~3m), and in the rest of the town roads are wider. Roads are lined with open drains. There are no trees along the roads, except in some new colonies in the outer areas. Nearest protected monument is Raniji Ki Bawari about 850 m from alignment and about 2 km from nearest wildlife sanctuary Ramgarh Vishdhari Sanctuary. Common property resources such as community-owned facilities, hospitals, schools, religious places, public utilities	 3. Location of Ground Level Service Reservoir (GLSR0  

S. No	Subproject component	Environmental Features of the Site	Photographs
		and Commercial establishments are abutting most of the main roads in the town.	4-Locations of Transmission & Distribution Networks
4.	450 KL OHSR, Vikas Nagar Housing Board	Replace of OHSR at Housing board, Vikas Nagar, site is owned by PHED. Proposed site is owned by PHED, having existing OHSR. Site is mostly flat connected with city Bituminous Road. Surrounding Land area mostly used in habituated. The existing OHSR will be dismantled and replaced with new CWR.	 5. Location of proposed 450 KL OHSR.
5	6.5 MLD Sewerage Treatment Plant (STP) at Ramganj, Balaji	The proposed site for new STP is located at existing STP campus at Ramgunj Balaji in the Southeast of the town, total available area of the WTP is 15,000 sq. m, of which 6,000 sq. m will be utilized for new STP. Site is owned by PHED Bundi. Nearest habitation of Belle Exotic Farmhouse is 1.4 km far from the proposed STP site on North-East direction. Site is predominantly flat. Site is presently vacant, and sparsely covered with few local trees, shrubs and bushes. Site is surrounded by Ramgunj Forest block and connected with Black top road The site is located in Southeast direction from Bundi town, nearest protected monument is (Raniji Ki Bawari (step well) located at about 6.9 km in north direction to site	 6.Location of proposed STP(6.5 mld) Latitude: 25°39’28.7”N Longitude:- 75°65’52.8”E 7.Location of existing STP (8.0 mld)

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Introduction

173. 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.

174. 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/throughout, waste production, discharge specifications, pollution sources and ancillary services.
(iii) **Pre-construction impacts** include impacts which are anticipated during construction works but planning are required for proposed mitigation measures before start of construction works i.e. during SIP period such as taking consents from various departments, planning for construction and workers camps, deployment of safety officer, arrangement of required barricades and caution boards etc.
(iv) **Construction impacts** include impacts caused by site clearing, earthworks, machinery, vehicles and workers. Construction site impacts include erosion, dust, noise, traffic congestion and waste production.
(v) **O&M impacts** include impacts arising from the operation and maintenance activities of the infrastructure facility. These include routine management of operational waste streams, and occupational health and safety issues.

175. 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).

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

177. In the case of this project (i) most of the individual elements are relatively small and involve straight forward construction and operation, so impacts will be mainly localized and not greatly significant; (ii) most of the predicted impacts are associated with the construction process, and are produced because that process is invasive, involving excavation and earth movements; and (iii) being located in an urban area, will not cause direct impact on biodiversity values. The project will be in properties held by the government departments and access to the

project location is through public right-of-way and existing roads hence, land acquisition and encroachment on private property will not occur.

B. Pre-Construction Impacts– Design and Location

1. Location Impacts

178. **Location impacts of Proposed WTP (8 MLD)-** Construction of WTP (8 MLD) is proposed on the government land from where existing WTP of the capacity of (24 MLD) which belongs to PHED. Land is vacant and there are four trees 1-Sisam (*Dalbergia sissoo*), 1-Neem (*Azadirachta indica*), and 2-Safeda (Eucalyptus sp.) present at site, no tree will be impacted for proposed WTP components. During design phase efforts will be required to save the trees as much as possible. In unavoidable conditions, if trees are needed to be cut, prior approval from concerned authorities is required for required tree cutting activities and compensatory plantations in the ratio of 1:3 should be done as per RUDISCO Policy.

179. There is one existing WTP of 24 MLD of PHED at proposed site; no habitation and wild fauna exist within 500 meters of the proposed project site therefore no other impacts will be envisaged.

180. **Location impacts of Intake wells at Kota Barrage-** No civil works are proposed in existing intake well only installation of new submersible VT pumps for additional 8 MLD capacity of water intake.

181. **Locations impacts of CWR.** One CWR of 1200 KL is proposed at Nainwa Road near post office there are PHED staff quarters within 200 meters from the proposed project site & One Bawadi located near within 100 meters. There are about two numbers of trees present at site of local species, cutting of these trees will not be required for construction works. The existing CWR which need to be demolished for site clearance. Measures should be taken for safety during demolitions works and safe disposal of demolished muck.

182. **Location impacts of Transmission System, Rising Main and Distribution Networks-** No new raw water is proposed in subproject. Only replacement of 1193 m clear water transmission line and replacement of distribution network of about 30.884 Kms in 05 Zones will be covered in subproject. No forest land being affected due to proposed pipeline works and no trees being affected.

183. Therefore, no significant impacts shall be envisaged regarding location; though some temporary disturbances are expected, and mitigation measures will be required to minimize these impacts. These works will require advance permission from concerned departments such as ULB, PWD and PHED etc. for road cutting and traffic diversion etc. If any tree cutting will be required during execution mitigation measures shall be adopted.

184. **Tree cutting at project sites.** As per the pre-construction environmental site visit there were four numbers of trees i.e 1. Sisam (*Dalbergia sissoo*) 1. Neem *(Azadirachta indica*) & 2 Safeda (*Eucalyptus sp.) identified in proposed WTP location.* But after the final approval of design & drawings no impact has occurred on existing trees and no tree cutting is required at WTP site. There is no tree impacted in pump house, and OHSR sites. Water pipelines will be laid along the road within the Right of the way (ROW) therefore no tree cutting is required on these sites.; Due to change in alignment of CWR (1200 KL) in the same campus premises one number of Neem (*Azadirachta indica*) tree identified which was impacted and found necessary

to cut down. Now tree has been cut after getting the approval of concerned authority (**Appendix :12**). and new plantation will be done as per the conditions of approval/ RUDISCO policy. The following measures need to be implemented to minimize and/or compensate for the loss of tree cover.

(i) Minimize removal of trees by adopting to site condition and with appropriate layout design of WTP, CWR or any other site with trees;
(ii) Obtain prior permission for tree cutting at any site that may require tree cutting finalized during detailed design; and
(iii) Plant and maintain 3 trees for each tree that is removed.

185. **Location Impacts of Sewage Treatment Plants.** STP (6.5 MLD) is proposed near Existing STP Village Ramganj Balaji, on vacant government land under Municipal Council. The site is surrounded by Ramgunj forest block. There are only agricultural activities in the periphery of this site. There are no habitations within 500 m of the proposed site. No wildlife is reported in this area. There are agricultural activities around this site and treated effluent and sludge from STP can be utilized in these agricultural practices.

186. **Physical Cultural Resources.** There are notable and significant archaeological places, protected monuments and areas in Bundi Town, but subproject components are located at sufficient distance from these protected monuments. Therefore, no impacts envisaged but risk of uncovering archaeological remains, given the long history of town, during the excavations cannot be ruled out completely. Construction contractors therefore should follow the below measures in conducting any excavation work:

(i) develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognized and measures are taken to ensure they are protected and conserved. This should involve:
(ii) Conduct awareness training to contractor & supervision staff prior to start of excavation;
(iii) Stopping work immediately to allow further investigation if any finds are suspected;
(iv) Calling in the ASI/state archeological department if a find is suspected, and taking any action they require to ensure its removal or protection in situ

187. **Odour Nuisance from STPs.** As presented in the baseline profile, the proposed STP sites are identified away from habitation, and sites are currently vacant, and do not have any notable sensitive environmental features. STP sites are located away from the habitation. The proposed treatment technology, SBR, being an aerobic process and conducted in a compacted and a closed system with automated operation, odor nuisance will be very minimal. Limited bad odors may be generated from wet well, primary treatment units and sludge treatment. Also, to account for future development potential around the sites, and to enhance the environmental benefits following measures should be included in the STP site planning and design:

(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 barrier, 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 odor generating units (such as sludge/ solids handling facilities) are located away from the surrounding area with future development potential.

188. **Reuse/discharge of treated effluent.** It is proposed to reuse the treated effluent for irrigation in agriculture, horticulture, development of urban forestry etc. Provision for ground water reservoir and elevated reservoir is made in the contract for the ease of getting required head for reuse in nearby agricultural activities. Although priority is given to reuse of treated wastewater for beneficial purposes following the Sewerage and Wastewater Policy of Government of Rajasthan, discharge point is necessary to provide for excess/surplus or when it is not reused. Therefore, it is proposed for construction of treated effluent storage ponds in both STPs for storage of treated effluent, when it is not being used.

2. Design Impacts

189. **Design of the Proposed Components.** The Central Public Health and Environmental Engineering Organization (CPHEEO) manual suggests a design period of 15/30 years[2] in general while designing the systems for water supply and sewerage components. It is proposed to consider 2055 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. Technical design of all the elements of water supply (intake, WTP, reservoirs, pumping, transmission and distribution system etc.), follows the relevant national planning and design guidelines. 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 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 optimize the water use;
(iv) Designing the entire system to maintain optimal flow and terminal pressure, and optimizing the overall energy usage;
(v) Avoiding usage of asbestos containing materials;
(vi) Reducing the incidence of water borne diseases by providing 100% population including urban poor with potable water supplies;
(vii) Provision of appropriate personal protection equipment to the workers and staff.

190. **Design of Sewage Treatment Plant.** One STPs of capacities 6.5 MLD proposed to be constructed at the identified sites to treat the sewage generated from Bundi Town. It is proposed to establish STP based on SBR (sequential batch reactor) process, followed by disinfection by chlorine with co-treatment of fecal. As the bid is DBO type, detailed design of the STP will be carried out by the contractor to the following specific discharge standards. Currently for STPs in India, the standards notified by Ministry of Environment, Forests and Climate Change (MOEFCC) in 2017 are applicable. However, under RSTDSP, PMU has decided to base the STP design on discharge standards for STPs suggested by the National Green Tribunal (NGT) in one of its orders directed MOEFCC in April 2019, which are more stringent. The strident standards also facilitate maximum utilization of treated wastewater for reuse in various purposes following the Sewerage and Wastewater Policy, 2016 of Rajasthan.[3]

[2] As per CPHEEO, pumps, motors, STP, storage reservoirs are to be designed for a life of 15 years.
[3] "The use of treated wastewater in irrigation and industrial application shall be given the highest priority and shall be pursued with care. Effluent quality standards shall be defined based on the best attainable treatment technologies, and calibrated to support or improve ambient receiving conditions, and to meet public health standards for end users".

Table 26: Proposed Raw and Treated Wastewater Characteristics for STP Design

S. No	Parameter	Proposed Discharge Standards for Bundi STPs	MOEFCC STP Discharge Standards, 2017	CPCB discharge standards, 2015	IFC Guideline value for sewage discharge	WHO Guideline Value for safe use in agriculture
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	pH	6.5 – 9.0	6 – 9	6.0-9.0	6 – 9	6 – 9
2	BOD5, mg/l	≤10	<30	≤10	30	-
3	COD, mg/l	≤50		≤50	125	-
4	TSS, mg/l	≤10	<100	≤10	50	-
5	NH4-N, mg/l	<5	-	≤5	-	
6	Total nitrogen, mg/l	<10	-	≤10	10	-
7	Oil & grease, mg/l	-	-	-	10	-
8	Total phosphorus, mg/l	<2	-	-	2	-
9	Faecal Coliform,	<100	<1000	≤100	-	<1,000
10	Nematodes, number of eggs per litre	-	-	-	-	1

191. **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, especially the poor and under privileged, through the provision of sustainable sanitation services and protection of environment". To further promote the reuse and provide guidance, Policy prioritized reuse in irrigation (agriculture, forestry, and landscaping), followed by fish farming, industry and non-potable domestic reuse. Policy requires monitoring of treated wastewater quality, soil quality etc. Policy prohibits artificial recharge of aquifers using treated wastewater and promotes construction of storage tanks to store treated wastewater to facilitate reuse. Policy prescribes that the detailed project report (DPR) should clearly define the best reuse option specific to the town and prepare a Reuse Action Plan part of the DPR following water quality norms and legal implications. LSGD is currently in the process of publishing Guidelines for Reuse of Treated Wastewater in Rajasthan 2019 to promote the reuse and provide guidance to the stakeholders. Guidelines promotes the use the treated wastewater and envisages to maximize the collection and treatment of sewage generated and reuse of treated wastewater on a sustainable basis, thereby reducing dependency on freshwater resources.

192. 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 C-9).**

193. **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; and
(xii) Individual users.

194. **Allocation of treated wastewater for reuse**. The City Level Committee (CLC) headed by the district collector will allocate the water for most appropriate uses. According to the proposed procedure, agencies/individuals that require treated wastewater shall apply to the district collector. CLC will allocate water to users. In case of supply is more than the demand of the town, the treated wastewater can be allocated to users within 25 km of STP by the CLC. It may also be made mandatory to industries to use treated wastewater under certain conditions. A Memorandum of understanding between ULB and the users of the treated water is available.

195. **Reuse Plan**. The State Policy requires the sewerage detailed project report provide reuse options and strategy to implement reuse, and detailed reuse action plan. As the Bundi 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 Bundi, and reuse modalities will be firmed up. Following needs to be considered in the preparation of reuse plan:

(i) As part of the plan, identify potential reuse application in Bundi, 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 Bundi, 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); and
(v) Carryout regular/online monitoring of critical quality parameters of treated wastewater to ensure that they meet the present standards established for reuse.

196. **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 enters the sewers. If the wastewater with bacteriological contaminants is used for food crops like lettuce, tomato, which are eaten without peeling or cooking, it will present a greater health risk if precaution such as such washing with chlorinated water or storing for adequate time in normal temperature before use (at least 10 days). According to the WHO, effluent which is used to irrigate trees, industrial/commercial (not food, like cotton) and fodder crops, fruit trees, and pasture should have less than one viable nematode egg per liter. Effluent used for the irrigation of food crops, sports fields, public parks, should have and less than one viable nematode egg per liter and less than 1,000 fecal coliforms per 100 milliliters (ml). These shall be considered in the reuse plan that will be prepared during the detailed design and complied accordingly.

197. **Disposal of treated wastewater.** As the wastewater shall be treated to stringent disposal standards, no notable impacts envisaged. The disposal of treated wastewater meeting the set quality standards, in fact, will improve the quality of water by dilution. Proper systems should be put in place at the proposed STP to ensure that treated wastewater always meet the stipulated standards prior to its disposal into river. Baseline water quality monitoring of the discharge point should be conducted during the detailed design phase (monsoon flow). The discharge point for treated effluent of STP is a natural depression located near STP site owned by ULB, treated effluent will be discharged into a drain which is adjoining to the proposed location of STP and it having approximate distance of 50 meter. In the surrounding of proposed STP location. 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. O&M of STP and change in incoming sewage quality will have impact on the treatment efficiency. This therefore requires to:

(i) Obtain of consent of RSPCB for discharge of treated wastewater into water body;
(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; and
(iv) Monitor water quality periodically during operation phase as per the EMP.

198. **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 contain heavy metals, which will then leach into the sludge. Sludge thickener with mechanical dewatering system after that sludge will go to sludge drying beds from where after drying sludge may use for construction material in form of bricks, blocks etc. or as a manure as decided by Local body. SBR Process is aerobic treatment therefore, there will be negligible odour.

199. 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". Other solid waste materials from sludge treatment should be covered by an environmentally compliant disposal management plan. Disposal to vacant lot (even if government land) should not be allowed.

200. 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.

201. Contractor will propose the sludge management plan with best methods for reuse of sludge as per guidelines of CPHEEO (guidelines are attached as **Appendix C-10**) 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 27 Standards for Sludge Reuse as Manure

S**tandards 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/kg	5	5
Chromium	mg/kg	50	50
Copper	mg/kg	300	300
Lead	mg/kg	100	100
Mercury	mg/kg	0.15	0.15
Nickel	mg/kg	50	50
Zinc	mg/kg	1000	1000
C/N ratio	-	<20	<20:1
pH	-	6.5 – 7.5	(1:5 solution) maximum 6.7
Moisture, percent by weight, maximum		15.0 – 25.0	25.0
Bulk density	g/cm3	<1	Less than 1.6
Total Organic Carbon, per cent by weight, minimum	percent by weight	12	7.9

S**tandards 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)**
Total Nitrogen (as N), per cent by weight, minimum	percent by weight	0.8	0.4
Total Phosphate (as P205) percent by weight, minimum	percent by weight	0.4	10.4
Total Potassium (as K20), percent by weight, minimum	percent by weight	0.4	-
Colour			
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			

202. To ensure the safe use of dried sludge, following should be followed:

(i) Prepare a dried Sludge utilization plan for Bundi within 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 include various potential uses and demand in town and surroundings;

(iii) Establish usage limits, where required, (geographical/crops/type of application /type of soils etc.); adopt international good practice suggested by agencies like World Health Organization (WHO), Food and Agricultural Organization (FAO) of the United Nations;

(iv) Identify a landfill/suitable site for disposal of surplus dried sludge;

(v) Monitor sludge quality during operation phase as per the EMP, ensure that it meets the quality parameters established by FCO; and

(vi) In case of sludge not meeting the quality parameters, it shall not be used as soil condition, and shall be disposed at appropriate disposal site (if it falls under hazardous category, it shall be disposed as per the Hazardous Waste Management Rules, 2016).

203. **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 industries are in Bundi. 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

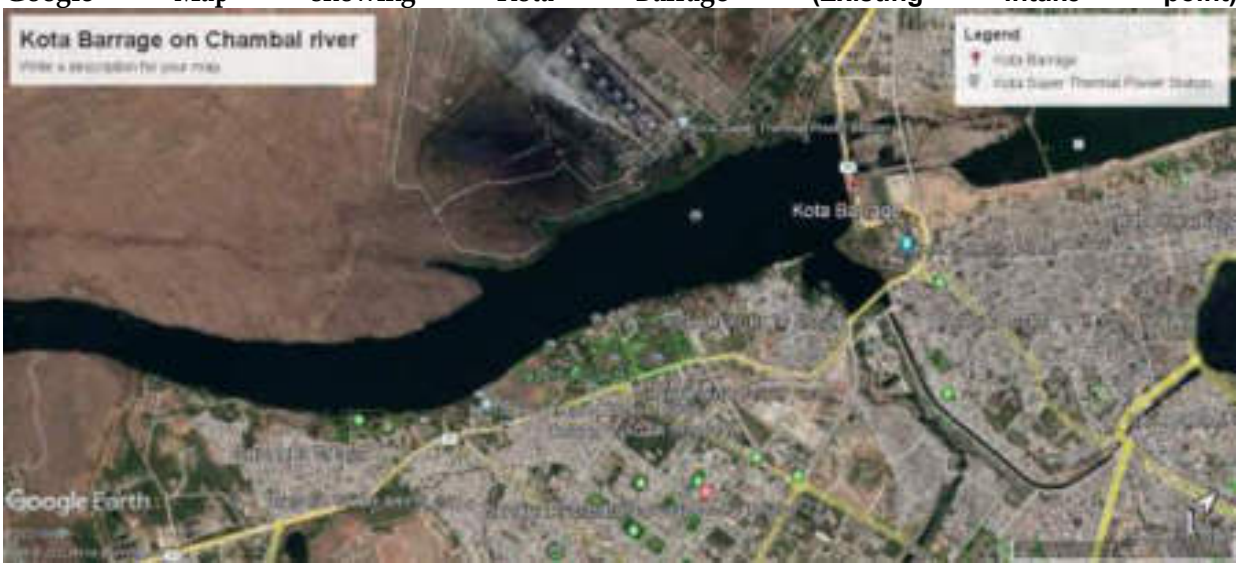
204. **Design of Water supply components**. Technical design of the water supply components (i) Intake well, (ii) water treatment plants; (iii) raw water and clear water transmissions mains (iv) overhead tanks, and (v) distribution network, connections, flow meters, etc., follows the relevant national planning and design guidelines, focusing on providing a robust system which is easy to operate, sustainable, efficient and economically viable. Besides, the project also included the following environmental considerations:

(i) Discontinuation of current unsustainable groundwater wells, creating a new comprehensive water supply system based on a nearest surface water sources. Ground water only in case of repair and maintenance of surface water infrastructure and lean season of water;
(ii) To the maximum extent possible nearest surface water source is adopted;
(iii) Appropriate location of intake to ensure water availability throughout the year;
(iv) Recovering backwash water from treatment process;
(v) Treatment and disposal management of sludge from treatment process;
(vi) Minimizing water losses from pipelines by perfect jointing and alignments;
(vii) Using appropriate techniques (HDPE pipes up to 150 mm dia joined by electro fusion couplers using on-site electro fusion welding, and all higher dia pipes by on site butt welding);
(viii) Designing the entire system to maintain optimal flow and terminal pressure, and optimizing the overall energy usage;
(ix) Reducing the incidence of water borne diseases by providing 100% population including urban poor with potable water supplies;
(x) Improve water use efficiency and reduce water wastage at household level by recording and monitoring the water usage, and charging the consumers as per usage; due consideration to urban poor;
(xi) Minimize unaccounted for water (UFW) losses using district metered area approach with flow meter and pressure logging arrangements to identify and rectify the leaks, and unauthorized connections; and
(xii) Using low-noise and energy efficient pumping systems.

205. **Sustainability and environmental considerations**. The proposed source of water at Bundi town is mainly Kota Barrage in the Kota City. Kota barrage is the fourth construction in the Chambal Valley Project over River Chambal, perineal river of Rajasthan. It was built to

store the waters stored by the three upstream dams of the project Gandhi Sagar Dam, Jawahar Sagar Dam and Rana Pratap Sagar Dam, and then channelize it to the dry areas of Rajasthan and Madhya Pradesh for irrigation purposes via canals. The total storage capacity of barrage is 112.06 MCUM while dead storage capacity is 42.23 MCUM and live storage is 69.83 MCUM. Out of total live storage 18 MCUM is reserved for Bundi water supply subproject which is about 16.6 % of total storage available in barrage.

Google Map showing Kota Barrage (Existing Intake point)



(Latitude: -25°10'32.71" N & Longitude: -75°49'38.42" E)

206. The Kota barrage is located across the Chambal River. The catchment area of Kota Barrage is intercepted by Gandhi Sagar, Rana Pratap Sagar and Jawahar Sagar Dam Projects respectively. Details of daily average level and discharge of Chambal Complex Dams for a period of 10 years from 2007-08 to 2017-18 is obtained from Superintending Engineer (SE) Irrigation Department, Kota Barrage, which depicts daily level, spillage. The Average daily water level at Kota Barrage is 853.52 while maximum water level was 854.90 during the last 10 years. Further there are 3 dams in the upper catchment of Kota Barrage which keep on adding water to Kota Barrage. Since storage capacity is more than 5 times the annual water demand of Bundi town. Also, during the dry summer months, the drawl would be less than compared to the water storage available. It is evident that the Kota Barrage is full to its crest level at the end of monsoon season (September), which gradually reduced to its minimum in summer and up to the arrival of monsoon flows in June-July. Based on above data analysis, it's come that the proposed water source "Kota Barrage" is sustainable and required quantity for supply from Kota Barrage will be continue without any fluctuation. Detailed Sustainability report of Kota Barrage is attached in Appendix 9

207. **Design of Water Treatment Plant**. An additional 8 MLD WTP is proposed to be constructed near existing WTP at Jhakmund WTP Campus to treat the raw water abstracted from the barrage to meet the drinking water standards for potable water supply in the Town. Since the package is proposed under DBO contract, the DBO contractor will design the WTP during the detailed design phase following the guidelines/requirements/standards prescribed in the bid documents. Water treatment process will generate wastewater from filter backwash activity and sludge from sedimentation of particulate matter in raw water, flocculated and precipitated material resulting from chemical coagulation, residuals of excess chemical dosage,

plankton etc., and waste from rinsing and back washing of filter media containing debris, chemical precipitates, straining of organic debris and plankton. Bid documents include various provisions in design of WTP to collect and dispose the wastewater and sludge generated in the treatment process, and the DBO contractor will design the WTP accordingly. As it is a DBO contract, the process of wastewater recovery and sludge system given is indicative only at this stage, the actual system will be designed by the DBO contractor during the detailed design with the following bid provisions:

(i) Backwash water reuse system and sludge recovery and disposal system;
(ii) Backwash recycling components: Filter backwash holding tank, recovered water storage tank and pumping for recycling;
(iii) Discontinuation of current unsustainable groundwater wells and keeping only sustainable wells and creating a new comprehensive water supply system based on a nearest surface water sources.
(iv) To the maximum extent possible nearest surface water source is adopted;
(v) Appropriate location of intake to ensure water availability throughout the year
(vi) Treatment and disposal management of sludge from treatment process;
(vii) Minimizing water losses from pipelines by perfect jointing and alignments
(viii) using appropriate techniques (HDPE pipes up to 150 mm dia joined by electro fusion couplers using on-site electro fusion welding, and all higher dia pipes by on site butt welding);
(ix) Designing the entire system to maintain optimal flow and terminal pressure, and optimizing the overall energy usage;
(x) Reducing the incidence of water borne diseases by providing 100% population including urban poor with potable water supplies;
(xi) Improve water use efficiency and reduce water wastage at household level by recording and monitoring the water usage, and charging the consumers as per usage; due consideration to urban poor;
(xii) Minimize unaccounted for water (UFW) losses using district metered area approach with flow meter and pressure logging arrangements to identify and rectify the leaks, and unauthorized connections; and
(xiii) Using low-noise and energy efficient pumping systems

208. **Selection of pipe materials for Water Supply system:** The pipe material designed 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 AC pipes, CC, DI and HDPE. AC pipes were not adopted due to carcinogenic risks and CC pipes were not considered due to profuse leakages and heavy in handling. Therefore, DI pipes were considered for transmission and HDPE pipes were considered for distribution networks.

C. Environmental Audit of Existing Infrastructure

209. It is designed to utilize existing water supply infrastructure like WTP, STP, clear water reservoirs, pump houses etc. with necessary improvements. As per the ADB SPS 2009, these are associated facilities and therefore the component operation shall comply with **the** ADB and applicable environmental laws of India. Besides, ADB SPS lays emphasis on impacts and risks

on biodiversity and natural resources, pollution prevention abatement including hazardous waste, occupational health and safety, community health and safety, and physical cultural resources. A random environmental audit is conducted to (i) assess the compliance of the existing infrastructure with environmental legislations and (ii) improve environmental performance to minimize future potential liabilities A more detailed environmental audit and risk assessment is in process and will incorporated into the further IEE updating.

210. All the existing infrastructure facilities are in urban areas within Bundi Town. All these components are located away from state or centrally protected environmental or archeologically sensitive areas and monuments such as forests, wildlife sanctuaries or protected historical sites. But there are significant historical and environmental sensitive sites in area in surroundings. Mitigation measures are designed to mitigate any negative impact of subproject around these areas. The designed project will optimally utilize the surface water sources and only allotted water will be used for subproject. Required permission and clearances as discussed in above sections will be taken before start of construction in specific section. The presence of Asbestos Containing Material (ACM) in the form of asbestos cement pipes in the existing water supply infrastructure is a cause of concern due to its potentially hazardous nature. Subproject, however, do not include rehabilitation or repair of AC pipes, AC pipes will be left underground without disturbance and new pipeline will be laid and used in future, discontinuing the use of existing AC pipes in system. Besides, the generation and disposal of debris and discarded materials, and construction phase health and safety need to be considered and mitigated to comply with the SPS provisions.

211. Intake is already constructed in the Chambal river bank, no reservoir is to be constructed, only a new WTP will be constructed. Environmental audit of Existing WTP is done. Environmental audit of existing intake well will be undertaken and will be updated in next version of IEE.

212. Two STPs each 0.50 MLD under AMRUT are separate from the proposed subproject components and will cater only zone 8&9, other 8 MLD STP is associated with proposed subproject. The following Table 28 provides component wise compliances and concerns. Corrective actions for the identified environmental concerns are discussed in the following section.

Table 28: Details of Water Supply & Sewerage Components

Infrastructure	Details	Designed Rehabilitation	Compliance with environmental regulatory framework	Environmental Concerns
Water Supply Component				
26 MLD WTP	Existing WTP of capacity 26 MLD at Jakhmund	No Change in existing WTP A new WTP is proposed within the campus.	Consent to establish under water and air act before start of construction and Consent to operated. before start of operation is required under	During the environmental audit of the existing 26 MLD WTP, it was observed that the operating agency, PHED, had not obtained the Consent to Operate (CTO). Consequently, the process of obtaining the CTO has been initiated and CTO will be applied soon. Backwash wastewater from the

Infrastructure	Details	Designed Rehabilitation	Compliance with environmental regulatory framework	Environmental Concerns
			Air and water act. Back wash and sludge management	process is recovered and recirculated in the WTP, no wastewater will be generated from water treatment process. Sludge from WTP is dewatered and used in filling up of low laying area within campus.
2 Pumping stations	• Mangli HW • Nainwa Road	• Replacement of pumps, motors replacement of pipes, connections, electrical and mechanicals parts as required	No requirements under existing laws	Presence of AC pipes in existing connections Spillage of oils, lubricants etc., Occupational health and safety, public safety during the construction works. Disposal of discarded material, waste oils, mechanical and electrical parts, debris including AC pipes.
Transmission and distribution	Treated water transmission mains of 70.14 kms of DI K-9 is already laid in town from WTP to Mangli Head works to various OHSRs located in the city. Dia of existing lines are from 100 mm to 600 mm. Distribution lines of about 250km	• Replacement; new pipes will be laid in the place of existing pipes Pipes will be left as it is in the ground, no rehabilitation / removal proposed	No requirements under existing laws	The ACM management plan has been prepared by ACM expert and detailed ACM management plan is appended as **Appendix -14** Accidental disturbance / need to remove in narrow roads. Occupational health and safety, public safety during trenching.
Sewerage Component				

Infrastructure	Details	Designed Rehabilitation	Compliance with environmental regulatory framework	Environmental Concerns
STP 8 MLD	Existing STP of capacity 8 MLD at Jakhmund	No Change in existing 8 MLD STP A new STP is proposed within the same campus	8 MLD STP based on SBR treatment process (Constructed under RUIDP, Phase-II and under operation): Consent to Operate is valid from 01.04.2023 to 31.03.2028 Ramganj 8 MLD STP	Occupational health and safety, public safety during the construction works. The existing 08 MLD STP has valid CTO and the validity of CTO from 01.04.2023 to 31.03.2028.

213. **Corrective Measures**: The consents from RSPCB are not available for existing WTP and needs to be obtained by PHED. The environmental concerns are mainly related to occupational health and safety, public safety, disposal of debris, discarded materials etc. A work specific environmental management plan needs to be prepared for these aspects. ACM Management Plan has been prepared.

214. The exact nature of rehabilitation and repair works will be known only during the detailed design phase as the detailed technical audit will be conducted by the DBO contractor and the required rehabilitation and repair measures will be designed accordingly. Therefore, a separate EMP will be prepared for rehabilitation works during the detailed design phase by the DBO contractor, and reviewed and approved by PMU/consultants, and the same will be implemented by the DBO contractor. These are included in the EMP. Appendix 6 and 7 provides details of environmental audit report for existing WTP and STP.

215. **Asbestos Containing Materials (ACM) Management.** No ACM is proposed to be used in the subproject construction. There are however ACM in the existing water supply infrastructure, which may be disturbed or encounter the workers and general public and may have serious health implications. This is already discussed in under the existing facilities audit, and necessary measures are suggested.

216. Existing water distribution network is mostly of asbestos cement (AC) pipes. As per PHED information about 30.6 km of AC pipes of dia 100 mm and 150 mm is present in existing 250.1 km of total distribution networks in Bundi. There is requirement of placing new pipelines to replace the old AC pipes, the existing AC pipes shall be made abandoned and left in situ and new pipelines shall be laid parallel to it, Therefore it will not attract specific mitigation measures for demolition, handling, transportation and disposal. The Detail report of ACM management plant has been prepared and submitted by the ACM Expert **(Annexure:-14)** Given the dangerous nature of this material for both workers and citizens, additional measure should be taken to protect the health of all parties in the event (however unlikely) that AC pipes are encountered. This is that, prior to start of construction works of water supply system, contractor

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 ADB for "protecting workplaces and communities from asbestos exposure risks (Good Practice Guidance for the Management and Control of Asbestos: Protecting Workplaces and Communities from Asbestos Exposure Risks[4] (March 2022)), United States Environmental Protection Agency (USEPA), and amongst other things, should involve:

(i) Contractor is required to develop AC management plan and protocol and submit in PIU and strictly follow during implementation of the project;
(ii) Training of all personnel (including manual labourers) to enable them to understand the dangers of AC pipes and to be able to recognize them in-situ;
(iii) Reporting procedures to inform PIU immediately if AC pipes are encountered.
(iv) 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 as a distance; (b) usage of appropriate breathing apparatus and protective equipment by persons delegated to deal with the AC material
(v) Procedures for the safe removal and long-term disposal of all asbestos-containing material encountered

217. Bureau of Indian Standards (BIS) Guidelines for Safe Use of Products containing asbestos states that “asbestos cement products (such as asbestos cement pipes) generally contain about 10-15% asbestos fibers in a cement mix 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 Convention,[5] asbestos or asbestos waste in the form of dust and fibres is classified as hazardous waste.

218. Working with or handling asbestos cement pipes in manner that produces dust, fibers, air borne particles etc., is very harmful and hazardous to the workers and public around the work sites. The condition of existing underground asbestos cement 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.

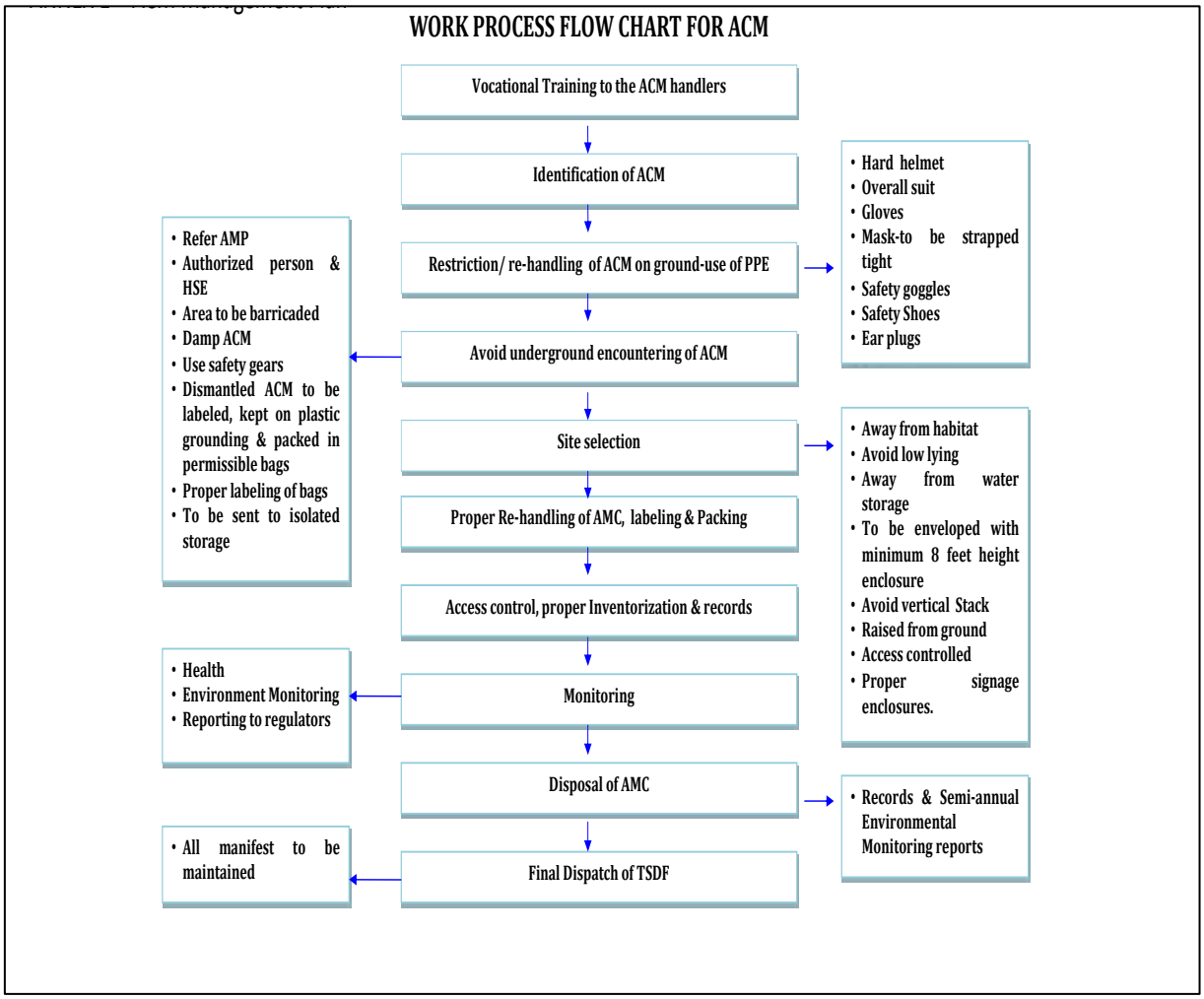
219. As per above discussions, it is therefore obvious that specific measures are necessary to safeguard the health and safety of the project workers and nearby communities; consistent with the requirements of the ADB SPS, 2009. Activities such as clearing, transfer and disposal of asbestos cement pipes, work in narrow streets, and interventions in existing asbestos cement 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

[4] https://www.adb.org/publications/good-practice-management-control-asbestos
[5] Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, adopted in 1989.

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 C-20**. Adhere to the workflow process suggested in Figure 36;
(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 asbestos cement 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 AMP will have to be adhered to; and
(vii) Maintain records of asbestos cement pipes as per the AMP.

Figure 36: ACM Management Plan – Work Process Flow Chart



220. **Requirement for the contractor and the subcontractor**. The following are operational requirements related to works involving asbestos:

(i) engaging certified and competent asbestos service provider to identify, handle and remove the asbestos materials present and encountered in the project sites;
(ii) adopting good practices per EHS Guidelines[6] to minimize the health risks associated with asbestos materials by avoiding their use in new construction and renovation, and, if installed asbestos-containing materials are encountered, by using internationally recognized standards and best practices to mitigate their impact;[7]
(iii) training of workers and supervisors, possession of (or means of access to) adequate equipment and supplies for the scope of envisioned works, and a record of compliance with regulations on previous work;
(iv) removal, repair, and disposal of ACM shall be carried out in a way that minimizes worker and community asbestos exposure, and require the selected contractor to develop and submit a plan, subject to the PMU and PIU's acceptance, before doing so;
(v) providing adequate protection to its personnel handling asbestos, including respirators and disposable clothing; and
(vi) notifying the Rajasthan State Pollution Control Board (RSPCB) of the removal and disposal according to applicable regulations as indicated in the technical requirements and cooperating fully with representatives of RSPCB during all inspections and inquiries.

221. PMU will engage an asbestos management specialist to provide training and awareness, and to coordinate with various stakeholders on the risks, management, and mitigation measures required for the identification, safe handling, transport and disposal of the asbestos materials.

D. Pre-construction Impacts

222. **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 identify the locations and operators of these utilities to prevent unnecessary disruption of services during construction phase; and instruct construction contractors to prepare a contingency plan to include actions to

[6] ADB SPS specifies application of 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 (EHS) Guidelines.* These standards contain performance levels and measures that are normally acceptable and applicable to projects. When host country regulations differ from these levels and measures, the borrower/client will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the borrower/client will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in this document.

[7] The EHS Guidelines specify that the use of ACM should be avoided in new buildings and construction or as a new material in remodeling or renovation activities. Existing facilities with ACM should develop an asbestos management plan that clearly identifies the locations where the ACM is present, its condition (e.g., whether it is in friable form or has the potential to release fibers), procedures for monitoring its condition, procedures to access the locations where ACM is present to avoid damage, and training of staff who can potentially come into contact with the material to avoid damage and prevent exposure. The plan should be made available to all persons involved in operations and maintenance activities. Repair or removal and disposal of existing ACM in buildings should be performed only by specially trained personnel following host country requirements or, if the country does not have its own requirements, internationally recognized procedures. Decommissioning sites may also pose a risk of exposure to asbestos that should be prevented by using specially trained personnel to identify and carefully remove asbestos insulation and structural building elements before dismantling or demolition.

be done in case of unintentional interruption of services.

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

224. **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. DBO contractor will identify sources of water for construction purposes and obtain necessary permissions as required, and approval of PIU before the use. Details of material sources and water sources will be provided in SEMP.

225. **Debris disposal.** Prior to the commencement of works, contractor shall identify a debris disposal site in consultation with the PIU and Consultant. Contractor will prioritize the use of solid/construction waste disposal sites operated under the consent from RSPCB. Contractor will follow all the prescribed rules[8] during construction and adhering to following criteria (including but not limited to)-

(i) The site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, top-soil stripping, stacking and preservation should be undertaken prior to initiation of any activities;
(ii) The local governing body and community shall be consulted while selecting the site;
(iii) Contractor shall prepare a construction and demolition waste management plan in pre-construction phase for safe disposal of construction and demolition wastes as per applicable rules and submit to Municipality through PIU for approval;
(iv) Debris disposal site shall be at least 200 m away from surface water bodies;[9]

[8]Construction and Demolition Waste Management Rules 2016

[9] 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.

(v) No residential areas shall be located within 100 m downwind side of the site; and
(vi) The site is minimum 250 m. away from sensitive locations like hospitals, religious places, ponds/lakes or other water bodies.
(vii) The contractor shall identify the disposal site confirming to the above criteria, obtain required permissions from local body, and submit for the approval of PIU; disposal sites shall be used only after approval of the PIU

226. **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 with concerned religious authorities, nearby people and devotees in pre-construction phase and explain the work method and duration of proposed works, take their suggestions and comments and incorporate in design the mitigation measures required
(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) Observe the local rituals and important dates of festivals, weekly/monthly/annual religious occasions in the religious places and include in mitigation measure to not make any disturbance/hindrance/obstacles during such time to the religious places,
(v) Design proper signage, barricades etc. to protect public and devotees from dangers of construction works.
(vi) develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognized and measures are taken to ensure they are protected and conserved.

E. Construction Impacts

227. The civil works for the subproject include earth work excavation which will be undertaken by machine (backhoe excavator) although manual excavation may also be required for small works like during pipe laying in low depth in narrow lanes, finishing the trench lines etc. Other building construction works shall be manual with help of machines.

228. **Laying of Water Supply & Sewerage Networks.** Subprojects include linear works (laying of water supply & Sewerage pipes). This covers almost entire project area of Bundi Town. Distribution lines will be laid in all streets and roads; the larger water mains will be laid mostly on wider main roads. Pipes will be laid by open cut method. Water pipes will be laid in the ground with or without a maximum cover of 1 m, so that depth of excavation will be up to 1.5 m-1.8 m. 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 1.5 m will be protected by shoring/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.

229. Although construction of these project components involves quite simple techniques of civil work, the invasive nature of excavation and the project locations in the built-up areas of the town where there are a variety of human activities, will result in impacts to the environment and sensitive receptors such as residents, businesses, and the community in general. The anticipated impacts are temporary and for short duration. A detail survey is needed after finalization of alignment to access the feasibility of the alignment for need of any tree cutting, demolition of any structure, road and railway crossings, pipe laying in any private land, presence of any sensitive receptor along alignment, disturbance to public or business etc. Mitigation measures have been prepared for potential adverse impacts. Prior consent from landowners (if pipe laying is required in private land) and NOC from concerned departments (for pipe laying in roads, road/railway crossings etc.) prior to start of construction works, is required.

230. 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. (iii) finish excavation, pipe laying and back filling of trench in the same day (iv) provide adequate barricades and road safety signage during pipe laying works in traffic areas (v) Further if night works are required (however unlikely, applicable only in extreme conditions) all the mitigation measures to reduce impacts of disturbance to minimum level to nearby habitants and road users should be ensured by contractor.

231. **Demolition works.** During detail design if any demolition works are required, proper work plan and Mitigation measures will be required before start of demolition activities. Structures to be demolished should be wetted through water sprinkling to reduce dust emission. Appropriate site for storage and disposal of demolished materials should be selected prior to start of demolition activities with prior permission/approval of PIU/ULB/PHED. All the safety measures should be adopted during demolition activities.

232. The existing CWR and OHSR which need to be demolished for site clearance. Following Measures should be taken for safety during demolitions works and safe disposal of demolished muck.

(i) Proceed with selective demolition systematically, from higher to lower level. The selective demolition should be completed above each floor before disturbing supporting members on the next lower level.
(ii) Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
(iii) Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
(iv) Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
(v) Remove structural framing members and lower to ground by a method suitable to avoid free fall and to prevent ground impact or dust generation.
(vi) Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
(vii) Dispose of demolished items and materials promptly.

233. **Storage and Disposal of excavated earth.** A large quantity of soil will be excavated for pipe laying, construction of WTP, CWR, pump house and other. Some part of this excavated soil will be reused for backfilling and/or surface levelling; rest of the soil will need to be disposed in

other locations. Proper storage and disposal plan from contractor is required before start of the work. Prior permission from landowner/concerned authority for storage and disposal of excess earth is required. Prior to the commencement of works, Contractor will follow all the prescribed rules[10] and shall identify a debris disposal site in consultation with the PIU/ULB and adhering to following criteria:

(i) The site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, top-soil stripping, stacking and preservation should be undertaken prior to initiation of any activities;
(ii) Debris disposal site shall be at least 200 m away from any surface water body;
(iii) No residential areas shall be located within 200 m downwind side of the site;
(iv) The site is minimum 250 m. away from sensitive locations like hospitals, religious places, ponds/lakes or other water bodies;
(v) The local governing body and community shall be consulted while selecting the site;
(vi) Contractor is required to prepare plan for disposal of construction and demolition waste including excavated earth in the designated site/sites and submit the plan in PIU to be approved by Municipal Council as per Construction and Demolition Waste Rules 2016;
(vii) Soil storage site should be properly demarcated by fencing and information board should be placed at entrance;
(viii) At soil storage site soil should be covered by tarpaulin or regular water sprinkling should be done to reduce dust emission; and
(ix) At soil disposal site the disposed soil should be levelled on daily basis and no heap or mound should be left at end of the day.

234. **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;[11]
(ii) Verify suitability of all material sources and obtain approval of PIU;
(iii) Ensure that the loading and unloading of the materials and the transportation of the materials from source to construction site does not cause impact on health and safety of the workers and the community; and
(iv) Submit to PIU monthly 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 RSPCB and will collect the copy of these certificates and submit to PIU/consultants

235. **Work near Forest Areas/Protected Areas.** No project components is proposed within the forest area. Although the pipeline will be laid within ROW of existing road, given their proximity of forest area, similarly STP is surrounded by Ramganj Forest area. Following measures are to be implemented to avoid any impacts due to trespassing or accidental entry or in the unlikely event of wildlife movement near the work sites:

[10] Construction and Demolition Waste Management Rules 2016 and Solid Waste Management Rules.
[11] CTE and CTO will be required for batching plant, hot mix plant, crushers etc. if specifically established for this project. If contractor is purchasing raw material or ready-mix concrete, asphalt/macadam and aggregates from third party, he has to be assured that third party is having CTE/CTO from RSPCB and should collect the copy of these and submit to PIU/consultants. Quarry sites should also have the desired permissions.

(i) Pipeline alignment, site and associated work facilities shall be properly demarcated and barricaded;
(ii) All works, construction material storage/ancillary works shall be confined to the demarcated areas, no movement of workers, vehicles, equipment allowed outside this area;
(iii) Ensure proper barricading so that no wildlife, even if it is unlikely, accidentally enters work area;
(iv) No labor camps shall be located near intake or near forests (maintain minimum 2 km buffer);
(v) Limit the work to daylight hours only; no work after sunset
(vi) No workers /personnel shall enter forest areas; it is the DBOC responsibility to take necessary precautions & prevent workers removing/damaging trees/vegetation, hunting / harming animals;
(vii) Create awareness among workers on environment & safety; and
(viii) No high noisy works shall be conducted.

236. **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, sulphur oxides, particulate matter, nitrous oxides, and hydrocarbons. These however will be temporary limiting to construction activities only. To mitigate the impacts, construction contractors will be required to:

(i) Consult with PIU/on the designated areas for stockpiling of soils, gravel, and other construction materials;
(ii) Damp down exposed soil and any stockpiled material on site by water sprinkling;
(iii) Use tarpaulins to cover sand and other loose material when transported by trucks;
(iv) Clean wheels and undercarriage of haul trucks prior to leaving construction site
(v) Don't allow access in the work area except workers to limit soil disturbance and prevent access by barricading and security personnel
(vi) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly, DGs should have proper stake height as per norms;
(vii) Ensure all the equipment are having PUC certificates;
(viii) Do regular water sprinkling in dusty areas to reduce dust emission during works;
(ix) Damp down the structures before demolishing to reduce dust emission;
(x) Damp down on regular basis all the access ways;
(xi) Maintain all the equipment and vehicles to reduce emission of smoke and keep pollution under control and keep records of periodic maintenance; and
(xii) Conduct ambient air quality monitoring periodically as per Environmental Management Plan EMP.

237. **Surface Water Quality.** Intake works shall be conducted in Kota Barrage. Construction activities may deteriorate the water quality of reservoir; therefore, mitigation measures shall be required during works at this site. There is no any other surface water source near any other proposed site, which can be polluted due to construction activities, however, run-off from stockpiled materials and chemical contamination from fuels and lubricants during construction works can contaminate the drainage system of town. These potential impacts are temporary and short-term duration only. Therefore, to ensure that these are mitigated, construction contractor will be required to:

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

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

(i) Plan activities in consultation with PIU so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance;
(ii) Use road cutters instead of breaker/hammer for cutting the road before excavation for pipe laying on roads;
(iii) Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach;
(iv) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and use portable street barriers to minimize sound impact to surrounding sensitive receptor;
(v) DGs being used at site should have sound reducing (acoustic) enclosures, preferably silent DGs should be used at site;
(vi) Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s and equipment;
(vii) Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity;
(viii) Consult the custodians of important buildings, cultural and tourism authorities and local communities in advance of the work to identify and address key issues,

and avoid working at sensitive times, such as religious and cultural festivals, exams of students etc.;

(ix) Provide all workers appropriate PPEs like ear plug/muff, working in high noise conditions;

(x) Keep all vehicles and equipment in good conditions to avoid excessive noise generation;

(xi) Provide noise barriers near sensitive receptors like schools, hospitals, temples, courts etc and consult in advance with sensitive receptors about the working hours (specially schools, hospitals, offices, courts etc) and avoid noisy works in those hours;

(xii) Avoid noisy works in nights in inhabited areas to avoid any disturbance to habitants;

(xiii) Consult in advance with habitants and inform them about the nature and duration of works; and

(xiv) Conduct noise monitoring according to the Environmental Management Plan (EMP).

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

(i) Night works should be avoided at construction sites specially in residential areas and should be performed only when day works are not possible due to excessive traffic/public/pedestrian movement, site of cultural or religious importance, where there is huge crowd during day hours or any other unavoidable circumstances.

(ii) Contractor should plan for night works only after directions from PMU/PIU/CMSC

(iii) Contractor should submit plan for night works for approval from PIU.

(iv) PIU should ensure that prior written information should be given to local authorities such as district administration, Police/traffic police, line agencies concerned, residents welfare association/business association/vyapar of the affected areas and their consents/permissions should be taken prior to start of night works.

(v) PIU/CMSC engineers should check and ensure that all the preparation as per management plan is done by contractor and contractor is having all the necessary equipment and materials for night works.

(vi) Contractor is required to have following equipment/arrangements for night works-

(vii) Contractors should have handheld noise level meter for measurement of noise during night hours

(viii) Contractors should have handheld lux meter for the measurement of illumination during night hours

(ix) Preferably electrical connections is available for running equipment otherwise sound proof/super silent Diesel Generator set should be available

(x) 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

(xi) 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

(xii) 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;

(xiii) All the noise activity like hammering, cutting, crushing, running of heavy equipment should be done in daytime and avoided in night time;

(xiv) Workers engaged in night works should have adequate rest/sleep in daytime before start of night works;

(xv) 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;

(xvi) 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;

(xvii) 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;

(xviii) Horns should not be permitted by equipment and vehicles;

(xix) Workers should not shout and create noise;

(xx) First aid and emergency vehicles should be available at site;

(xxi) Emergency preparedness plan should be operative during night works;

(xxii) Old persons and pregnant women and women having small kids should not work in nighttime;

(xxiii) All the vehicles and equipment being used at night works should have adequate type of silencers/enclosures/mufflers to reduce noise;

(xxiv) All the vehicles should be checked for working head lamps, tail lamps, inner lights etc. before start of night works;

(xxv) PIU/CMSC 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;

(xxvi) Night works should be stopped early in the morning at least one hour before start of pedestrian/traffic movement;

(xxvii) After completion of night works all the site should be cleaned and maintained obstruction free for daytime movement of vehicles and pedestrians;

(xxviii) Drivers and workers should be alert and responsive during night works;

(xxix) All the wages to workers working in night hours should be as per the applicable labour acts;

(xxx) Avoid any nuisance which may create problems to nearby habitants and work peacefully during night hours; and
(xxxi) Night works should not be conducted near hospitals and during peak seasons such as peak tourist season, students' exam times etc.

240. **Soil Contamination, Landscape and Aesthetics.** The construction works may require cutting of trees and also 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) Store fuel, oils, lubricants etc on impervious and protected areas, ensure spill control kits, and proper containments bunds to ensure no spillage
(ii) Prepare and implement spoils management plan;
(iii) Avoid stockpiling of excess excavated soils;
(iv) Coordinate with ULB for beneficial uses of excess excavated soils or immediately dispose to designated areas;
(v) Recover used oil and lubricants and reuse or remove from the sites;
(vi) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
(vii) Minimize removal of vegetation and disallow cutting of trees;
(viii) If tree-removal will be required, obtain tree-cutting permit from the Revenue Department;
(ix) Plant three native trees for every one that is removed;
(x) Remove all wreckage, rubbish, or temporary structures which are no longer required; and
(xi) Request PIU to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.

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

(i) Prepare and implement a spoils management plan (**Appendix C-13**);
(ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
(iii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with PIU on designated disposal areas;
(iv) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
(v) Place storage areas for fuels and lubricants away from any drainage leading to water bodies;
(vi) Dispose any wastes generated by construction activities in designated sites; and
(vii) Conduct periodical ground water quality monitoring according to the Environmental Management Plan (EMP).

242. **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 C-14**)
(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.

243. 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; and
(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.

244. **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 C-13**);
(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;
(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; and
(ix) Provide all mitigation measures as given in resettlement plan (RP) prepared for the project to mitigate impacts on vendors and shopkeepers.

245. **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.

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

(i) Comply with all national, state and local labor laws (see **Appendix C-12**);
(ii) Develop and implement site-specific occupational health and safety (OH&S) Plan which will include measures such as: (a) excluding public from the site; (b)ensuring all workers are provided with and use personal protective equipment;(c) OH&S Training [12] for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;
(iii) Ensure that qualified first aid is provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;
(iv) Provide medical insurance coverage for workers;
(v) Secure all installations from unauthorized intrusion and accident risks;
(vi) The project area experiences extreme temperature during summer months of April and May, which may affect the health of workers engaged in construction work. Contractor should take necessary measures during summers including the following:
    a. Work schedule should be adjusted to avoid peak temperature hours (12 -3 PM);
    b. Provide appropriate shade near the workplace; allow periodic resting and provide adequate water;
    c. Provide necessary medicine and facilities to take care of dehydration related health issues;
(vii) Provide supplies of potable drinking water;
(viii) Provide clean eating areas where workers are not exposed to hazardous or noxious substances;
(ix) Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers;

[12] 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.

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

247. **Asbestos Containing Materials.** No ACM is proposed to be used in the subproject construction. There are however ACM in the existing water supply infrastructure, which may be disturbed or encounter the workers and general public and may have serious health implications. This is already discussed under heading **Design Impacts**, and necessary measures are suggested.

248. **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) Provide prior information to the local people about the nature and duration of work;
(iv) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.
(v) Provide road signs and flag persons to warn of on-going trenching activities.
(vi) 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;
(vii) Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day.
(viii) Provide hard barricades and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches;
(ix) Survey the surrounding vulnerable buildings for likely issues in structural stability/ differential settlement during the excavation works; and
(x) 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.

249. **Work Camps.** Operation of work camps can cause temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants. Potential impacts are negative but short-term and reversible by mitigation measures.

The construction contractor will be required to:

(i) Consult PIU before locating project offices, sheds, and construction plants;
(ii) Minimize removal of vegetation and disallow cutting of trees;
(iii) Provide drinking water, water for other uses, and sanitation facilities for employees;
(iv) Provided temporary rest and eating area at all work sites;
(v) Ensure conditions of liveability at work camps are maintained at the highest standards possible at all times; living quarters and construction camps shall be provided with standard materials (as far as possible to use portable ready to fit-in reusable cabins with proper ventilation); thatched huts, and facilities constructed with materials like GI sheets, tarpaulins, etc., shall not be used as accommodation for workers; accommodation shall meet the IFC standards for workers accommodation[13] 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 meter (m3) (volume) or 4 to 5.5 square meters (m2) (surface) per worker, a minimum ceiling height of 2.10 m; 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 (Guidelines for workers camps as per IFC benchmark standards is provided in **Appendix C-21**);
(vi) Prohibit employees from poaching wildlife, fishing in water sources (Kota Barrage) and cutting of trees for firewood;
(vii) Train employees in the storage and handling of materials which can potentially cause soil contamination;
(viii) Recover used oil and lubricants and reuse or remove from the site;
(ix) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
(x) Remove all wreckage, rubbish, or temporary structures which are no longer required; and
(xi) Report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.

250. **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 for this project, excavation will occur at locations not known to have archaeological values, so there is no risk of such impacts. Religious places such as temples are present nearby the proposed pipeline works for water supply and contractor will require to follow the mitigation measures as given below.

(i) Consult with concerned religious authorities, nearby people and devotees in pre-construction phase and explain the work method and duration of proposed works, take their suggestions and comments and incorporate in design the mitigation measures required;
(ii) Adjacent to religious/social/historic sites, undertake excavation and construction work in such a way that no structural damage is caused to the religious building;

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

(iii) Observe the local rituals and important dates of festivals, weekly/monthly/annual religious occasions in the religious places and do not make any disturbance/hindrance/obstacles during such time to the religious places; and
(iv) Provide proper signage, barricades etc. to protect public and devotees from dangers of construction works.

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

(i) Prepare and implement a Traffic Management Plan;
(ii) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
(iii) Schedule transport and hauling activities during non-peak hours Locate entry and exit points in areas where there is low potential for traffic congestion;
(iv) Keep the site free from all unnecessary obstructions;
(v) Drive vehicles in a considerate manner;
(vi) Coordinate with Traffic Police for temporary road diversions and for provision of traffic aids if transportation activities cannot be avoided during peak hours; and
(vii) Inform the affected local population 1-week in advance about the work schedule and notify affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints;
(viii) Maintain sufficient access to houses and shops (commercial establishments) during pipe laying work through metal sheets and temporary bridges;
(ix) Locate entry and exit points in areas where there is low potential for traffic congestion;
(x) Plan and execute the work in such a way that the period of disturbance/ loss of access are minimum; and
(xi) Excavate only that stretch in a day that could be finished in the same day by laying of pipes and backfilling.

F. Operation and Maintenance Impacts

252. **Water Supply System.** O&M of the water supply system will be carried out by DBO contractor for 10 years and then by PHED Bundi directly or through an external operator. The water supply system is intended to deliver potable water meeting drinking water standards (**Appendix C-1**) to the consumers at their homes. This must be ensured.

253. The system has 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.

254. **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 150-75µ. 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.

255. 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. DBO contractor 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.

256. **Safety in Chlorine Usage.** Water disinfection in the WTP and CWR 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. It is proposed to use chlorine for disinfection of water, therefore there is a safety risk due to handling of chlorine at the WTP/CWRs. Likely impacts will be negligible if the various suggested safety features and equipment to meet with any accidental eventuality are included in the design and development of the facility. During the operation phase, it is necessary that the facility is operated by trained staff as per the standard operating procedures.

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

(i) Ensure that water supplied to the consumers at all times meet the drinking water standards; carry out regular sampling and testing, and disseminative information;

(ii) 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; and

(iii) Implement emergency response system (ERS) for the chlorine leakage; Guidelines and Emergency plan for handling and storing chlorine is attached as **Appendix C-22**.

258. 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.

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

260. 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; and
(ii) Complete work in these areas quickly.

261. 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.

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

263. 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 DBO, and the successful bidder/DBO contactor 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. Remaining treated effluent is proposed to be discharged into the open space available in campus during rainy season. 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.

264. 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.

265. 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 discussed earlier in this IEE. This follows the Sewerage and Wastewater Policy, 2016, which suggests "use of sludge produced from the treatment as fertilizer and soil conditioner after processing". A sludge disposal site will be identified during the detailed design phase to dispose unutilized dried sludge in reuse applications. The updated IEE will include the details of disposal site. If the sludge is managed accordingly, there will no impacts.

266. 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, Fertilizer Control Order (FCO), 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 compiled 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 C-22**;
(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; and

(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.

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

(i) Establish regular maintenance program, including:
   (a) Regular cleaning of grit chambers and sewer lines to remove grease, grit, and other debris that may lead to sewer backups. Cleaning should be conducted more frequently for problem areas;
   (b) Inspection of the condition of sanitary sewer structures and identifying areas that need repair or maintenance. Items to note may include cracked/deteriorating pipes; leaking joints or seals at manhole; frequent line blockages; lines that generally flow at or near capacity; and suspected infiltration or exfiltration;
   (c) Monitoring of sewer flow to identify potential inflows and outflows; and
   (d) Conduct repairs on priority based on the nature and severity of the problem;
   (e) 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 ERS for the sewerage system leaks, burst and overflows, etc.;

(vi) Provide necessary health & 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:
   (a) As far as possible use remote/CCTV mechanism to identify/detect the problems in sewers and do not engage persons for this purpose;
   (b) 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;
   (c) Ensure that maintenance staff and supervisors understand the risks;

provide proper instructions, training and supervision;
(d) Use gas detector to detect any hazardous or inflammable gas in confined areas like sewers/manholes prior to maintenance process;
(e) 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;
(f) Provide adequate welfare facilities, including clean water, soap, nail brushes, disposable paper towels, and where heavy contamination is foreseeable, showers;
(g) For remote locations portable welfare facilities should be provided;
(h) Areas for storage of clean and contaminated equipment should be segregated and separate from eating facilities;
(i) Provide adequate first-aid equipment, including clean water or sterile wipes for cleansing wounds, and a supply of sterile, waterproof, adhesive dressings;
(j) Make effective arrangements for monitoring the health of staff; and
(k) Keep emergency preparedness plan ready before starting the work of sewage system cleaning.

268. 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 COVID19 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.

269. **Project Benefits.** The citizens of the Bundi Municipal Council areas will be the major beneficiaries of the improved water supply, as they will be provided with a constant supply of better-quality water, piped into their homes. This should improve the environment, should deliver major improvements in individual and community health and well-being. Diseases due to poor quality water, 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.

VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Overview

270. 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.

271. A three-tier consultation process has been adopted for RSTDSP project: focus group discussions, primary household sample surveys and a town-level public consultation workshop. Most of the main stakeholders have already been identified and consulted during preparation of preliminary design and IEE, and any others that are identified during project implementation will

be brought into the process in the future. Primary stakeholders of the subproject are: residents, shopkeepers and businesspeople who live and work alongside the roads in which network improvements will be provided, and government and utility agencies responsible for provision of services, Bundi Nagar Palika, Public Health Engineering Department, and Rajasthan Pollution Control Board. Secondary stakeholder are: NGOs and CBOs working in the area, community representatives, beneficiary community in general, government agencies, the executing and implementing agencies (LSGD and RUDSICO-EAP), Government of India and the ADB.

B. Public Consultation

272. Informal and formal consultation are conducted with local population of the area, about at 5 places along with proposed alignment with about 87 persons in month of April 2022 and January 2023. Discussions were held about proposed project components, EMP measures, grievance redressal, ownership of land, and general people perception for proposed project. The public consultation and disclosure program is a continuous process throughout the project implementation, including project planning, design and construction. Informal and formal consultations at different locations were also conducted during social and environmental impact assessment in Bundi in April 2022 (**Appendix 2 &3**).

1. Consultation during Project Preparation

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

274. Focus-group discussions with residents and other stakeholders were conducted to learn their views and concerns. A social and environmental impact assessment has been conducted in the town, covering sample households and nearby vendors to understand the basic characteristics of town, health status, and the infrastructure service levels, and also the demand for infrastructure services.

275. Public consultation was done on 4th April, 2022 at various location of Bundi Town. During consultation, 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. Project team responded to the issues on nuisance and disturbance raised during the consultation that measures have been incorporated in the EMP. Consultations also conducted with the people living close to the proposed reservoir site in PHED campus, and the project team explained the measures to be put in place during the construction. Consultation conducted in proposed FSSM Area with 47 persons (26 male and 21 females) on 23 January 2023 and people of area express their support to project. Regarding water supply people were ready to bear cost of water through modern meters but demanded continuous supply of water in day. Details of public consultations are given in (**Appendix 2 & 3).**

276. A town-level City Level Committee (CLC) has been formed in Bundi District by Government orders. The CLC meeting was organized during the detailed design stage to which representatives of primary and secondary stakeholders were invited. City Level Stakeholder committee meeting was organized for Bundi in District Head Quarter, on Dated. 20.10.2021 to

discuss the matter of proposed Water Supply & Sewerage in Bundi under the chairmanship of District Collector, in presence of Member of Legislative Assembly (Bundi), PHED officials, Municipal Council officials, UIT officials, PWD officials, DPR consultants, RUDSICO-EAP officials, and other invitee members. The proposed scope of works and technology i.e. WTP, CWR, OHSR, distribution networks and allied works under this scheme were discussed in the meeting. Land availability for the proposed components was also confirmed by local authority. The feedback and concerns of the stakeholders were taken into consideration for finalization of design and scope of works. The project was agreed by the committee for further course of action by RUDSICO-EAP. Details of CLC meeting, minutes and photographs are attached in **Appendix 3**.

2. Consultation During Construction

277. Prior to start of construction, Bundi Nagar Palika and PIU with the assistance of Consultants will conduct information dissemination sessions at major intersections and solicit the help of the local community leaders/prominent citizens to encourage the participation of the people to discuss various social and 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.

278. A constant communication is 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 Palika/PIU with the help of Community Awareness and Participation Consultant (CAPC) organizing public meetings and appraising the communities about the progress on the implementation of EMP. Meeting are being organized at the potential hotspots/sensitive locations before and during the construction.

279. A town level consultation was conducted on 24.03.2023 at Collectorate Meeting Hall in Bundi Town, which was attended by Chairperson, Vice Chairman, and elected councilors of Bundi Municipal council, and officers of district administration and local bodies. The details of the town level consultation is appended as Appendix 4.

C. Information Disclosure

280. Executive summary of the IEE will be translated in the local language and made available at the offices of Nagar Palika, RUDSICO-EAP- PMU and PIU. Copies of summary will be provided to participants of city level workshop to be organized in Bundi. Hard copies of the IEE will be accessible to citizens 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 Palika/RUDSICO-EAP after approval of the IEE by Government and ADB. Stakeholders will also be made aware of grievance register and redress mechanism.

281. Public information campaigns via newspaper/radio/TV, to explain the project details to a wider population were conducted primary by circulating pamphlets. Public disclosure meetings will be conducted at key project stages to inform the public about the 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 public.

282. Local communities are 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. Before start of construction works, Social Outreah Team (SOT) of contractor and CAPP team are providing advance public notice/ public information by distributing pamphlets showing work details, toll free complaint registration number, also by individual consultation with each and every household and shop owner of the area/section.

283. 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. Before start of construction works, social outreach team (SOT) of contractor and CAPP team are providing advance public notice/ public information by distributing pamphlets showing works details, toll free complaint registration number, also by individual consultation with each and every household and shop owner of the area/section.

284. 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); and
(vi) Semi-annual Environmental Monitoring Reports (English).

285. A concise summary of project and draft IEE report (in Hindi), providing all necessary details of designs, 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. Draft IEE has already been posted on ADB and RUDSICO website. Further, the following will be again posted 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.

VII. GRIEVANCE REDRESS MECHANISM

A. Project Specific Grievance Redress Mechanism

286. A project-specific, three-tier grievance redress mechanism (GRM) covers both environmental and social issues. The GRM is 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)[14] the system was effective in timely resolution of grievances in a transparent manner.[15] The multichannel, project-specific, three-tier GRM is functional at RUSDP, hence the design of GRM for RSTDSP considers the proposed institutional structure for RSTDSP and the positive features and learnings from the previous GRM.[16]

287. **Common Grievance Redress Mechanism.** A common GRM is 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.

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

289. **Grievance Redress Process:** Affected persons will have the flexibility of conveying grievances/suggestions by dropping grievance redress/suggestion forms in complaint/suggestion boxes that will be installed by project PIUs or by e-mail, by post, or by

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

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

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

writing in a complaints register in ULB offices/complaints register at contractor's work site[17] or by sending a WhatsApp message to the PIU[18] or by dialing the phone number of town level PIU/CAPPC or by dialing a toll-free number.[19] 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.[20] 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 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)[21] 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 compliant/grievance in discussion with the ASO, field level PIU, CMSC, CAPPC and the contractor; and

(iii) **3rd level grievance**. All the grievances that are not addressed by Zonal PIU within 7 days of receipt will be brought to the notice of the PMU. Depending on the nature of grievance, the project officer (social/environment) at PMU will resolve the grievance within 15 days of receipt of grievance with necessary coordination of Zonal PIU and CMSC and guidance/instruction of additional project director (APD-PMU).

(iv) Grievances not redressed through this process within/at the project level within stipulated time period will be referred to the CLC/GRC, which has been set up.[22]

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

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

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

[20] http://www.sampark.rajasthan.gov.in/RajSamWelcome.aspx

[21] The 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.

[22] City Level Committee (CLC)/grievance redress committees (GRCs) has been constituted for each town/city under the Chairmanship of District Collector to provide overall subproject guidance and "to sort out issues and remove

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.

290. The multi-tier GRM for the project is outlined below (Figure 37), 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.

291. 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.[23]

292. 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 try 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.[24]

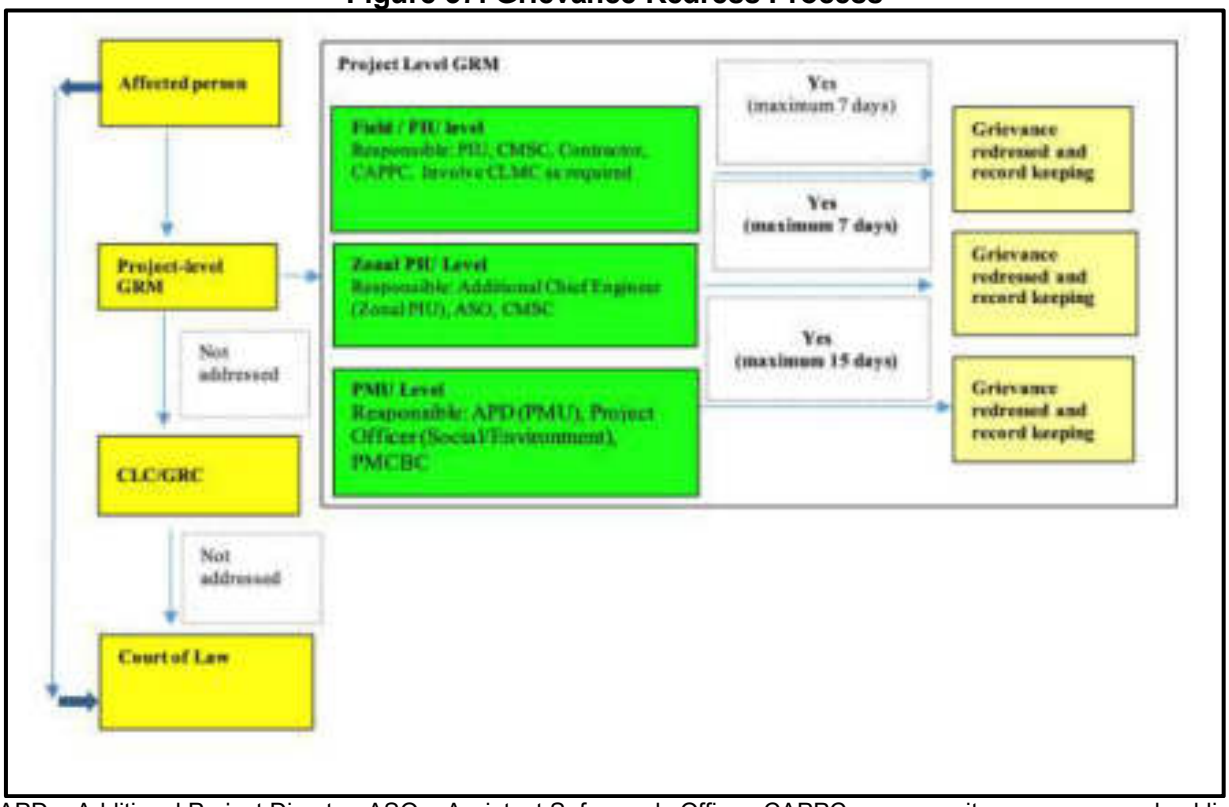
293. **Record-keeping.** The PIU of each town/city will keep records of grievances received, including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions and the date these were affected and outcome. The number of grievances recorded and resolved, 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 C-17.

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.

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

[24] Accountability Mechanism. http://www.adb.org/Accountability-Mechanism/default.asp.

Figure 37: Grievance Redress Process



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

294. **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.

295. **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.

296. Presently GRC in 14 ongoing project towns are functional as per RSTDSP's Grievance Redress Mechanism (GRM). Therefore 2nd and 3rd level GRC are already functional at Zonal PIUs (at Jaipur and Jodhpur) and PMU levels. PIU level GRC is also formed in project towns through office order from PMU for the same.

VIII. ENVIRONMENTAL MANAGEMENT PLAN

A. Environmental Management Plan

297. 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.

298. A copy of the EMP must be always kept at work sites. 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.

299. For civil works, the contractor will be required to (i) establish an operational system for managing environmental impacts (ii) carry out all 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.

300. The tables below present Environment Management Plan during Design, Pre-construction, Construction and Operation phases are given below.

Table 29: Design Stage Environmental Management Plan

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation/ Monitoring	Cost and Source of Funds
Location impacts of proposed components	Nearby community may be affected due to increased pollution during construction and operation	▪ sites should be selected so that nearby community may have no or minimum impact due to proposed works ▪ Mitigation measures are prepared and included in design and EMP is attached with contract documents	List of pre-approved sites for -construction work camps, areas for stockpile, storage and disposal -Waste management plan	Consultants/PMU	No cost required
Intake in Kota Barrage	Water quality and ecological impacts	▪ Do not utilize the dead storage for supply; ensure that dead storage is available in the barrage all times ▪ Design inlet of intake pipe in the barrage with appropriate screen to avoid entry of aquatic organisms into inlet ▪ Select a construction methodology that is least disturbing, and appropriate for the in-situ soil condition, and able to complete the construction work prior to onset of monsoon ▪ Schedule the construction works during low water level period – late winter months to pre monsoon (February – June/July); ensure that works are completed during the same period to prior to onset of monsoon; ▪ Erect temporary barriers to form enclosed construction area with least disturbance ▪ Allow adequate time to settle the distributed solids to prior to pumping out water; only clear/clarified water shall be pumped back into the reservoir; any silt laden water should be pumped to a silt pond	Design of intake and construction methodology submitted by DBO contractor and approved by PIU	DBO contractor and PIU	DBO contractor

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation/ Monitoring	Cost and Source of Funds
		▪ Avoid/minimize use of fuels, chemicals and lubricants; ensure no spillage ▪ Clear the work site after completion at least to pre project conditions, ensure that there are no materials, debris, spills etc., and prior to removal of temporary barriers / coffer dam ▪ Implement work site safety at works in water body			
Design of water supply 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: ▪ 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 ▪ Locating components and facilities appropriately by avoiding sensitive locations like forests and protected areas (environmentally, socially, and archeologically). ▪ Recovering wash water from treatment process to optimise the water use ▪ Designing the entire system to maintain optimal flow and terminal pressure, and optimising the overall energy usage ▪ Avoiding usage of asbestos containing materials ▪ Reducing the incidence of water borne diseases by providing 100% population including urban poor with potable water supplies	Detail design include compliance of bid conditions and provisions of draft IEE	DBO contractor/PIU	DBO contractor

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation/ Monitoring	Cost and Source of Funds
Seismic sensitivity	Damage to infrastructure and potential risks: project area in low earthquake risk zone (Zone II)	▪ 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).	Detail design considering risk of earthquake in town	DBO contractor/PIU	DBO contractor
Groundwater source	Groundwater contamination	▪ Prepare a source protection plan for existing open wells ▪ Prevent flow of untreated wastewater in the drains ▪ Measures should be taken to control the open defecation, and to close all unsafe latrines (for example pit latrines). ▪ Awareness programs shall be conducted regarding the sanitation practices and its effect on groundwater quality	Tube well construction and operation plan	DBO contractor	DBO contractor
Water Treatment Plant (WTP)	Inefficient treatment, treated water characteristics not satisfying the standards	▪ Design treatment process that is suitable for raw water source characteristics duly considering the seasonal variation in quality if any ▪ Duly consider quality of groundwater that will be supplemented for surface water supply variations ▪ Treated water and supplied water at consumer end should meet the drinking water standards all times	Detail design of WTP WTP design should meet desired treatment parameters	DBO contractor Consultants PIU	DBO contractor
	Design to prevent pollution due to wastewater and sludge	Ensure that the following are included in the WTP design: ▪ Backwash water reuse system and sludge recovery and disposal system ▪ Backwash recycling components: Filter backwash holding tank, recovered water storage tank and pumping for recycling	Detail design of WTP WTP design should meet desired treatment parameters	DBO contractor Consultants PIU	DBO contractor

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation/ Monitoring	Cost and Source of Funds
		▪ Sludge management system components: Gravity thickeners for sludge from clarifiers, mechanical sludge dewatering system, storage facility for dewatered sludge ▪ Disposal of sludge at a landfill or the disposal site provided by the ULB			
	Sludge management	▪ Prepare sludge management plan for safe handling and disposal of sludge from WTP ▪ Estimate the quantity of sludge / solids generated from the WTP during the detailed design phase, and likely composition based on the raw water quality and process chemicals ▪ Minimize the quantity of solids generated by the water treatment process through optimizing coagulation processes; ▪ Recover process chemicals to the extent possible to minimize / prevent the disposal ▪ Carryout pre-treatment prior to disposal ▪ Dispose dried sludge / solids from WTP at approved solid waste landfill / disposal site identified by ULB ; this should be identified during the detailed design phase ▪ Evaluate the option of land application during the operation stage; conduct quality tests on the first batch of sludge generated from the WTP, check for physico chemical characteristics including heavy metals ▪ Manage hazardous/harmful waste if any, as per the Hazardous Waste Management Rules	Detail design of WTP WTP design should meet desired treatment parameters Management plan for sludge from WTP	DBO contractor Consultants PIU	DBO contractor

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation/ Monitoring	Cost and Source of Funds
		▪ Employ safe and beneficial methods for disposal of dried sludge: in building and construction industry, brick / tile manufacturing etc.,			
WTP and CWR	Hazardous / harmful chemicals may cause health impact on workers	▪ 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. ▪ Establish proper handling / storage / application system according to the relevant standards, safety precautions and prevent accidental release / spill ▪ Provide leak/spill detection, collection / capture and safe disposal facilities such as chlorine absorption and neutralization facility ▪ Provide ventilation, lighting, entry and exit facilities; visible & audible alarm facilities to alert chemical/chlorine leak ▪ Facility for isolation in the event of major leakages ▪ Eye wash & shower facility ▪ Personal protection and safety equipment for the operators (masks, oxygen cylinders, gloves, etc.,) ▪ Provide training to the staff in safe handling and application of chemicals, material safety, and standard operating procedures and emergency responses ▪ Develop emergency response procedures	WTP design should include safety measures during chlorine handling and usage	DBO contractor Consultants PIU	DBO contractor
Requirement of tree cutting	Tree cutting may result loss of aesthetics and increase in air pollution	▪ sites should be selected so that minimum tree cutting is required	As per RUDSICO-EAP policy;	DBO contractor Consultants PIU	No cost required

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation/ Monitoring	Cost and Source of Funds
		▪ project documents should include the minimum tree cutting provisions ▪ Provision for Compensatory plantations should be included in contract documents	Tree Cutting Approvals; Compensatory Afforestation Plan;		
Energy Efficiency	Loss of natural resources	▪ Use energy efficient electrical equipment ▪ Provision of use of energy efficient equipment in contract agreements and BOQ	As per BEE norms	DBO contractor Consultants PIU	No cost required
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	▪ 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 C-20. Adhere to the workflow process ▪ Conduct awareness program on safety during the construction work ▪ Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day ▪ Provide barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches ▪ Identify risk of intervention with existing AC pipes. If there is significant risk, implement the AMP strictly that includes identification of hazards, the use of proper safety gear and disposal methods. ▪ Maintain records of AC pipes as per the AMP ▪ Refer to the instructions of the Asbestos Expert	ACM Management Plan developed by DBO contractor and approved by PIU	DBO contractor Consultants PIU	
Incorporating EMP and	Implementation of the EMP	▪ The EMP should be included in the Bid Document so that the selected Contractor	EMP included in Bid Document	PMU	Project Costs

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation/ Monitoring	Cost and Source of Funds
Health and Safety requirements into Contractor Bid Document		understands the issues and makes necessary plans to prepare and implement the EMP			
	Implementation of the Health and Safety measures by contractor	▪ Health and safety requirements should be incorporated as part of the contract bid document so that the selected Contractor understands the issues and makes necessary plans to prepare and implement the health and safety requirements.	EMP included in Bid Document	PMU	Project Costs
Sewage Treatment Plant (STP)	Odour nuisance and aesthetics	▪ 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. ▪ 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	PMU	Project costs
Design of Sewage Treatment Plant	Treated effluent not meeting the disposal standards and associated impacts on receiving environment	STP design to meet latest norms for wastewater disposal into inland water bodies (ref Appendix C-8 for detailed parameters) including: ▪ BOD < 10 mg/l ▪ Total Suspended Solids < 20 mg/l ▪ Fecal coliform < 100/100 ml	RSPCB, Consent etc.,	Consultants / PMU	Project Costs
	Impairment of STP treatment efficiency	▪ Ensure continuous uninterrupted power supply ▪ Provide back-up facility (such as generator) and make sure that adequate fuel supplies during operation for running of generator when required;	RSPCB Consent etc.	Consultants / PMU	Project Costs

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation/ Monitoring	Cost and Source of Funds
		▪ Provide operating manual with all standard operating procedures (SOPs) for operation and maintenance of the facility; this should include guidance on the follow up actions in case of process disruptions, inferior quality of treated water; etc. Necessary training (hands-on and classroom / exposure visits) shall be provided to the ULB staff dealing with STP. ▪ The scope of work of facility contractor should include extended operation period (at least five years) to ensure smooth operation, training to the ULB staff and transfer of facility to Bundi Nagar Palika ▪ Design should include online monitoring for the minimum BOD, pH and Ammonia at the inlet and outlet of the plant			
	Mixing of industrial effluent with sewage	▪ No industrial wastewater shall be allowed to dispose into municipal sewers ▪ No domestic wastewater from industrial units shall be allowed into municipal sewers ▪ Ensure that there is no illegal discharge through manholes or inspection chambers ▪ Conduct public awareness programs; in coordination with RSPCB, issue notice to all industries for compliance ▪ Conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated effluent quality complies with the standards	ULB/PIU and RSPCB Consent etc.	PIU / ULB	Project Costs
STP	Use of treated wastewater for reuse applications	▪ Develop wastewater reuse plan for Bundi town in consultation with CLC as per the Sewerage and Wastewater Policy, 2016.	DBO Contractor / PIU	PMU/ ULB	Project cost

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation/ Monitoring	Cost and Source of Funds
		The Reuse Plan shall inter alia include the following: ▪ Identify potential reuse application in Bundi, and establish quality criteria for each of the use ▪ 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; ▪ Prepare a reuse plan for agriculture, if that is the priority use or one of the applications as per the CLC in Bundi, 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. ▪ Plan should include awareness and training provisions and responsibilities; these can be conducted by concerned department (e. g., Agricultural Department, District Collectorate) ▪ Carryout regular / online monitoring of critical quality parameters of treated wastewater to ensure that they meet the present standards established for reuse			
STP	Treated effluent discharge into water channel/drains and associated impacts on river water and downstream users	▪ Obtain of consent of RSPCB for discharge of treated wastewater into drains ▪ Conduct a baseline water quality assessment of receiving water body	DBO Contractor/PIU	PMU/ ULB	Project costs

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation/ Monitoring	Cost and Source of Funds
		▪ Regularly monitor the treated wastewater quality at STP and ensure that it meets the discharge standards ▪ Monitor water quality periodically during operation phase as per the Environmental Monitoring Plan			
STP	Sludge management and reuse	▪ Prepare a sludge management plan ▪ Prepare a dried Sludge utilization plan for Bundi within the help of Agriculture Department / CLC; plan should also include if any additional processing is required for sludge to use as soil conditioner ▪ Plan should clearly various potential uses and demand in Bundi and surroundings ▪ 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. ▪ Identify a landfill / suitable site for disposal of surplus dried sludge ▪ Monitor sludge quality during operation phase as per the Environmental Monitoring Plan, ensure that it meets the quality parameters established by FCO ▪ In case of sludge not meeting the quality parameters, it shall not be used as soil condition, and shall be disposed at appropriate disposal site (if it falls under hazardous category, it shall be disposed as per the Hazardous Waste Management Rules, 2016)	DBO Contractor/PIU	PMU/ ULB	Project costs

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation/ Monitoring	Cost and Source of Funds
FSSM	Occupational health and safety issues, and impact on STP process	▪ 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 ▪ Create awareness program on the FSSM from collection to treatment system that will be adopted ▪ Design the sewage treatment process duly considering mixing of septage ▪ 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 ▪ Demarcate a proper area for cleaning of mobile tankers in STP premises, and ensure that the wastewater shall be discharged into STP ▪ Provide proper training to the workers, and staff in safe handling of FSSM tasks, provide all necessary personal protection equipment ▪ Ensure proper facilities for workers including showers, wash areas, toilets, drinking water, eating and resting places ▪ Conduct regular health checks ▪ Prepare Health and Safety Plan for FSSM	DBO Contractor/PIU	PMU/ULB	Project costs
Physical Cultural resource	Encroachment/ damage to protected monuments and chance finds	▪ develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognized and measures are taken to ensure they are protected and conserved. This should involve:	PIU	PMU	Project Cost

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation/ Monitoring	Cost and Source of Funds
		▪ Conduct awareness training to contractor & supervision staff prior to start of excavation; ▪ Stopping work immediately to allow further investigation if any finds are suspected; ▪ Calling in the ASI/state archeological department if a find is suspected, and taking any action they require to ensure its removal or protection in situ			

Table 30: Environmental Management Plan of Anticipated Impacts during Pre-Construction

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	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	Consents, permits, clearance, NOCs, etc.	PIU and Sagwara Nagar Palika	PMU	No costs required
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	Consents, permits, clearance, NOCs, etc.	PIU/Consultants in coordination of Nagar Palika, Sagwara	PMU	Cost of obtaining all consents, permits, clearance, NOCs etc. prior to start of civil works responsibility of PIU.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Environmental monitoring of baseline conditions of air, noise, water and soil	To establish base line environmental conditions	Environmental monitoring through NABL approved laboratory	Environmental Monitoring Report of Air, noise, soil and water quality	Construction contractor	Consultants/PIU	Contractor
Utilities	Telephone lines, electric poles and wires, water lines and gas pipelines within proposed project area	(i) Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and (ii) Require construction contractors to prepare a contingency plan to include actions to be taken in case of unintentional interruption of services. (iii) Require contractors to prepare spoils management plan (**Appendix C-13**) and traffic management plan (**Appendix C-14)**	-List and maps showing utilities to be shifted -Contingency plan for services disruption 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 C-13**), and traffic management plan (**Appendix C-14**)	Contractor in collaboration with PIU and with approval of PMU	CMSC/ PIU	No cost required. Mitigation measures are part of TOR of PMU, PIU and Consultants
Works close to forest areas	Disturbance / damage to flora, fauna	(i) Pipeline and STP work site shall be properly demarcated and barricaded;	Working plan near forest area,	Contractor in collaboration with PIU and with approval of PMU	DBOC/ PIU	No cost required. Mitigation measures are

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		(ii) All works, construction material storage/ancillary works shall be confined to the demarcated areas, no movement of workers, vehicles, equipment allowed outside this area (iii) Ensure proper barricading so that no wildlife, even if it is unlikely, accidentally enters work area (iv) No labour camps shall be located near forests (maintain minimum 2 km buffer) (v) Limit the work to daylight hours only; no work after sunset (vi) No workers /personnel shall enter forest areas; it is the DBOC responsibility to take necessary precautions & prevent workers removing/damaging trees/vegetation, hunting / harming animals (vii) Create awareness among	Compliance of conditions of forest diversion Training / awareness program records			part of TOR of PMU, PIU and Consultant

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		workers on environment & safety; (viii) No high noisy works shall be conducted				
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Encroachment in sensitive 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, Contractor will prioritize the use of solid/construction waste disposal sites operated under the consent from RSPCB. If unavailable or not feasible, contractor	-List of pre-approved sites for construction work camps, areas for stockpile, storage and disposal -Waste management plan	Contractor to finalize locations in consultation and approval of PIU	CMSC/ PIU	No cost required. Mitigation measures are part of TOR of PIU and Consultants and also part of contractual terms

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		contractor shall identify disposal site confirming to the following criteria, obtain required permissions from local body, and submit for the approval of PIU; disposal sites shall be used only after approval of the PIU: (a) site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, written consent from landowners (not lessees) will be obtained; (b) debris disposal site shall be at least 200 m away from surface water bodies; (c) no residential areas shall be located within 50 m downwind side of the site; and (d) site is minimum 250 m away from sensitive locations like settlements, ponds/lakes or other water bodies.				

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
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.	Permits issued to quarries/sources of materials	Contractor to prepare list of approved quarry sites and sources of materials with the approval of PIU	CMSC/ PIU	No cost required. Mitigation measures are part of TOR of PIU and Consultants 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 WTP from RSPCB), permits, clearance, NOCs, etc. prior to start of civil works. (ii) Following consents are required- Tree cutting- local authority Storage, handling and transport of hazardous materials- RSPCB	Consents, permits, clearance, NOCs, etc.	PIU and Consultants	CMSC/ PIU	No cost required. Cost of obtaining all consents, permits, clearance, NOCs, etc. prior to start of civil works responsibility of PIU. Mitigation measures are part of TOR of

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		Sand mining, quarries, borrow areas- Department of mines and Geology Traffic diversion/road cutting- local authority, traffic police (ii) Ensure that all necessary approvals for construction to be obtained by contractor are in place before start of construction (iii) Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc. (iv) Include in detailed design drawings and documents all conditions and provisions if necessary				PIU and Consultants

Table 31: Environmental Management Plan of Anticipated Impacts during Construction

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
EMP Implementation Training	Irreversible impact to the environment, workers, and community	(i) Project manager and all key workers will be required to undergo EMP implementation including spoils management, Standard operating procedures (SOP) for construction works; occupational health and safety	Training Plan and its implementation Achievement of the	Construction Contractor	CMSC/ PIU	Cost of EMP Implementation Orientation Training to contractor is

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		(OH&S), core labor laws, applicable environmental laws, etc. (ii) Contractor must depute a qualified EHS personnel in the start of the project to conduct training to all the personnel and effective monitoring of mitigation measures during construction	environmental performance targets by the Contractor;			responsibility of PMU. Other costs responsibility of contractor.
Air Quality	Emissions from construction vehicles, equipment, and machinery used for installation of pipelines resulting to dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulphur oxides, particulate matter, nitrous oxides, and hydrocarbons.	(i) Consult with PIU on the designated areas for stockpiling of clay, soils, gravel, and other construction materials; (iii) Damp down exposed soil and any stockpiled material on site by water sprinkling necessary during dry weather; (iv) Use tarpaulins to cover sand and other loose material when transported by trucks; and (v) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly. (vi) Quarterly environmental monitoring for ambient air as per EMP	-Visual inspection -No complaints from sensitive receptors -Records -PUC certificates - CTE and CTO; -Periodic Air Quality Monitoring;	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
Water quality	Mobilization of settled silt materials, and chemical contamination from fuels and lubricants during	(i) Prepare and implement a spoils management plan; (ii) Avoid to construct any construction camps and labour camps near to any water body and do not allow to dispose any waste or sullage in to any water body	As per Appendix C-1; -Periodic Water Quality Monitoring;	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
	installation of pipelines can contaminate nearby surface water quality.	(iii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets; (iv) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with PIU on designated disposal areas; (v) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; (vi) Place storage areas for fuels and lubricants away from any surface water body or drainage leading to water bodies and provide impermeable lining under the storage yard of fuels and lubricants (vii) Dispose any wastes generated by construction activities in designated sites; do not dispose any waste into any water body (viii) Keep oil tray or pans under the DG set or during maintenance of mechanical equipment to avoid oil spillage resulting soil and water pollution, (ix) Do not wash vehicles and equipment at/near the Kota Barrage dam (x) Instruct workers not to defecate near the Kota Barrage dam, provide adequate toilets to workers; and (xi) Conduct surface water quality Monitoring according to the				

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		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/Consultants 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) Quarterly environmental monitoring for ambient noise as per EMP	-No complaints from sensitive receptors; - Periodic Noise level monitoring reports;	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
Ground Water Quality	Contamination of ground water quality due to spillage of oil and lubricants	Prepare and implement a spills management plan; Provide impermeable liner on the ground and place layer of mortar or concrete over it in the oil and lubricants storage areas, provide spillage trap in oil and lubricant store, use dip tray and pump to pour oil from oil and lubricant drums; Dispose any oil contaminated wastes generated by construction activities in scientific manner; and Conduct ground water quality monitoring according to the EMP	-Complaints from sensitive receptors; -CTO and CTE compliance; -Periodic GW Quality Monitoring Reports;	DBO Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Construction of intake at Kota Barrage	Aquatic flora and fauna of Kota Barrage may be affected due to construction works of intake	To protect aquatic flora and fauna of dam following measures should be adopted- (i) **Maintenance of flow level.** During dewatering activities; provide compensation flow for the conservation of microflora, aquatic insects and fish in the dewatering zone within 10-20% of the regular flow. Regular releases of flushing flows will maintain quality of spawning gravel scouring fine sediments away. (ii) **Screens and fish exclusion devices**. provision should be made to protect the fish against entrapment and impingement during construction works in dam. Installation of appropriate screen devices at the intake will divert the fish from water intakes. Ideally, fish bypass facilities should be installed. (iii) **Fish passes**. Provide fish passes during dewatering activities for assisting fish migration from dewatering zone to water zone. A fish pass should meet the following criteria: ➢ it should be adapted to the requirements of the species concerned. ➢ it should be of a pool type, rocky ramp type, or a vertical slot ➢ flow velocities must not exceed the swimming capacity of fish	Records for flora & fauna Flow level monitoring sheet. Records of fish breeding time	Construction Contractor	CSMC/PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		➢ it should provide passage for all fish sizes - large and small, ➢ it should be provided with proper fencing, with total ban on fishing. (iv) **Trapping and hauling**. In unavoidable conditions, practice trapping of fish below the dam and transport them to another reservoir or further upstream to maintain fish diversity and gene pool.				
Soil contamination, Landscape and aesthetics	Impacts due to excess excavated earth, excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, and other similar items.	(i) Store fuel, oils, lubricants etc on impervious and protected areas, ensure spill control kits, and proper containments bunds to ensure no spillage (ii) Prepare and implement spoils management plan **(Appendix C-13)**; (iii) Avoid stockpiling of excess excavated soils; (iv) Coordinate with ULB/PIU for beneficial uses of excess excavated soils or immediately dispose to designated areas; (v) Recover used oil and lubricants and reuse or remove from the sites; (vi) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; (vii) Remove all wreckage, rubbish, or temporary structures which are no longer required; and (viii) Request PIU to report in writing that the necessary environmental	As per Appendix C-13.	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		restoration work has been adequately performed before acceptance of work.				
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 (iii) inform nearby community in advance about the nature and timings of disturbance	As per contingency plan	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
Ecological Resources – Terrestrial	Loss of vegetation and tree cover	(i) Minimize removal of vegetation and disallow cutting of trees; (ii) If tree-removal will be required, obtain tree-cutting permit from the Revenue Department; and (iii) Plant three native trees for every one that is removed.	-Records -Plant native tree species as per RUDSICO-EAP Policy	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
Land use	Environmental Issues due to land use change	The impact due to change in land use will be negligible due to this project.	-Latest land use records	Not applicable	PMU/ ULB	Not applicable
Accessibility	Traffic problems and conflicts near project locations and haul road	(i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites; (ii) Schedule transport and hauling activities during non-peak hours; (iii) Locate entry and exit points in areas where there is low potential for traffic congestion; (iv) Keep the site free from all unnecessary obstructions; (v) Drive vehicles in a considerate manner; (vi) Coordinate with Traffic Police for temporary road diversions and with for	As per Traffic Management Plan given in **Appendix C-14.**	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		provision of traffic aids if transportation activities cannot be avoided during peak hours; (vii) Notify affected sensitive receptors 1-week in advance by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints. (viii) Plan and execute the work in such a way that the period of disturbance/ loss of access are minimum. (ix) Provide pedestrian access in all the locations until normalcy is restored.				
Socio-Economic – Income.	Impede the access of residents and customers to nearby shops	(i) Prepare and implement spoils management plan (**Appendix C-13**). Contractor to Implement RP and to follow mitigation measures prescribed such as- (ii) Leave spaces for access between mounds of soil; (ii) Provide walkways and metal sheets where required for people; (iii) Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools; (iv) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and (v) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.	-Visible and understandable sign boards in construction zone; -Construction Implementation Schedule	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Socio-Economic - Employment	Generation of temporary employment and increase in local revenue	(i) Employ at least 50% of the labour force, or to the maximum extent, local persons within the 2-km immediate area if manpower is available; (ii) Secure construction materials from local market. (iii) Comply with labor laws	-Employment records	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
Occupational Health and Safety	Occupational hazards which can arise during work	(A) Comply with all national, state and local core labor laws (see **Appendix C12** of this IEE) (B) Ensure that qualified EHS personnel is deputed to look the H&S matter (i) Develop and implement site-specific occupational health and safety (OH&S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use personal protective equipment like helmet, gumboot, safety belt, gloves, nose musk and ear plugs; (c) OH&S Training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents; (ii) Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site; (iii) Provide medical insurance coverage for workers; (iv) Secure all installations from unauthorized intrusion and accident risks; (v) The project area experiences extreme temperature during summer months of April and May, which may	-Visual inspection -Records -Work schedule -Noise level monitoring in work area -Visible first aid equipment and medical supplies -Condition in H&S plan -Area secured -Trenches barricaded -Supply of water -Providing clean drinking water in worker areas. -Visible and understandable sign boards in construction zone -H&S plan including appropriate	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

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

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and (xii) Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively. (xiii) Provide proper solid and liquid waste management program 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 & safety – asbestos containing material handling (AC pipes)	Hazardous working conditions due to presence of asbestos containing material / AC Pipes in work sites	(i) Develop and implement Comprehensive Asbestos Management Plan (CAMP); CAMP should be prepared during detailed design and should form part of the IEE; Engage experts on asbestos management to develop the plan following international best practice such as the approach recommended by the United States Environmental Protection Agency (USEPA) (ii) CAMP inter alia, should include: a. Regulatory framework b. Identify location of AC pipes or Asbestos Containing Materials (ACM) in the existing facilities that are to be	ACM management prepared by DBO contractor and approved by PIU Quantity and characteristics of asbestos containing material removed/handled and disposed safety	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		rehabilitated and / or dismantled under the subproject, c. assesses the condition of such AC pipes and ACM, if any, d. procedures for monitoring its condition e. procedures to assess the locations where AC pipes / ACM present to avoid damage f. Awareness and training of staff/workers to avoid damage and prevent exposure g. Most appropriate, safe and least cost approach suitable for local conditions in managing existing AC pipes and ACM; h. AC pipes protocol to be applied in any instance that AC pipes are encountered, to ensure that appropriate action is taken. i. CAMP implementation arrangements and costs (iii) the plan should, inter alia assess, whether it is possible to lay new pipes without disturbing the underground AC pipes, accidentally or otherwise, whether it is appropriate to leave them in-situ in the ground without disturbing or more appropriate to remove the AC pipes and dispose in hazardous waste disposal sites, (iv) 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)				

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		removal of all persons to a safe distance; (b) usage of appropriate breathing apparatus and protective equipment by persons delegated to deal with the AC material; and (c) Procedures for the safe removal and long-term disposal of all asbestos-containing material encountered. (v) The project shall allocate specific budget in developing and implementing the CAMP (vi) Implement CAMP, and report compliance to ADB via Environmental Monitoring Reports				
Community Health and Safety.	Traffic accidents and vehicle collision with pedestrians during material and waste transportation	(i) Plan routes to avoid times of peak-pedestrian activities. (ii) Liaise with PIU/ULB in identifying high-risk areas on route cards/maps. (iii) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure. (iv) Provide road signs and flag persons to warn of on-going trenching activities.	As per Traffic Management Plan given in Appendix C-14.	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
Safety of sensitive groups (children, elders etc.) and others pedestrians in narrow streets	Trench excavation in in narrow streets will pose high risk to children and elders in the locality	(i) Provide prior information to the local people about the nature and duration of work (ii) Conduct awareness program on safety during the construction work (iii) Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day (iv) Provide barricades, and deploy security personnel to ensure safe	-H&S plan including appropriate signs for each hazard present -Construction vehicles condition in H&S plan.	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches				
Work Camps and work sites	Temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants Unsanitary and poor living conditions for workers	(i) Consult with PIU before locating project offices, sheds, and construction plants; (ii) Minimize removal of vegetation and disallow cutting of trees; (iii) Provide drinking water, water for other uses, and sanitation facilities for employees; (iv) Ensure conditions of livability at work camps are maintained at the highest standards possible at all times; (v) Train employees in the storage and handling of materials which can potentially cause soil contamination; (vi) Recover used oil and lubricants and reuse or remove from the site; (vii) Manage solid waste according to the preference hierarchy: reuse, recycling and disposal to designated areas; (viii) Ensure unauthorized persons especially children are not allowed in any worksite at any given time.	-Condition in list of preapproved sites for construction work camps, areas for stockpile, storage and disposal prepared by the Contractor.	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
Impacts due to night works (if required as per nature of works and feasibility at site)	Occupational hazards which can arise during work at night in extreme and unavoidable cases	(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 (iii) Preferably electrical connections is available for running equipment's otherwise sound proof/super silent	As per Management Plan for night works (Appendix C-18).	Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		Diesel Generator set should be available (iv) Sound level should not increase as per EMP (v) Illumination should be adequate as required according to nature of works (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 noise activity like hammering, cutting, crushing, running of heavy equipment's 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				

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		(xii) Horns should not be permitted by equipments 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 equipments 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				
Social and Cultural Resources	Risk of archaeological chance finds	(i) develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognized and measures are taken to ensure they are protected and conserved. This should involve: (ii) Conduct awareness training to contractor & supervision staff prior to start of excavation; (iii) Stopping work immediately to allow further investigation if any finds are suspected; (iv) Calling in the ASI/state archaeological department if a find is suspected, and taking any action they	Chance find protocol	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		require to ensure its removal or protection in situ (v) Consult with concerned religious authorities, nearby people and devotees in pre-construction phase and explain the work method and duration of proposed works, take their suggestions and comments and incorporate in design the mitigation measures required (vi) Adjacent to religious/social sites, undertake excavation and construction work in such a way that no structural damage is caused to the religious building. (vii) Observe the local rituals and important dates of festivals, weekly/monthly/annual religious occasions in the religious places and do not make any disturbance/hindrance/obstacles during such time to the religious places, (viii) provide proper signage, barricades etc. to protect public and devotees from dangers of construction works.				
Monsoon preparedness	Disruption of utilities and water logging in trenches	(i) As for a possible avoid trench works and excavation works (pipe laying) during monsoon season to avoid any water logging and accident due to it (ii) if open trenches are not avoidable during monsoon, keep ready all the mitigations measures to avoid water logging such as dewatering pumps and	As per monsoon preparedness plan& as per **Appendix C-19** "Guidelines for Safety during Monsoon/Heavy Rainfall"	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		sufficient pipes, traffic assistance, barricades etc. (iii) Guidelines for safety during monsoon is attached as **Appendix C-19**				
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	Availability and competency of appointed supervisor Monthly report	Construction contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
COVID-19 prevention and control during construction works	Health risk to workers due to COVID-19 virus	(i) provide face mask, hand gloves and sanitizers to workers during works (ii) Keep social distancing (iii) Educate workers about risks of COVID-19 (iv) Health check-up of workers suffering with symptoms of COVID-19 and test for same (v) isolation of workers suspected/suffering with COVID-19 and due medical care (vi) follow guidelines of WHO/Central/State/Local government and RUDSICO-EAP regarding COVID-19 (refer **Appendix C-24**)	Compliance of COVID-19 protocol and guidelines	Construction contractor	CMSC/ PIU	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	PIU/Consultant report in writing that (i)worksite is restored to original conditions; (ii)camp has been vacated and restored to	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		(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 regressed using the guidelines set out in the revegetation specification that forms part of this document. (vii) The contractor must arrange the cancellation of all temporary services. (viii) Request PIU to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.	pre-project conditions; (iii)All construction related structures not relevant to O&M are removed; and (iv) worksite clean-up is satisfactory.			

Table 32: Environmental Management Plan of Anticipated Impacts during Operation

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Water supply system operation: water treatment	Supply of water not meeting drinking water standards, health and environment issues due to operation of WTP	(i) Judiciously utilize the available water in Kota Barrage water and groundwater resources by adapting conjunctive use; prepare a water utilization plan every year post monsoon season depending on the water storage in Kota Barrage (ii) Ensure that dead storage is always maintained in Kota	Intake operation and Management Plan WTP operation and management plan Yearly Plan for available water from surface source and distribution demand and supply	DBO contractor	PIU/PHED	DBO contractor

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		Barrage; utilize only available live storage for water supply (iii) Prepare and implement Contingency Plan for low rainfall years that will result in low water levels in Kota Barrage; in such cases revise the water supply rate appropriately to ensure uninterrupted water supply throughout the year; provide prior information to stakeholders (iv) Ensure that water supplied to the consumers always meet the drinking water standards; carry out regular sampling and testing, and disseminative information (v) Ensure zero wastewater discharge from the water treatment process via collection and recirculation of process wastewater / backwash water; (vi) Implement sludge management plan; ensure collection, processing, drying, and safe disposal / reuse accordingly (vii) Assess composition and characteristics of sludge from the first batch operation at the initial phases, and confirm the handling,				

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		management and disposal/reuse actions suggested in the management plan (viii) Conduct periodic testing of sludge as per the environmental monitoring plan (ix) Ensure valid consent to operate (CTO) from S for operation of WTP (x) Ensure that all conditions/standards prescribed by RSPCB are compiled duly (xi) 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 (xii) Implement Emergency Response System (ERS) for the chlorine leakage; (xiii) Guidelines and Emergency plan for handling and storing chlorine is attached as **Appendix C-22**				
Construction disturbances, nuisances, public & worker safety	All work sites	Implementation of dust control, noise control, traffic management, & safety measures.	All the dust control will be done by water sprinkling measures at site, noise will be	Weekly during construction	Supervising staff and safeguards specialists	No costs required

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		Site inspection checklist to review implementation is appended at **Appendix C-16**	kept well within prescribed limits of standards, Follow Traffic management Plan as given in **Appendix C-16** and all the safety measures such as PPE's etc. Site inspection will be done as per checklist is given in **Appendix C-16**.			
Consent to Operate	Periodical renewal of consent to operate, if not done, may attract penal action from State Pollution Control Board	Renew the consent to operate (CTO) of WTP/STP before expiry date and follow all the conditions set forth in CTO	RSPCB	/PHED/O&M Contractor	PHED/O&M Contractor	PHED/O&M Contractor
Achieving targeted sludge reuse	Violation of ULB commitment under the project. Moreover, o land has been identified for safe sludge disposal. Hence, it is imperative to achieve the targeted sludge reuse under the project.	Ensure that the targeted sludge reuse is achieved throughout the project period	Records	O&M Contractor	O&M Contractor	O&M Contractor
Routine maintenance of CWR and other facilities to ensure delivery of safe drinking water	Health impact due to supply of unsafe drinking water in the system	Ensure periodical maintenance and cleaning of OHSRs, CWRs to ensure delivery of safe drinking water Periodical testing of treated water to ensure treated water quality meets the required standards	Maintenance Records	O&M contractor for 10 years and then PHED, Bundi	PHED, Bundi	O&M cost of contractor

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Leakages in water supply pipe lines	Entry of waste water into water supply pipes and health risk to public due to poor quality water	Ensure to identify and repair leakage immediately Strengthen grievance mechanism and attend the grievance of any leakage	Maintenance Records; Periodic Leakage Report;	O&M contractor for 10 years and then PHED, Bundi	PHED, Bundi	O&M cost of contract or
Asset management	Reduction in NRW Increased efficiency of the system	Preparation and implementation of O&M Manual	O&M Manual; Implementation Records;	O&M contractor for 10 years and then PHED, Bundi	PHED, Bundi	O&M cost of contract or

Table 33: Environmental Monitoring Plan of ambient air, noise, water and soil quality and other 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 C-16**	Weekly during construction	Supervising staff, EHS officer and safeguards specialists	No costs required
Tree cutting	WTP, Pipe laying, construction/ labour camps and CWR site	Tree cutting permit taken, Tree cutting done	Continuous	Supervising staff, EHS officer and safeguards specialists	Contractor
Construction, Labour Camp, storage yard Management	Construction, Labour Camp, storage yard sites	As per SEMP	Weekly	EHS officer, Environment Specialist of consultant	contractor
Solid waste management	Construction, Labour Camp, storage yard Management	As per SEMP	Weekly	EHS officer, Environment Specialist of consultant	contractor
Construction and demolition waste management	All construction site	As per SEMP and applicable rules and regulations	Monthly	EHS officer, Environment Specialist of consultant	contractor
Consent to establish of WTP, batching plants, crusher, hot mix plant. DG sets etc.	WTP, batching plants, crusher, hot mix plants etc.	Copies of Consents	Periodically	EHS officer, Environment Specialist of consultant	No cost required for monitoring cost for obtaining CTE/CTO from PMU and for others from Contractor
Ambient air quality	4 locations (WTP -1, CWR-1, Pipe laying-1,STP-1) during construction)	PM_{10}, $PM_{2.5}$, NO_2, SO_2, CO	Quarterly except Monsoon period	Contractor	Contractor
Ambient noise	4 locations (WTP -1, CWR-1, Pipe laying-1,STP-1) during construction)	Day time and nighttime noise levels	Quarterly	Contractor	Contractor

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Ground Water quality	3 locations (WTP -1, CWR-1,STP-1) during construction)	pH, TDS, Total Hardness, Zn, Chloride, Iron, Copper, DO, Manganese, Suplhate, Nitrate, Fluiride, Hg, Cadmium, Cr^{+6}, Arsenic, Lead, Total Alkalinity, Phosphate, Phenolic compound	Quarterly except Monsoon period	Contractor	Contractor
Surface water quality	1 Location (STP)	pH, Oil & grease, Cl, F, NO3, TC, FC, Hardness, Turbidity BOD, COD, DO, Total Alkalinity	Quarterly except Monsoon period	Contractor	Cost for implementation of monitoring measures responsibility of contractor
Soil quality	3 locations (WTP -1, CWR-1,STP-1) during construction)	pH, Elect. Conductivity (at 25^0C), Moisture (at 105^0C), 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	Quarterly except Monsoon period	Contractor	Contractor

Table 34: Environmental Monitoring Plan of Anticipated Impacts during Operation

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Monitoring of plantations	Plantations locations	Nos. of tree survived	monthly	DBO contractor/ PHED	DBO contractor
Consent to operate (CTO) from RSPCB	WTP	CTO should be renewed before expired	5 yearly	DBO contractor/ PHED	DBO contractor
Monitoring of quality of water supplied to consumers	Consumer end-random sampling in all zones	As per CPHEEO norms (refer **Appendix C-1**)	Daily	DBO contractor/ PHED	DBO contractor
Pipeline network to sustain operational	Pipeline network	to be included in O&M plan prepared under the project	Daily/when required	DBO contractor/ PHED	DBO contractor

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
efficiency and avoid early occurrence of leakages					
Reduction of NRW	Pipeline networks	As per RUDSICO-EAP norms	Daily/when required	DBO contractor/ PHED	DBO contractor
Monitoring of raw and treated sewage quality	Inlet of the STP Outlet of yhr STP	Suspended solids, pH, Temperature Oil and grease, Total residual chlorine, ammoniacal nitrogen (as N), BOD, COD, Nitrate Nitrogen, Faecal Coliform	As per RSPCB consent requirements	DBO Contractor / Operator	DBO contractor / operator costs
Consent to operate (CTO) from RSPCB	STP	CTO should be obtained prior to start of operation, and continuously renewed with RSPCB	As per RSPCB requirements	DBO Contractor / Operator	DBO contractor / operator costs
Sludge	Sludge Management	Heavy metals	Yearly once	DBO Contractor / Operator	DBO contractor / operator costs

B. Institutional Arrangements

301. The Local Self Government Department (LGSD) is the executing agency which is 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 Honourable 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 already established at state-level (Jaipur) and headed by a dedicated Project Director. The PIUs have two zonal offices (1 in Jaipur and 1 in Jodhpur). Each zonal office is 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.

302. At the PMU level, the Project Director is being supported by Additional Project Director (Chief Engineer-level) and a Chief Engineer, who are being supported by Dy Project Directors (Technical and Administration) and a financial advisor. There is one project officer for Social and another project officer for Environmental aspects within PMU.

303. The PMU is being 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 has engaged 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.

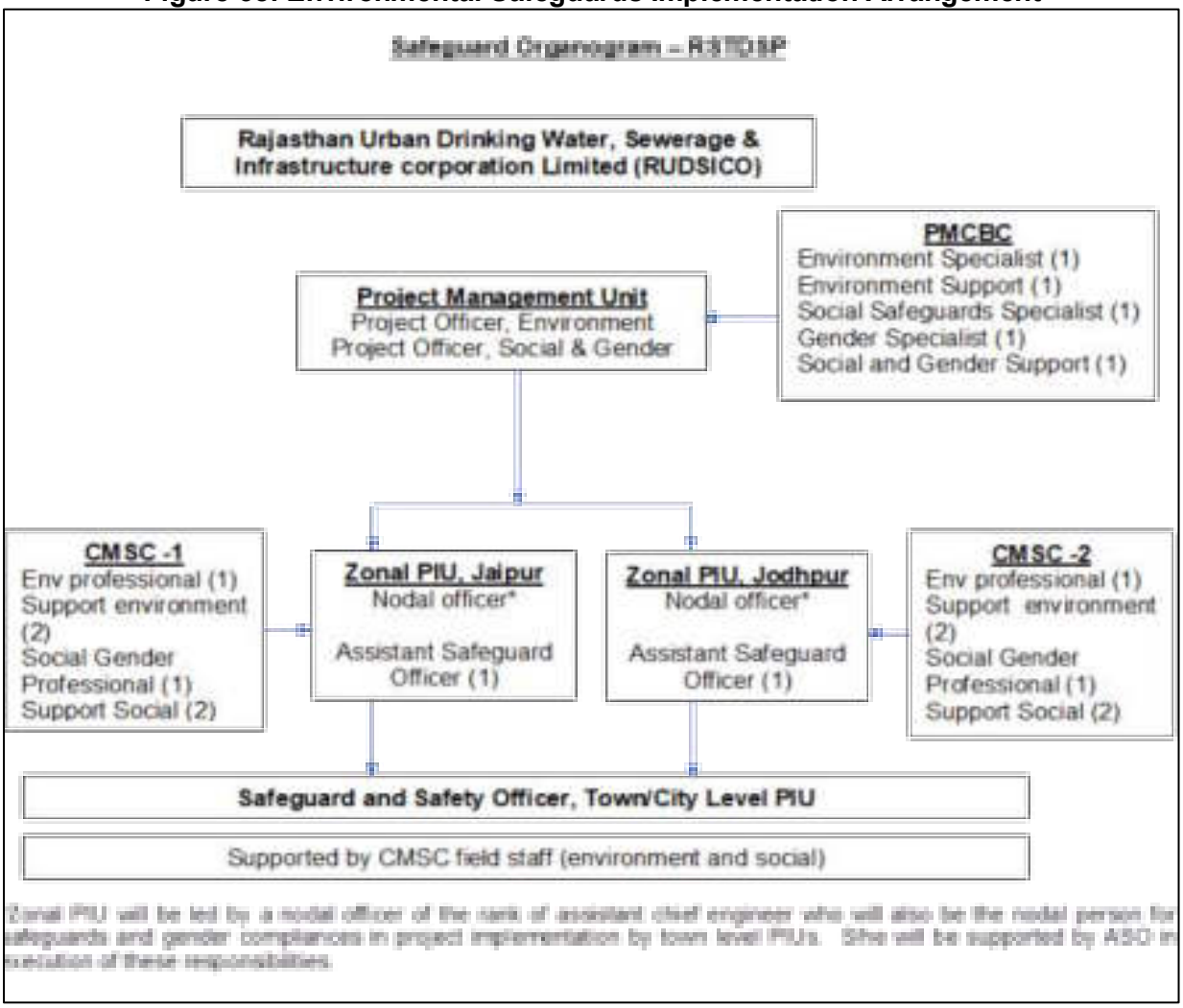
304. There are two zonal PIUs are already established in Jaipur and Jodhpur. One PIU shall be established at every town before award of new projects. PIUs at the town-level shall be headed by a Superintending Engineer / Executive Engineer, who shall work as Project Manager and shall sign the contract documents, manage the contract and disburse payments as Drawing and Disbursing Officer.

305. **Construction management and supervision consultants (CMSCs) -** 2 nos. of CMSCs. catering to Jaipur and Jodhpur units are already established. 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 prepare detailed plans for detour of traffic during excavation for pipe laying. The CMSCs 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.

306. **Community awareness and public participation consultants (CAPPC)-** CAPC core unit is already established at PMU, Jaipur and at fields in ongoing 14 project towns. CAPC field team and PIU already established in Bundi. CAPC is working closely in the field (with PIUs) to facilitate creation of project awareness and ensuring public participation for all project works at the community level. This 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.

307. Figure 38 shows Environmental Safeguards Implementation Arrangements within RUDSICO-EAP and **Table 35** summarize the institutional responsibility of environmental safeguards implementation at all stages of the project.

Figure 38: Environmental Safeguards Implementation Arrangement



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

309. The PMU is being supported by 3 institutional consultants under the supervision and control of PD, PMU: (i) the project management and capacity building consultants (PMCBC) is supporting the PMU; (ii) 2 CMSCs are supporting the 2 zonal PIUs and town-level PIUs; and (iii) CAPPC, is supporting the PMU, zonal PIUs and town-level PIUs.

310. **Zonal Project implementation units (Zonal PIUs).** There are 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 is also working as the Nodal Officer, Safeguards and Gender. Each Zonal PIU will be staffed with an assistant safeguards officer (ASO Environmental and Social Safeguards) who will assist PMU project officer (environment/social) in implementation of the environmental/social safeguards and

GESI action plan in PIUs under its jurisdiction. Zonal PIUs are doing internal monitoring and supervision and record observations throughout the project period to ensure that the safeguards and mitigation measures are provided as intended.

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.

311. **Town/City Level Project Implementation Unit.** The town-level PIUs [25] 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 Safeguard Professional of CMSCs will assist PIUs 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.

312. **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,[26] consultations with interested/affected people, (iv) field-level grievance redress; and (iv) reporting.

313. The Contractor will be required to submit to RUDSICO-EAP, 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.

314. A copy of the EMP or approved SEMP will be always kept on-site during the construction period. 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.

315. RUDSICO-EAP 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

[25] Presently 14 PIUs are established in all 14 towns where projects are ongoing, further PIUs shall be established in other towns before award of new packages

[26] 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.

transmitted diseases including HIV/AIDS, to employees and local communities surrounding the project sites.

Table 35: 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 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	(i) Over-all environmental safeguards compliance of the project (iii) Monitor and ensure compliance of EMPs as well as any other environmental provisions and conditions. (i) Review monthly monitoring report (ii) Prepare and submit to ADB semi-annual monitoring reports (iv) If necessary, prepare Corrective Action Plan and ensure implementation of corrective actions to ensure no environmental impacts; (iii) Review and submit Corrective Action Plans to ADB (iv) Organize capacity building programs on environmental safeguards (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	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**
	impacts or ineffective mitigation measures found during 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.		
PIU, Safeguard and Safety Officer (SSO)	(i) Ensure IEE is included in bid documents and contract agreements. Ensure cost of EMP implementation is provided. (iv) Disclose of approved EIAs/IEEs. (v) Obtain all necessary clearances, permits, consents, NOCs, etc. Ensure compliance to the provisions and conditions. (vi) EMP implementation regarding sites for disposal of wastes, camps, storage areas, quarry sites, etc. (vii) Organize an induction course for the training of contractors, preparing them on EMP implementation, environmental monitoring requirements related to mitigation measures, and on taking immediate action to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation.	(i) oversee day-to-day implementation of EMPs by contractors, including compliance with all government rules and regulations. (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	(i) Conducting environmental monitoring, as specified in the EMP. (ii) Issuance of clearance for contractor's post-construction activities as specified in the EMP.
Consultant – 1.PMCBC-Environmental Safeguard Specialist –	(i) Review IEE/EMP submitted by CMSC and revise report to submit to PMU	(i) Monitor EMP implementation (ii) Assist in addressing any grievances brought about through the Grievance	

Responsible Agency	Responsibility		
	Pre-Construction Stage	**Construction Stage**	**Post-Construction**
1 no. Asbestos Expert – 1no. Heritage Expert – 1no. Biodiversity Expert – 1no.	(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	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 (ii) Assist in summarizing IEE and translating to language understood by local people.	Monitoring of Implementation of EMP at site by contractor Recommend corrective action measures for non-compliance by contractors 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;	(i) Assist in the inspection and verification of contractor's post-construction activities.
Contractors (EHS Engineer)	(i) Review the IEE and provide information about changes needed as per revised design and scope of works to ESS of PMCBC for final revision of IEE (ii)Prepare EHS plan and take approval from CMSC/PIU and Ensure EMP implementation cost is included in the methodology. (iii) Undergo EMP implementation orientation by ESS of supervision consultant prior to start of works (iv) Provide EMP implementation orientation to all workers prior to deployment to worksites (v) Seek approval for camp sites and sources of materials.	(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 labour 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	(i) Ensure EMP post-construction requirements are satisfactorily complied (ii) Request certification from PIU

Responsible Agency	Responsibility		
	Pre-Construction Stage	**Construction Stage**	**Post-Construction**
	(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.	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.	

C. Capacity Building and Development

316. 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.

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

318. 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 36**.

Table 36: 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	All staff, ULBs and consultants involved in the project. At PMU, Jaipur	PMU cost

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

D. Monitoring and Reporting

319. 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.

320. 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.

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

322. 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 C-15**). Once concurrence from the ADB is received the report will be disclosed in the Project website.

323. The PMU will include safeguards implementation status in the quarterly progress report (QPR) using the suggested checklists 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 C-15**. 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.

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

324. Most of the mitigation measures require the contractors to adopt good site practice. DBO contractor being bound to adopt several mitigation measures through various legal obligations (e.g. BOCW Act, Labour acts etc.) such as use of PPEs, provide toilets and potable drinking water, labour camp management, safety at work sites, safety in equipment operations etc. which should be part of their normal procedures; are not included in EMP cost of this project. Mitigation that is the responsibility of PIU/ULB will be provided as part of their management of the project, so this also does not need to be duplicated here. Cost for the capacity building program is included as part of the project. Regardless of these, project specific costs of mitigation by the construction contractors are included in the EMP budget for the civil works are enumerated here (**Table 37**).

Table 37: Cost Estimates to Implement the EMP

S.N.	Particulars	Stages	Unit	Total Number	Rate (INR)	Cost (INR)	Costs Covered By
A.	**Mitigation Measures**						
1	Compensatory plantation measures*	Construction	per tree	15	4050	60,750	Civil works contract under DBO Contractor
	Subtotal (A)					**60,750**	
B.	**Monitoring Measures**						

S.N.	Particulars	Stages	Unit	Total Number	Rate (INR)	Cost (INR)	Costs Covered By
1	Air quality monitoring** (quarterly)	Pre-construction and Construction	per sample	24	4920	1,18,080	Civil works contract under DBO Contractor
2	Noise levels monitoring** (quarterly)	Pre-construction and Construction	Per sample	24	1980	47,520	Civil works contract under DBO Contractor
3	Groundwater quality** (quarterly)	Pre-construction and Construction	per sample	18	6720	1,20,960	Civil works contract under DBO Contractor
4.	Soil quality** (quarterly)	Pre-construction and Construction	per sample	18	5880	1,05,840	Civil works contract under DBO Contractor
5.	Surface Water** Quality (quarterly)	Pre-construction and Construction	per sample	6	6720	40,320	
	Subtotal (B)					**4,32,720**	
C.	**Capacity Building**						
1.	Introduction and sensitization to environment issues	Pre-construction	lump sum			100,000	PMU
2.	EMP implementation	Construction	lump sum			50,000	PMU
3.	Plans and Protocols	Construction	lump sum			25,000	PMU
			lump sum			25,000	Civil works contract under DBO 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	Civil works contract under DBO Contractor
	Subtotal (C)					**325,000**	
D	**Civil Works**						
1	Water Sprinkling for dust suppression	Construction	KL	2000	111	222,000	Civil works contract under DBO Contractor
2	Rainwater Harvesting for water conservation	Construction at proposed WTP sites	Nos.	2	438819	8,77,638	Civil works contract under DBO Contractor

S.N.	Particulars	Stages	Unit	Total Number	Rate (INR)	Cost (INR)	Costs Covered By
3	Implementation of Asbestos Management Plan (Inventory, Testing, Supervision and reporting) ***	Construction -	Lumpsum		-	7,000,000	Civil works contract under DBO Contractor
	Sub Total (D)					**80,99,638**	
4	**Barricading**						
	Providing and fixing Barricading using 40 mm dia M.S. pipe vertical and horizontal posts	Construction	m	16039	50	718405	Civil works contract under DBO Contractor
	Providing and fixing using 40 mm dia M.S. pipe ("B" class) as vertical post and PVC tape	Construction	m	16039	38.50	933172	Civil works contract under DBO Contractor
	Sub Total (D)					**16,51,577**	
E	**Grievance Redressal Mechanism**				Lump sum	350,000	Civil works contract under DBO Contractor
	Sub Total (F)					**350,000**	
	Total (A+B+C+D+E+F)				**INR**	**109,19,685**	

* After confirmatory survey by DBO contractor, tree cutting as envisaged during design period will not be required, only one Neem tree at CWR site is required to cut and same is done after getting permission form the authorities and compensatory plantation will be done as per RUDISCO policy. . However, in future if tree cutting is required due to change in alignment, permission for the same will be taken and compensatory plantation shall be done as per RUDISCO policy.

*** (Inventory, Testing, Supervision and reporting) for Asbestos Removal, Storage, Transportation, Disposal / Treatment, Documentation and Reporting)

F. Summary of EMP Cost incurred by Institution:

Contractor Cost - INR /- 109,19,685
PMU Cost - INR 275000/-
Total - INR 136,69,685.

(In Words: Rupees One Crore, Thirty-Six Lacs Sixty-Nine Thousand Six Hundred Eighty-Five)

Table 38: Details of Environment Monitoring Locations

Project components where environmental monitoring is required	Total numbers of environmental monitoring required in one quarter	Total numbers of environmental monitoring required in year (three quarters leaving quarter of monsoon)	Project duration	Total number of environmental monitoring required during project duration
WTP-1 CWR-1 STP-1 WS networks-1 **Total-4 Locations**	Air- 4 Noise- 4 Ground Water- 3 Surface Water-1 Soil- 3	Air- 12 Noise- 12 Ground Water- 9 Soil- 9 Surface Water-3	2 years	Air- 24 Noise- 24 Ground Water- 18 Soil- 18 Surface Water-6

IX. CONCLUSION AND RECOMMENDATION

325. The process described in this document has assessed the environmental impacts of all elements of the Bundi water supply & sewerage subprojects. 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 pipes 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 the pipes will be laid. A resettlement plan has been developed in accordance with ADB SPS 2009 and Government of India laws and regulations.

326. Presently source of water at Bundi town is surface water. The town is benefited from Kota Barrage in the Kota city. These are connected to existing WTP of capacity 26 MLD at Jakhmund and further supplied to Mangli H/W in the city & from there by pumping water is transferred to related various CWR to various overhead service reservoir & Direct pumping to Zone WDN. Total present production is approximately 26 MLD. At present, an intermittent water supply system is running in the town with actual service level 135 LPCD (frequency once in a day) at consumers' end, which is at par with standard of 135 LPCD. The supply duration is about 1 to 1.5 hours twice a day with low pressure.

327. The proposed water supply subproject for Bundi town is formulated to address gaps in water infrastructure in a holistic and integrated manner. The Project Components include improvements in water supply infrastructure to improve the service level of water supply as per PHED recommended norms of 135 LPCD.

328. Proposed sites of WTP, CWR and OHSR is located sufficiently away from habitation areas. At WTP site, there were 04 nos. of trees of Neem (*Azadirachta indica*), Safeda (*Eucaliotus* sp.), Sheesham (*dalbergia* sissoo), of various ages present at site . After the final approval of design & drawings no tree will be impacted at WTP site. . However, Due to alignment change of CWR(1200 KL) in same campus premises one number of Neem (Azadirachta indica) tree identified for which was impacted & found necessary to cut. Now tree has been cut after getting the approval of concerned authority (Appendix 12) and new plantation will be done as per the RUDISCO policy.. Adequate compensatory afforestation measures are being proposed under the project to counter the tree-cutting activity.

329. 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.

330. 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 redressing grievances, and describes the channels, timeframe, and mechanisms for resolving complaints about environmental performance.

331. The Environmental Management Plan proposed in the project includes mitigation measures for identified impacts, training and capacity building activities, a monitoring plan to ensure that the environmental standards are maintained throughout the project construction period and a reporting plan to ensure that the project is implemented as per environmentally sound engineering and construction practices. The budgetary provision for mitigating the anticipated impacts by proposed subproject component is made in the project for effective implementation of the EMP Plan.

332. The EMP will assist the PMU, PIU, Consultants 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 always 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.

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

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

A. Recommendations.

251. The applicable recommendation to this subproject based on the findings of draft IEE, as per this update the compliances status of the recommendations of draft IEE are as follows;

219. Recommendations which are already complied during current IEE update-

(i) Include this IEE in bid and contract documents; Complied
(ii) Conduct safeguards induction to the contractor upon award of contract; Complied
(iii) Ensure contractor appointed qualified environment, health and safety (EHS) officers prior to start of works; Complied
(iv) Involvement of contractors, including subcontractors, in first level GRM; Complied

220. Recommendations to be complied in final IEE

(v) Ensure that sludge management protocols are compliant with environmental regulations (Solid Waste Management Rules 2016 and its amendments) and solid waste disposal should have a designated site (dumping on vacant lot is not allowed); Being complied

(vi) Ensure that the construction and demolition waste generated from demolition is existing structure to be reused and disposed as per guidelines stipulated in Construction and Demolition Waste Management Rules 2016; Being complied

(vii) Timely disclosure of information and establishment of GRM; Being complied

(viii) Strictly supervise EMP implementation; Being complied

(ix) Continuous consultations with stakeholders; Being complied

(x) Documentation and reporting on a regular basis as indicated in the IEE; Being complied,

(xi) Commitment from PMU, PIUs, project consultants, and contractors to protect the environment and the people from any impact during project implementation: Being complied

(xii) Obtain all statutory clearances at the earliest time possible and ensure conditions/provisions are incorporated in the detailed design; Complied

(xiii) PMU to ensure adequate treatment capacity and treatment efficiency of WTP meeting National standards in compliance with government regulations; Being complied

(xiv) PMU to ensure CTO for existing WTP is applied and taken by PHED; being complied

(xv) Update/revise this IEE based on detailed design and/or if there are unanticipated impacts, change in scope, alignment, or location; Being complied

(xvi) Update and implement the asbestos management plan per site-specific conditions; Being complied

Appendix 1: REA Check list

Instructions:

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

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

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

Country/Project Title: India/Rajasthan Secondary Towns Development Investment Program (RSTDP)/ Bundi Water Supply Project Supply and Wastewater Project, Distt. Bundi, Rajasthan
Sector Division: Urban Development

REA Checklist- Water Supply

REA Checklist- Water Supply

SCREENING QUESTIONS	Yes	No	REMARKS
Water Supply			
A. Project Siting Is the project area			
▪ Densely populated?	√		WTP and Intake proposed under the project are in remote locations, whereas pipeline activities extend to the entire town including the densely populated areas. There are no major negative impacts envisaged, because pipeline will be located in unused government lands alongside the existing roads and can be constructed without causing disturbance to, houses, and commercial establishments. In narrow streets, disruption to road users is likely, and measure like best activity scheduling, alternative routes, prior information to road users, houses and shops will minimize the impact to acceptable levels.
▪ Heavy with development activities?	√		Bundi is a developing town; urban expansion is considerable
▪ Adjacent to or within, any environmentally sensitive areas?		√	No, Sensitive area around proposed STP area but few sensitive areas at proposed CWR (1200 KL) at Nainwa Road; Bundi. Details of Environmental Sensitive areas: 1. Govt. Naveen Primary School at distance of 502m from proposed CWR (1200 KL) 2. Govt. Senior Secondary School at distance of 370 m from proposed CWR (1200 KL)

REA Checklist- Water Supply

SCREENING QUESTIONS	Yes	No	REMARKS
			3. New Vasundhara School at distance of 400 m from proposed CWR (1200 KL)
• Cultural heritage site		√	Bundi has one ASI and 3 state protected monuments, nearest of them is state protected Rani ji ki Bawri about 270 m from distribution network. All these monuments are surrounded by houses and roads
• Protected Area		√	Bundi has several protected areas, but all proposed components are planned suitably away from the protected area. Nearest protected area is Ramgarh Vishdhari Sanctuary about 2 km from proposed CWR and OHSR site.
• Wetland		√	
• Mangrove		√	
• Estuarine		√	
• Buffer zone of protected area		√	
• Special area for protecting biodiversity		√	
• Bay		√	
A. Potential Environmental Impacts Will the Project cause…			
• Pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?		√	Raw water shall be taken from Kota Barrage, which is not polluted through waste water discharge from upstream side
• Impairment of historical/cultural monuments/areas and loss/damage to these sites?		√	Bundi has one ASI and 3 state protected monuments, nearest of them is state protected Rani ji ki Bawri about 271 m from distribution network site. All these monuments are surrounded by houses and roads
• Hazard of land subsidence caused by excessive ground water pumping?	√		Ground water pumping is being done by Municipal Board and PHED to meet out for current water supply to town,
• Social conflicts arising from displacement of communities?		√	Project does not involve land acquisition /displacement. No social conflicts envisaged
• Conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?	√		Prior allotment for raw water from Kota Barrage is done for proposed water supply of Bundi. Conflicts may arise when over exploitation of raw water is done. To avoid such conflict, meters shall be installed for amount of water taken from Kota Barrage
• Unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?	√		Raw water shall be taken from Kota Barrage, which may contain pathogens or mineral constituents, for which sufficient treatment of raw water will be required
• Delivery of unsafe water to distribution system?	√		A new WTP of 8 MLD capacity is proposed to cater delivery of safe water.
• Inadequate protection of intake works or wells, leading to pollution of water	√		Raw water will be taken from Kota Barrage which is protected by Irrigation Department

REA Checklist- Water Supply

SCREENING QUESTIONS	Yes	No	REMARKS
supply?			
• Over pumping of ground water, leading to salinization and ground subsidence?		√	Ground water pumping is being done by Municipal Board and PHED to meet out for current water supply to town, after completion con construction only allotted surface water will be used
• Excessive algal growth in storage reservoir?	√		There has been noted algal growth in old reservoirs and therefore refurbishment of these old reservoirs are planned in this project. Periodical maintenance regime should be followed during O&M period to check algal growth in the system
• Increase in production of sewage beyond capabilities of community facilities?		√	STP is already constructed under separate project (UIDSSMT). Sewerage system has been designed considering water supply at the rate of 135 lpcd, keeping in mind for future waste water discharge. Proposed water supply project under RSTDSP is also considering water supply at the rate of 135 lpcd, therefore both the projects will meet out the standards.
• Inadequate disposal of sludge from water treatment plants?	√		Sludge from new WTP to be constructed will need appropriate disposal. Contractor has to submit disposal plan for sludge emerged from WTPs
• Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?		√	Proposed site for WTP and pump houses are in remote location where no habitation exist therefore there will be no problem to public due to increased noise
• Impairments associated with transmission lines and access roads?		√	Old transmission lines will be replaced with new transmission line on existing ROWs therefore no such problem will emerge
• Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.	√		Chlorination is proposed in WTP where utmost care is needed during design stage to avoid any health impact on workers/operators
• 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?	√		Health and safety hazard may be caused during operation of chlorination plant in WTP
• Dislocation or involuntary resettlement of people		√	There is no resettlement of people for project implementation. Resettlement Plan is also prepared for temporary impacts on vendors
• disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	No such impact is envisaged

REA Checklist- Water Supply

SCREENING QUESTIONS	Yes	No	REMARKS
• Noise and dust from construction activities?	√		All the construction machineries employed should comply with noise emission standards of Central Pollution Control Board. Dust suppression measures such as water sprinkling will be employed
• Increased road traffic due to interference of construction activities?	√		Excavation and laying pipelines along public roads will interfere with the traffic. Construction material transport will increase traffic within city. Proper traffic management and construction planning will be ensured to minimize the interference
• Continuing soil erosion/silt runoff from construction operations?	√		Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
• Delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?	√		There is possibility of delivery of unsafe water due to poor O&M of treatment facilities. O&M contractor has to ensure the quality of water to be supplied. Penalty provisions has been taken in O&M contract for delivery of unsafe drinking water
• Delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?	√		Not envisaged, pipes of corrosion free materials should be used in the project and provision should be made in designs
• Accidental leakage of chlorine gas?	√		Accidental leakage of chlorine gas may take place during chlorination. Utmost care should be taken
• Excessive abstraction of water affecting downstream water users?		√	Only water allocated for the water supply from Kota Barrage shall be used for proposed project.
• Competing uses of water?		√	Only water allocated for the water supply from Kota Barrage shall be used for proposed project.
• Increased sewage flow due to increased water supply	√		Sewerage system is already under progress in the town
• Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	Most of the unskilled workers will be hired locally, some of skilled workers will be brought from outside but numbers will not so large to have impacts on social infrastructure and services
• Social conflicts if workers from other regions or countries are hired?		√	The contractor will be utilizing the local labour force as far as possible; in case if it is unavoidable, labour camps and facilities will be provided appropriately. No conflicts envisaged
• 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		√	No explosives shall be used in project. Fuel and other chemicals will be used in very less quantities which will not have significant impact on community health and safety. Safe

REA Checklist- Water Supply

SCREENING QUESTIONS	Yes	No	REMARKS
during operation and construction?			handling of fuels and chemicals will be ensured by contractor.
• Community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	√		Community safety risk may be there during construction during excavation for pipe laying, equipment and vehicle operation, construction of WTP etc. for which mitigation measures will be required by contractor

REA Checklist- Sewerage Treatment

SCREENING QUESTIONS	**Yes**	**No**	**REMARKS**
A. Project Siting Is the project area…			
Densely populated?	√		Subproject activities are scattered to entire town including the densely populated areas.
Heavy with development activities?	√		Bundi is a developing town with continuous urban expansion, there are no major industries and mostly agriculture, business and service are the common occupations
Adjacent to or within any environmentally sensitive areas?		√	There are no environmental sensitive areas near the proposed sites.
Cultural heritage site		√	Bundi has 3 State protected and one ASI protected monument nearest of them is state protected Rani ji KI Bawri is about 6 km form proposed STP site in Northern direction
Protected Area		√	
Wetland		√	
Mangrove		√	
Estuarine		√	
Buffer zone of protected area		√	
Special area for protecting biodiversity		√	
Bay		√	
Potential Environmental Impacts Will the Project cause…			
Impairment of historical/cultural monuments/areas and loss/damage to these sites?		√	Bundi has 3 State protected and one ASI protected monument nearest of them is state protected Rani ji KI Bawri is about 6 km form proposed STP site in Northern direction

SCREENING QUESTIONS	Yes	No	REMARKS
Interference with other utilities and blocking of access to buildings; nuisance to neighboring areas due to noise, smell, and influx of insects, rodents, etc.?	√		Construction work may interfere with the water supply, power and communication lines. Access to houses and business may be affected during pipe laying works. Construction works may cause nuisance to public in form of traffic disturbance, utility disruption, increased noise and air pollution. Proposed STP sites are located away from inhabited areas. Adequate green buffer around the site will be provided to minimize the nuisance due to bad odour, if any.
dislocation or involuntary resettlement of people		√	Project does not involve land acquisition / involuntary resettlement /displacement. During the sewer construction, particularly in narrow streets there may be temporary disruption to household and there will also be temporary loss of livelihood to roadside vendors, the same is addressed in the Resettlement Plan.
disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	
Impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage?		√	Treated water shall not be disposed into any surface water source. Nevertheless, there is proposal of reuse of treated effluent from STP and unused treated effluent shall be discharged into nearby land or drains, therefore treated effluent needs to meet prescribed standards set by the Central Pollution Control Board (CPCB).
Overflows and flooding of neighboring properties with raw sewage?		√	Raw sewage shall not cause any flooding and overflowing and will be ensured through regular operation and maintenance.
Environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers?	√		Inadequate sludge disposal may cause environmental pollution (soil and Water) This sewerage system will cater only domestic waste water, no industrial wastewater discharge is allowed into the sewerage system. As a precaution, ULB should take responsibilities that wastewater from industrial units should not be allowed into sewers.
Noise and vibration due to blasting and other civil works?		√	Blasting for underground works is prohibited in RUDSICO-EAP works
risks and vulnerabilities related to occupational health and safety due to physical, chemical, and biological hazards during project construction and operation?	√		Occupational health and safety risks are negligible due to chemical and biological hazards during construction in sewerage works, physical hazards may arise due to safety risks during construction works. During operation of sewerage system physical and biological hazards may cause health and safety risks to workers for which mitigation measures will be required
Discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers?		√	This sewerage system will cater only domestic wastewater, no industrial wastewater discharge is allowed into the sewerage system.

SCREENING QUESTIONS	Yes	No	REMARKS
Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances, and protect facilities?		√	STP is located away from habitation. ULB will be required to make provision of buffer zone of 200 mts for STP.
Road blocking and temporary flooding due to land excavation during the rainy season?	√		Road blocking/diversion will be done during pipe laying with prior permission from concerned authorities. Contractor has to prepare proper traffic management plan before excavation on roads. Underground construction works (sewer laying, foundations) will be carried out in non-monsoon period. In Bundi, rainfall is scanty and confined only to a limited period. No impacts envisaged
Noise and dust from construction activities?	√		Road cutting (cement and bituminous roads) for sewer laying works is likely to generate noise and dust. Scheduling of works appropriately and prior information to the affected people will minimize the impact. Dust generation will be controlled through water sprinkling, immediate transportation of excess soil, covered transport etc.
traffic disturbances due to construction material transport and wastes?	√		Linear activities like sewer laying along the roads is likely to disrupt traffic. Vehicle movement for construction purpose will increase the traffic. Identification of alternate routes, allowing limited - at least one-way traffic, prior information about the works and alternative arrangements, providing information/sign boards etc. will reduce the impact.
temporary silt runoff due to construction?	√		Mitigation measures will be required for checking temporary silt runoff from construction activities
hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?	√		Sewerage system will be designed with applicable standards. Adequate trained staff and necessary equipment will be in place for regular operation and maintenance of the system. Proposed treatment system will be efficient and appropriate repair and maintenance procedure will be developed. Sufficient funds for operation will be ensured. Backup power supply system is part of project.
deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?		√	No untreated/partially treated sewage will be disposed into any surface water body. STP is designed to meet the peak demand. Regular monitoring of treated water will be conducted to check the treatment efficiency.
contamination of surface and ground waters due to sludge disposal on land?		√	Digested Sludge from reactors will be disinfected to be contamination free and will be collected, and stabilized / dried before disposal/reuse. This process will ensure the dried sludge is harmless.

SCREENING QUESTIONS	Yes	No	REMARKS
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?		√	It is unlikely that sewage contain hazardous substances. Necessary apparatus and personal protection equipment will be provided. Staff will be trained in safe handling of sewage and sludge, and in cleaning of sewers.
large population increase during project construction and operation that causes increased burden on social infrastructure (such as sanitation system)?		√	Most of the unskilled workers will be hired locally, some of skilled workers will be brought from outside but numbers will not so large to have impacts on social infrastructure and services.
Social conflicts between construction workers from other areas and community workers?		√	The contractor will be utilizing the local labour force as far as possible; in case if it is necessary, labour camps and facilities will be provided appropriately. 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?		√	No explosives shall be used in project. Fuel and other chemicals will be used in very less quantities which will not have significant impact on community health and safety. Safe handling of fuels and chemicals will be ensured by contractor.
community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	√		Community safety risk may be there during construction during excavation for pipe laying, equipment and vehicle operation, construction of STP etc. for which mitigation measures will be required by contractor

Checklist for Preliminary Climate Risk Screening

Country/Project Title: India/Rajasthan Secondary Towns Development Investment Program (RSTDP), Bundi Water Supply Project, District Bundi, Rajasthan
Sector : Urban Development
Subsector: Water Supply
Division/Department:

Screening Questions		Score	Remarks[1]
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	Water source for project is Kota Barrage, excessive or low rainfall may affect the whole system during operation phase
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters	0	No such issue may affect the project

[1] 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.

	(e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?		
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	No such issues may affect the project
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	0	No such issue may affect the project
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	No problem will envisaged in future which likely affect the performance of project output

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

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

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

Other Comments: The proposed subproject activity involves construction of one STP, CWRs and pump houses along with water supply and sewerage networks and the anticipated environmental impacts are very marginal and the construction activity does not impose any threat to the existing climatic conditions.

Appendix 2: Public Consultation with Attendance Sheet during Social and Environmental Impact Assessment and Stakeholder Consultation with Community Awareness Programme Meeting

Consultations during Social and Environmental Impact Assessment

Various consultations were done during social and environmental impact assessment of the project with residents of the town at various locations to understand their level of satisfaction about the present water supply and sewerage conditions in town and also to understand their awareness about the proposed works and their willingness/acceptance of the proposed works under RUSTDIP. Details of these consultations are given below-

Public Consultations During April 2022

S. No	Date of Consultation	Location	Topic Discussed	Outcome
1	07th April 2022	Existing STP (8 MLD) Ram Gunj Balaji. Mahindra Gujjar Bharu Lal Bhawar Singh **Male: 03** **Female: 00** **Total-03**	• Project components under RSTDSP and the benefits to the community • Grievance redressal mechanism under the project. • Present Status of Water Supply and Waste Water services in town • Presence of any forest, wildlife or any sensitive/unique environmental components nearby the project, • Presence of historical/ cultural/ religious sites nearby. • Unfavourable climatic condition • Willingness to Reuse the STP treated water. • Status of land and present vegetation at proposed land, reuse of treated effluent from STP	• Grievance mechanism and process of loading complaints briefed with participants. • It was also informed by habitations that water supply is being provided by PHED but it's intermittent on alternate days and quality of water is also not good. Sewerage facility is not available in the town; most of households having their own Septic tanks or soak pits. • No wildlife present at proposed STP site • Participants are happy with proposed project. • There is not any forest, wildlife or any sensitive /unique environmental, component near the project area. • There are not any historical/cultural and religious sites in nearby the subproject area Weather is Bundi is comfortable up to April and becomes hot from May to July, rains are normal to heavy
2	07th April 2022	Location: -OHSR Vikas Nagar Ward no.02	. • Project components under RSTDSP and the benefits to the community	• Grievance mechanism and process of loading complaints briefed with participants. • It was also informed by habitations that water supply is being provided by PHED but

S. No	Date of Consultation	Location	Topic Discussed	Outcome
		Balwan Mahesh Deepak Anupam Amit Eshwar **Male: 06** **Female: 00** **Total-06**	• Grievance redressal mechanism under the project. • Present Status of Water Supply and Wastewater services in town • Dust and noise pollution and disturbances during construction work. • Perception of villagers on tree felling and afforestation • Safety of residents during construction phase and applying of vehicle for construction activities • Status of land and present vegetation at proposed land, reuse of treated effluent from STP.	it's intermittent on alternate days and quality of water is also not good. Sewerage facility is not available in the town; most of households having their own Septic tanks or soak pits. • Participants are happy with proposed project • The contractor should take care of the safety arrangement during construction phase and should provide traffic diversion routes to avoid the vehicle congestion • People should be made aware before start of work in particular area. • Water sprinkling should be done during construction works to reduce dust. People are not having problem from construction noise
3	8th April 2022	Location-CWR Nainwa Road, Near by Post Office. Pappu Sen Bherolala Chandra Prakash Paras Lokesh Bhavarlal Satya Narayan **Male: 07** **Female: 00** **Total-07**	• Project components under RSTDSP and the benefits to the community • Grievance redressal mechanism under the project. • Present Status of Water Supply and Wastewater services in town • Presence of any forest, wildlife or any sensitive/unique environmental components nearby the project, • Presence of historical/ cultural/ religious sites nearby. • Willingness to Reuse the STP treated water. • Status of land and present vegetation at proposed land.	• Grievance mechanism and process of loading complaints briefed with participants. • It was also informed by habitations that water supply is being provided by PHED but it's intermittent on alternate days and quality of water is also not good. Sewerage facility is not available in the town; most of households having their own Septic tanks or soak pits. • Participants are happy with proposed project and are willing to pay for improved quality of water and sewerage services. • There is not any forest, wildlife or any sensitive /unique environmental, component near the project area. • There are not any historical/cultural and religious sites in nearby the subproject area

S. No	Date of Consultation	Location	Topic Discussed	Outcome
4	8th April 2022	Distribution Line Location-Ganesh Ji Gali Ward No-12 & 13 Tilak chowk Ram Babu Brij Bihari Bharat Sharma Hamid Nitesh Gautam Washim Khan Abdul Salim **Male: 07** **Female: 00** **Total-07**	Project components under RSTDSP and the benefits to the community • Grievance redressal mechanism under the project. • Present Status of Water Supply and Wastewater services in town • Presence of any forest, wildlife or any sensitive/unique env ironmental components nearby the project, • Presence of historical/ cultural/ religious sites nearby. • Unfavourable climatic condition • Willingness to Reuse the STP treated water. • Status of land and present vegetation at proposed land, reuse of treated effluent from STP	• Grievance mechanism and process of loading complaints briefed with participants. • It was also informed by habitations that water supply is being provided by PHED but it's inte rmittent on alternate days and quality of water is also not good. Sewerage facility is not available in the town; most of households having their own Septic tanks or soak pits. • No wildlife present at proposed STP site • Participants are happy with proposed project. • There is not any forest, wildlife or any sensitive /unique environmental, component near the project area. • There are not any historical/cultural and religious sites in nearby the subproject area Weather is Bundi is comfortable up to April and becomes hot from May to July, rains are normal to heavy
5	8th April 2022	Distribution Line Location-Dhanmal Ji Chowk & Nahar Chotta. Ward No.5 Omprakash saini Imran Chandra prakash **Male: 03** **Female: 00** **Total-03**	. • Project components under RSTDSP and the benefits to the community • Grievance redressal mechanism under the project. • Present Status of Water Supply and Wastewater services in town • Dust and noise pollution and disturbances during construction work. • Perception of villagers on tree felling and afforestation	Grievance mechanism and process of loading complaints briefed with participants. • It was also informed by habitations that water supply is being provided by PHED but it's intermittent on alternate days and quality of water is also not good. Sewerage facility is not available in the town; most of households having their own Septic tanks or soak pits. • Participants are happy with proposed project • The contractor should take care of the safety arrangement during construction phase and should provide traffic diversion routes to avoid the vehicle congestion

S. No	Date of Consultation	Location	Topic Discussed	Outcome
			• Safety of residents during construction phase and applying of vehicle for construction activities • Status of land and present vegetation at proposed land, reuse of treated effluent from STP.	• People should be made aware before start of work in particular area. • Water sprinkling should be done during construction works to reduce dust. People are not having problem from construction noise
6	8th April 2022	Distribution Line Location-Nahar ji Ka chotha Ward No.9 **Male: 07** **Female: 00** **Total-07**	• Project components under RSTDSP and the benefits to the community • Grievance redressal mechanism under the project. • Present Status of Water Supply and Wastewater services in town • Presence of any forest, wildlife or any sensitive/unique environmental components nearby the project, • Presence of historical/ cultural/ religious sites nearby. • Willingness to Reuse the STP treated water. • Status of land and present vegetation at proposed land.	• Grievance mechanism and process of loading complaints briefed with participants. • It was also informed by habitations that water supply is being provided by PHED but it's intermittent on alternate days and quality of water is also not good. Sewerage facility is not available in the town; most of households having their own Septic tanks or soak pits. • Participants are happy with proposed project • The contractor should take care of the safety arrangement during construction phase and should provide traffic diversion routes to avoid the vehicle congestion • People should be made aware before start of work in particular area. • Water sprinkling should be done during construction works to reduce dust. People are not having problem from construction noise • Grievance mechanism and process of loading complaints briefed with participants. • It was also informed by habitations that water supply is being provided by PHED but it's intermittent on alternate days and quality of water is also not good. Sewerage facility is not available in the town; most of households having their own Septic tanks or soak pits.

S. No	Date of Consultation	Location	Topic Discussed	Outcome
				• Participants are happy with proposed project and are willing to pay for improved quality of water and sewerage services. • There is not any forest, wildlife or any sensitive /unique environmental, component near the project area. • There are not any historical/cultural and religious sites in nearby the subproject area
7.	8th April 2022	Distribution Line Location-Suraj Ji Ka Bada Ward No.5 **Male: 04** **Female: 00** **Total-04**	• Project components under RSTDSP and the benefits to the community • Grievance redressal mechanism under the project. • Present Status of Water Supply and Wastewater services in town • Presence of any forest, wildlife or any sensitive/unique environmental components nearby the project, • Presence of historical/ cultural/ religious sites nearby. • Willingness to Reuse the STP treated water. • Status of land and present vegetation at proposed land.	• Grievance mechanism and process of loading complaints briefed with participants. • It was also informed by habitations that water supply is being provided by PHED but it's intermittent on alternate days and quality of water is also not good. Sewerage facility is not available in the town; most of households having their own Septic tanks or soak pits. • Participants are happy with proposed project • The contractor should take care of the safety arrangement during construction phase and should provide traffic diversion routes to avoid the vehicle congestion • People should be made aware before start of work in particular area. • Water sprinkling should be done during construction works to reduce dust. People are not having problem from construction noise • Grievance mechanism and process of loading complaints briefed with participants. • It was also informed by habitations that water supply is being provided by PHED but it's intermittent on alternate days and quality of water is also not good. Sewerage facility is not available in the town; most of

S. No	Date of Consultation	Location	Topic Discussed	Outcome
				households having their own Septic tanks or soak pits. • Participants are happy with proposed project and are willing to pay for improved quality of water and sewerage services. • There is not any forest, wildlife or any sensitive /unique environmental, component near the project area. • There are not any historical/cultural and religious sites in nearby the subproject area
8.	8th April 2022	Transmission Line Location-Shukla baori, Kagjidewra, Toap Khana, Near Purana PHED campus **Male: 02** **Female: 00** **Total-02**	• Project components under RSTDSP and the benefits to the community • Grievance redressal mechanism under the project. • Present Status of Water Supply and Wastewater services in town • Presence of any forest, wildlife or any sensitive/unique environmental components nearby the project, • Presence of historical/ cultural/ religious sites nearby. • Willingness to Reuse the STP treated water. Status of land and present vegetation at proposed land.	• Grievance mechanism and process of loading complaints briefed with participants. • It was also informed by habitations that water supply is being provided by PHED but it's intermittent on alternate days and quality of water is also not good. Sewerage facility is not available in the town; most of households having their own Septic tanks or soak pits. • Participants are happy with proposed project • The contractor should take care of the safety arrangement during construction phase and should provide traffic diversion routes to avoid the vehicle congestion • People should be made aware before start of work in particular area. • Water sprinkling should be done during construction works to reduce dust. People are not having problem from construction noise • Grievance mechanism and process of loading complaints briefed with participants. • It was also informed by habitations that water supply is being provided by PHED but it's intermittent on alternate days and

S. No	Date of Consultation	Location	Topic Discussed	Outcome
				quality of water is also not good. Sewerage facility is not available in the town; most of households having their own Septic tanks or soak pits. • Participants are happy with proposed project and are willing to pay for improved quality of water and sewerage services. • There is not any forest, wildlife or any sensitive /unique environmental, component near the project area. • There are not any historical/cultural and religious sites in nearby the subproject area

Attendance Sheet of Public Consultation

Consultation with Stakeholders (Planning/Implementation Phase)

Project Town: Bundi

Date: 07/04/2022

Name of the project: Upgradation STP (Existing 2 MLD)

Place of consultation: Ram Ganj Balaji, Bundi, STP Area

S.No.	Name and mobile no.	Occupation and Address	Topics Discussed	Outcome of the consultation	Signature
1	Mahinder Gurjar [illegible]	Tea stall	1. Awareness about the project 2. Present status of site/project 3. Status of water supply/ SWM/sewerage in town 4. Requirement of any tree cutting due to project 5. Presence/movement of wild fauna at project town/project sites 6. Whether project is beneficial for citizens and increase citizen's convenience 7. Whether project is causing any livelihood impact to someone 8. Any historical or cultural monuments in town/near project sites 9. Any suggestion about the project 10. Any other relevant information found at site	Community People are in favour of Proposal Project	[illegible]
2	[illegible]	Tea Stall		" "	[illegible]
3	Bhawani Singh [illegible]	Farmer		" "	[illegible]
4					
5					
6					
7					

Name and Signature of the person who done consultation: Mini Kumar/[illegible]

Rajasthan Secondary Town Development Sector Project (RSTDSP-Ph-IV)

Consultations with Stakeholders

Project Town: Bundi

Name of Project: Water supply, STP, [illegible]

Date: 07/04/2021

Place of Consultation: नगर परिषद

Attendance Sheet

S.N.	Name	Occupation	Mobile Number	Signature
1	/			
2	Mini Kumar	Safeguard Support Engineer	8360043214	[illegible]
3	Nasir Hasan	Social Safeguard Expert	9610105136	[illegible]
4	Sanjiv Luna	Safeguard [illegible]	9602408089	Sanjiv
5	Dinesh	A.En	9785450201	[illegible]
6	RAJIVANSHARMA		8432422475	[illegible]
7				
8				
9				

Consultation with Stakeholders (Planning/Implementation Phase)

Project Town: Bundi

Date: 08/04/2022

Name of the project: CNR

Place of consultation: Vikas Nagar, Ward No. [illegible]

S.No.	Name and mobile no.	Occupation and Address	Topics Discussed	Outcome of the consultation	Signature
1	Balram Mob. [illegible]	Transport Manager	1. Awareness about the project 2. Present status of site/project 3. Status of water supply/ SWM/sewerage in town 4. Requirement of any tree cutting due to project 5. Presence/movement of wild fauna at project town/project sites 6. Whether project is beneficial for citizens and increase citizen's convenience 7. Whether project is causing any livelihood impact to someone 8. Any historical or cultural monuments in town/near project sites 9. Any suggestion about the project 10. Any other relevant information found at site	Community People are in the favour of Proposed Project development	[signature]
2	Mahesh Mob. [illegible]	Transport Cashier		- -	[signature]
3	Deepak Mob. [illegible]	Supervisor		- -	[signature]
4	Anupam Mob. [illegible]	Bussiness		- -	[signature]
5	Amit Mob. [illegible]	Shop keeper		- -	[signature]
6	[illegible] Mob. [illegible]	Bussiness		- -	[signature]
7					

Name and Signature of the person who done consultation: Mani Kumar / [signature]

Consultation with Stakeholders (Planning/Implementation Phase)

Project Town: Bundi

Date: 08/04/2022

Name of the project: CNR

Place of consultation: [illegible] Road, Near By Post office

S.No.	Name and mobile no.	Occupation and Address	Topics Discussed	Outcome of the consultation	Signature
1	[illegible] [illegible]	[illegible]	1. Awareness about the project 2. Present status of site/project 3. Status of water supply/ SWM/sewerage in town 4. Requirement of any tree cutting due to project 5. Presence/movement of wild fauna at project town/project sites 6. Whether project is beneficial for citizens and increase citizen's convenience 7. Whether project is causing any livelihood impact to someone 8. Any historical or cultural monuments in town/near project sites 9. Any suggestion about the project 10. Any other relevant information found at site	Community People are in the favour of Proposed Project development	[thumb impression]
2	[illegible] [illegible]	[illegible]		- -	[signature]
3	[illegible] [illegible]	[illegible]		- -	[signature]
4	[illegible] [illegible]	[illegible]		- -	[signature]
5	[illegible] [illegible]	[illegible]		- -	[signature]
6	[illegible] [illegible]	[illegible]		- -	[signature]
7	[illegible] [illegible]	[illegible]		- -	[signature]

Name and Signature of the person who done consultation: Mani Kumar / [signature]

Consultation with Stakeholders (Planning/Implementation Phase)

Project Town: Bundi

Date: 05/04/2022

Name of the project: Water Supply Distribution Line.

Place of consultation: [illegible] Ward No. 18 & Tilak Chowk [illegible]

S.No.	Name and mobile no.	Occupation and Address	Topics Discussed	Outcome of the consultation	Signature
1	Ram Babu Sharma Mob. [illegible]	Shopkeeper	1. Awareness about the project 2. Present status of site/project 3. Status of water supply/ SWM/sewerage in town 4. Requirement of any tree cutting due to project 5. Presence/movement of wild fauna at project town/project sites 6. Whether project is beneficial for citizens and increase citizen's convenience 7. Whether project is causing any livelihood impact to someone 8. Any historical or cultural monuments in town/near project sites 9. Any suggestion about the project 10. Any other relevant information found at site	Community People are Positive in the Proposed Project development	[illegible]
2	Brij Bihari Mob. [illegible]	Pujari		" "	[illegible]
3	Bharat Sharma Mob. [illegible]	Shop Keeper		" "	[illegible]
4	Hamid	Painter		" "	[illegible]
5	Nitesh [illegible] Mob. [illegible]	ShopKeeper		" "	[illegible]
6	Wasim Khan Mob. [illegible]	ShopKeeper		" "	[illegible]
7	Abdul Rahim Mob. [illegible]	ShopKeeper		" "	[illegible]

Name and Signature of the person who done consultation: Hari Sharma / [illegible]

Consultation with Stakeholders (Planning/Implementation Phase)

Project Town: Bundi

Date: 05/04/2022

Name of the project: Water Supply Distribution Line.

Place of consultation: Dhanmandi, Chowk Ka Nohara, [illegible]

S.No.	Name and mobile no.	Occupation and Address	Topics Discussed	Outcome of the consultation	Signature
1	OM Prakash [illegible] Mob.	Driver	1. Awareness about the project 2. Present status of site/project 3. Status of water supply/ SWM/sewerage in town 4. Requirement of any tree cutting due to project 5. Presence/movement of wild fauna at project town/project sites 6. Whether project is beneficial for citizens and increase citizen's convenience 7. Whether project is causing any livelihood impact to someone 8. Any historical or cultural monuments in town/near project sites 9. Any suggestion about the project 10. Any other relevant information found at site	Community Peoples are Positive in the Proposal Project development	[illegible]
2	Imran Mob. [illegible]	Mechanic		" "	[illegible]
3	Chandan Prasad Mob. [illegible]	Shop Keeper		" "	[illegible]
4					
5					
6					
7					

Name and Signature of the person who done consultation: [illegible] / Hari [illegible]

Consultation with Stakeholders (Planning/Implementation Phase)

Project Town: Bundi
Date: 05/04/2022

Name of the project: ~~Water~~ Distribution Line
Place of consultation: Nahar Ka Chotta ; Ward No.-09

S.No.	Name and mobile no.	Occupation and Address	Topics Discussed	Outcome of the consultation	Signature
1	Ashok Kumar Mob.	Shop Keeper	1. Awareness about the project 2. Present status of site/project 3. Status of water supply/ SWM/sewerage in town 4. Requirement of any tree cutting due to project 5. Presence/movement of wild fauna at project town/project sites 6. Whether project is beneficial for citizens and increase citizen's convenience 7. Whether project is causing any livelihood impact to someone 8. Any historical or cultural monuments in town/near project sites 9. Any suggestion about the project 10. Any other relevant information found at site	Community Peoples are Busam in the Propsed Project development	[illegible]
2	Uday Singh Mob. 9460606155	" "		" "	[illegible]
3	Yogesh Mob. 7014229898			" "	[illegible]
4	Jagdish Mob.	Tea stall		" "	[illegible]
5	Deepak Mob. 9358992185	Shop Keeper		" "	[illegible]
6	Arvind	Shop Keeper		" "	[illegible]
7	Laxman	Shop Keeper		" "	[illegible]

Name and Signature of the person who done consultation: Mani Kumari [signature]

Consultation with Stakeholders (Planning/Implementation Phase)

Project Town: Bundi
Date: 05/04/2022

Name of the project: ~~Water~~ Distribution Line
Place of consultation: Suraj Ji Ka Bada ; Ward No.-25

S.No.	Name and mobile no.	Occupation and Address	Topics Discussed	Outcome of the consultation	Signature
1	Mahbin Mob. 92201[illegible]	Labour	1. Awareness about the project 2. Present status of site/project 3. Status of water supply/ SWM/sewerage in town 4. Requirement of any tree cutting due to project 5. Presence/movement of wild fauna at project town/project sites 6. Whether project is beneficial for citizens and increase citizen's convenience 7. Whether project is causing any livelihood impact to someone 8. Any historical or cultural monuments in town/near project sites 9. Any suggestion about the project 10. Any other relevant information found at site	Community Peoples are in the favour of Proposed Project	[illegible]
2	Tara chand Mob. [illegible]	Shop Keeper		" "	[illegible]
3	Mahesh Lahe	Shop Keeper		" "	[illegible]
4	Ramesh Sharma Mob. [illegible]	Shop Keeper		" "	[illegible]
5					
6					
7					

Name and Signature of the person who done consultation: Mani Kumari [signature]

Consultation with Stakeholders (Planning/Implementation Phase)

Project Town: Bundi

Date: [illegible]

Name of the project: [illegible]

Place of consultation: [illegible]

S.No.	Name and mobile no.	Occupation and Address	Topics Discussed	Outcome of the consultation	Signature
1	[illegible]	[illegible]	1. Awareness about the project 2. Present status of site/project 3. Status of water supply/ SWM/sewerage in town 4. Resettlement of anyone staying due to project 5. Presence/movement of wild fauna at project town/project sites 6. Whether project is beneficial for citizens and increase citizen's convenience 7. Whether project is causing any livelihood impact to someone 8. Any historical or cultural monuments in town/near project sites 9. Any suggestions about the project 10. Any other relevant information found at site	[illegible]	[illegible]
2	Dinesh Mo. [illegible]	[illegible]		" "	[illegible]
3					
4					
5					
6					
7					

Name and signature of the person who done consultation: [illegible]

Appendix 3: Photographs of Public Consultations & Meetings

<table>
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<tr>
<td>Meeting with JEn, PHED, Bundi at existing WTP, where new WTP has been proposed. Seeking current status of existing and proposed Water Treatment Plant.</td>
<td>Meeting with junior level PHED staff with JEn, PHED, Bundi and discussed with them about Water Transmission main line and distribution main, Malipura</td>
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<tr>
<td>All Staff Meeting at existing STP regarding Sewerage Treatment Plant at Ramganj Balaji, Bundi.</td>
<td>Public Consultation with nearby local residents regarding transmission main at Vikash Nagar, Bundi</td>
</tr>
</table>

	
Public Consultation with nearby local residents regarding transmission main at Vikash Nagar, Bundi	Staff Meeting at existing Water Treatment Plant at Jakhmund, Bundi.
	
Public Consultation with nearby local residents regarding transmission main at Vikash Nagar, Bundi	WTP staff meeting along with JEn, PHED regarding proposed Water Treatment Plant at Jakhmoond, Bundi.

Public Consultation with local residents regarding Transmission Water Line, Kagri Devra, Bundi.

Public Consultation with residents regarding Distribution Water Line at Nahar Ka choto, Ward-09, Bundi.

Public Consultation with local residents regarding Distribution Water Line at Nahar Ka choto, Ward-09, Bundi.

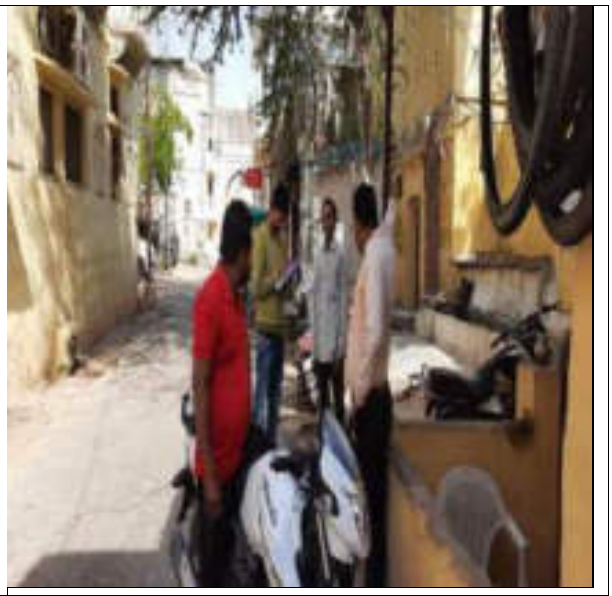
Public Consultation with local residents regarding Distribution Water Line at Nahar Ka choto, Ward-09, Bundi.

Public Consultation with local residents regarding Distribution Water Line at Tilak Chok, Ward-12, Bundi.

Public Consultation with local residents regarding Distribution Water Line at Tilak Chok, Ward-12, Bundi.

Public Consultation with local residents regarding Distribution Water Line at Tilak Chok, Ward-12, Bundi.

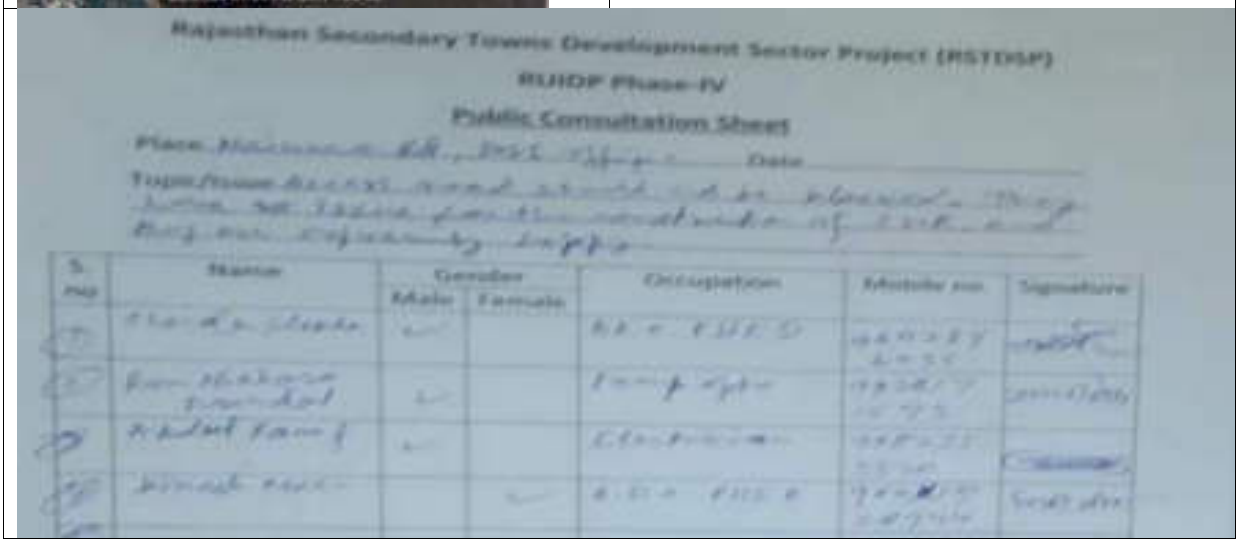
Public Consultation with local residents regarding Distribution Water Line at Ganesh Ji Ki Gali Sadar Bazar, Ward No.13, Bundi.

	
Public Consultation with local residents regarding Distribution Water Line at Danmal Ji Nohara, Ward No.08, Bundi.	Public Consultation with local residents regarding Distribution Water Line at Danmal Ji Nohara, Ward No.08, Bundi.
	
Public Consultation with local residents regarding Distribution Water Line at Danmal Ji Nohara, Ward No.08, Bundi.	

Consultation with people living close to service reservoir site and FSSM area in Bundi

Consultation with PHED staff living in quarters located close to proposed reservoir site was held and they have no-objection of proposed work. During implementation, hard barricading will be installed in all the site and proper access will be made available for the staff . Additionally, Consultation was conducted in Proposed FSSM Area with 47 persons including 26 male and 21 females on 23 January 2023. The consultants from RUIDP informed about proposed FSSM works in Area and people of area express their support to project.

Consultation with PHED staff near proposed location of CWR-Nainwa Road



Rajasthan Secondary Towns Development Sector Project (RSTDSP)

RUIDP Phase-IV

Public Consultation Sheet

Place ..... Date .....

S. No	Name	Gender		Occupation	Mobile no.	Signature
		Male	Female			

Consultation with local public in proposed FSSM areas.

Location/ Date	participants	Topic Discussed	Outcome	Photos
23.01.2023 Ward No.4	Total- 11 Male- 9 Female-2	Awareness of the project-including project coverage area, Present condition of Sewerage, Drainage and solid waste collection In what way they may associate with the project Present solid waste collection and disposal problem Willingness to pay for improved services	During interaction with households, it was noticed that most of the households having a septic tanks and soak pits and due to lack of sewerage facilities, effluents from the septic tanks directly drain into the open drains that creates unhealthy and unhygienic environment. It was conveyed that Government of Rajasthan under RUIDP project, FSTP works has been planned for this town for safe collection and, storage of the collected Faecal sludge in a sealed container, transportation of the collected Faecal sludge to a treatment facility. Regular inspection will be done by Nagar Palika. Overall the objectives of this project is to provide safe and healthy environment through regular cleaning of septic tanks. Local people informed that there is currently no sewerage network in the town. Consultant informed that two vehicle will be proposed to collect sludges from septic tank of households and later it will be disposed in STP. They all appreciated the process of proposed collection and disposal system to maintain cleanliness in the town by the administration. People are showing their interest to pay for Faecal sludge collection services in the town if properly managed.	    

Location/ Date	participants	Topic Discussed	Outcome	Photos
23.01.2023 Ward No. 5	Total- 8 Male-4 Female-4	Awareness of the project-including project coverage area, Present condition of Sewerage, Drainage and solid waste collection In what way they may associate with the project Present solid waste collection and disposal problem Willingness to pay for improved services	During interaction with households, it was noticed that most of the households having a septic tanks and soak pits and due to lack of sewerage facilities, effluents from the septic tanks directly drain into the open drains that creates unhealthy and unhygienic environment. It was conveyed that Government of Rajasthan under RUIDP project, FSTP works has been planned for this town for safe collection and, storage of the collected Faecal sludge in a sealed container, transportation of the collected Faecal sludge to a treatment facility. Regular inspection will be done by Nagar Palika. Overall the objectives of this project is to provide safe and healthy environment through regular cleaning of septic tanks. Local people informed that there is currently no sewerage network in the town. Consultant informed that two vehicle will be proposed to collect sludges from septic tank of households and later it will be disposed in STP. They all appreciated the process of proposed collection and disposal system to maintain cleanliness in the town by the administration. People are showing their interest to pay for Faecal sludge collection services in the town if properly managed.	

Location/ Date	participants	Topic Discussed	Outcome	Photos
23.01.2023 Ward No. 23	Total- 12 Male-5 Female-7	Awareness of the project-including project coverage area, Present condition of Sewerage, Drainage and solid waste collection In what way they may associate with the project Present solid waste collection and disposal problem Willingness to pay for improved services	During interaction with households, it was noticed that most of the households having a septic tanks and soak pits and due to lack of sewerage facilities, effluents from the septic tanks directly drain into the open drains that creates unhealthy and unhygienic environment. It was conveyed that Government of Rajasthan under RUIDP project, FSTP works has been planned for this town for safe collection and, storage of the collected Faecal sludge in a sealed container, transportation of the collected Faecal sludge to a treatment facility. Regular inspection will be done by Nagar Palika. Overall the objectives of this project is to provide safe and healthy environment through regular cleaning of septic tanks. Local people informed that there is currently no sewerage network in the town. Consultant informed that two vehicle will be proposed to collect sludges from septic tank of households and later it will be disposed in STP. They all appreciated the process of proposed collection and disposal system to maintain cleanliness in the town by the administration. People are showing their interest to pay for Faecal sludge collection services in the town if properly managed.	    

Location/ Date	participants	Topic Discussed	Outcome	Photos
23.01.2023 Ward No.24	Total- 8 Male-3 Female-5	Awareness of the project-including project coverage area, Present condition of Sewerage, Drainage and solid waste collection In what way they may associate with the project Present solid waste collection and disposal problem Willingness to pay for improved services	During interaction with households, it was noticed that most of the households having a septic tanks and soak pits and due to lack of sewerage facilities, effluents from the septic tanks directly drain into the open drains that creates unhealthy and unhygienic environment. It was conveyed that Government of Rajasthan under RUIDP project, FSTP works has been planned for this town for safe collection and, storage of the collected Faecal sludge in a sealed container, transportation of the collected Faecal sludge to a treatment facility. Regular inspection will be done by Nagar Palika. Overall the objectives of this project is to provide safe and healthy environment through regular cleaning of septic tanks. Local people informed that there is currently no sewerage network in the town. Consultant informed that two vehicle will be proposed to collect sludges from septic tank of households and later it will be disposed in STP. They all appreciated the process of proposed collection and disposal system to maintain cleanliness in the town by the administration. People are showing their interest to pay for Faecal sludge collection services in the town if properly managed.	

Location/ Date	participants	Topic Discussed	Outcome	Photos
23.01.2023 Ward No.25	Total- 8 Male-5 Female-3	Awareness of the project-including project coverage area, Present condition of Sewerage, Drainage and solid waste collection In what way they may associate with the project Present solid waste collection and disposal problem Willingness to pay for improved services	During interaction with households, it was noticed that most of the households having a septic tanks and soak pits and due to lack of sewerage facilities, effluents from the septic tanks directly drain into the open drains that creates unhealthy and unhygienic environment. It was conveyed that Government of Rajasthan under RUIDP project, FSTP works has been planned for this town for safe collection and, storage of the collected Faecal sludge in a sealed container, transportation of the collected Faecal sludge to a treatment facility. Regular inspection will be done by Nagar Palika. Overall the objectives of this project is to provide safe and healthy environment through regular cleaning of septic tanks. Local people informed that there is currently no sewerage network in the town. Consultant informed that two vehicle will be proposed to collect sludges from septic tank of households and later it will be disposed in STP. They all appreciated the process of proposed collection and disposal system to maintain cleanliness in the town by the administration. People are showing their interest to pay for Faecal sludge collection services in the town if properly managed.	

Appendix 4: City Level Committee (CLC) meeting and Stakeholder Consultation Minutes of Meeting

1. **City level Stakeholder Committee (CLC) Meeting (dtd. 20.10.2021) -** A town-level City Level Committee (CLC) has been formed in Bundi district by Government orders. City Level Committee meeting was organized during the detailed design stage to which representatives of primary and secondary stakeholders were invited. City Level Stakeholder committee meeting was organized for Bundi on dtd. 20.10.2021 to discuss the matter of proposed Water Supply, waste water and gaps in other infrastructure in Bundi under the chairmanship of District Collector, Bundi, in presence of Member of Legislative Assembly, DPR consultants, RUDSICO-EAP officials, PHED officials, Municipal Council officials, UIT officials, PWD and other invitee members. Proposed scope of works and technology was discussed in the meeting. The feedback and concerns of the stakeholders were taken into consideration for finalization of design and scope of works. The project was agreed by the committee for further course of action by RUDSICO-EAP. Minutes of CLC meeting, attendance sheet and photographs are given below-

Minutes of Meeting of CLC Meeting

Municipal Council, Bundi

No. 15-8/21/1309 Date: 20.10.2021

Minutes of City Level Committee Meeting

A City Level Committee meeting held on 20.10.2021 under chairmanship of District Collector, Bundi for finalization of Drainage & other development works in Bundi city under RUIDP Phase-IV

List of Officials, public representative & stack holders, who attended the meeting, is enclosed at **Annexure 'A'**.

It was initially briefed out that RUIDP will take up Drainage and other development works in Bundi city. It was apprised that the DPRs of proposed works is being prepared by the Consultant M/s Cadcon Consultants, Jaipur engaged by the Municipal Council, Bundi. It will be considered for Phase-IV project. RUIDP has scrutinized the Draft DPRs and suggestions have already been conveyed to consultants for modifications & revision & the estimates are as per RUIDP SOR-2017.

Provisions under the DPR and basic scope of work were briefed to the committee. The tentative cost of DPR is of Rs. 135crs for works proposed underDrainage & other development works. The brief scope of works are as follows:-

1. **Augmentation of Bundi RUIDP water supply scheme for demand load of 26 MLD to 34 MLD**

Particulars	Proposed works Detail
Upgradation of Intake Well	8.0 MLD
Water Treatment Plant	8.0 MLD
Transmission Main – DI K-9 Pipe Dia ranging from 100mm to 400mm	1.194 Km
Clear Water Reservoir	1 Nos.
OHSR	1 Nos.
Distribution Mains	
HDPE PE -100, PN6, Pipe Dia ranging from 110mm to 400 mm	38.2 Km
House Service Connection (2025)	5038 nos.

2. **Development of main roads and Beautification work of crossings in the city area**

(A) Works related to developemanta of CC Roads

S.no.	Road Type	Length (in m)
1.	Category-I (9.0 to upto 15.0 mtr)	1200
2.	Category-II (5.0 to upto 9.0 mtr)	33545
3.	Category-III (3.0 to upto 5.0 mtr)	9110
	Total	**43855**

(B) **Works related to Beautification, conservation and bodies**

a. Nawalsagar heritage path from Jaipur road Entry Gate to petrol pump tirhaha
b. Development of Petrol Pump Tiraha
c. Development of Ahinsa Circle
d. Construction ENT Gate at Bundi (Jaipur Road)
e. Construction of ENT Gate of Kota Road
f. Conservation of Naru Ki Baori, naagarsagarkund
g. Conservation of City Gates 5 Nos., and provision of Chhatri on circles

3. Remaining work of Sewerage (STP) of capacity 10.5 MLD based on SBR Technology including FSSM

4. Development of NawalSagar Talab and Heritage work.

5. Following drainage work are proposed in town:-

S.no.	Name of Drain	Length(in m)
1	Jaipur Bypass to FCI godam along with Rani jikiBawadi	2690.00
2	Khoja Gate Ganesh ji to Ice Factory	415.00
3	GurudwaraDevpura to Nanak PuliyaTiraha	2820.00
4	JaitSagarNallah	5800.00
5	Silor Road (Agarwal Dharamshala to highway nalah on Silor road)	610.00
	Total	**12335.00**

Committee decided to approve the detailed project Report the brief of which is mentioned as above.

Meeting ended with vote of thanks to the chair.

Commisioner
Municipal Council, Bundi

District Collector & Chairman CLC
Bundi
Date: 20-.10.2021

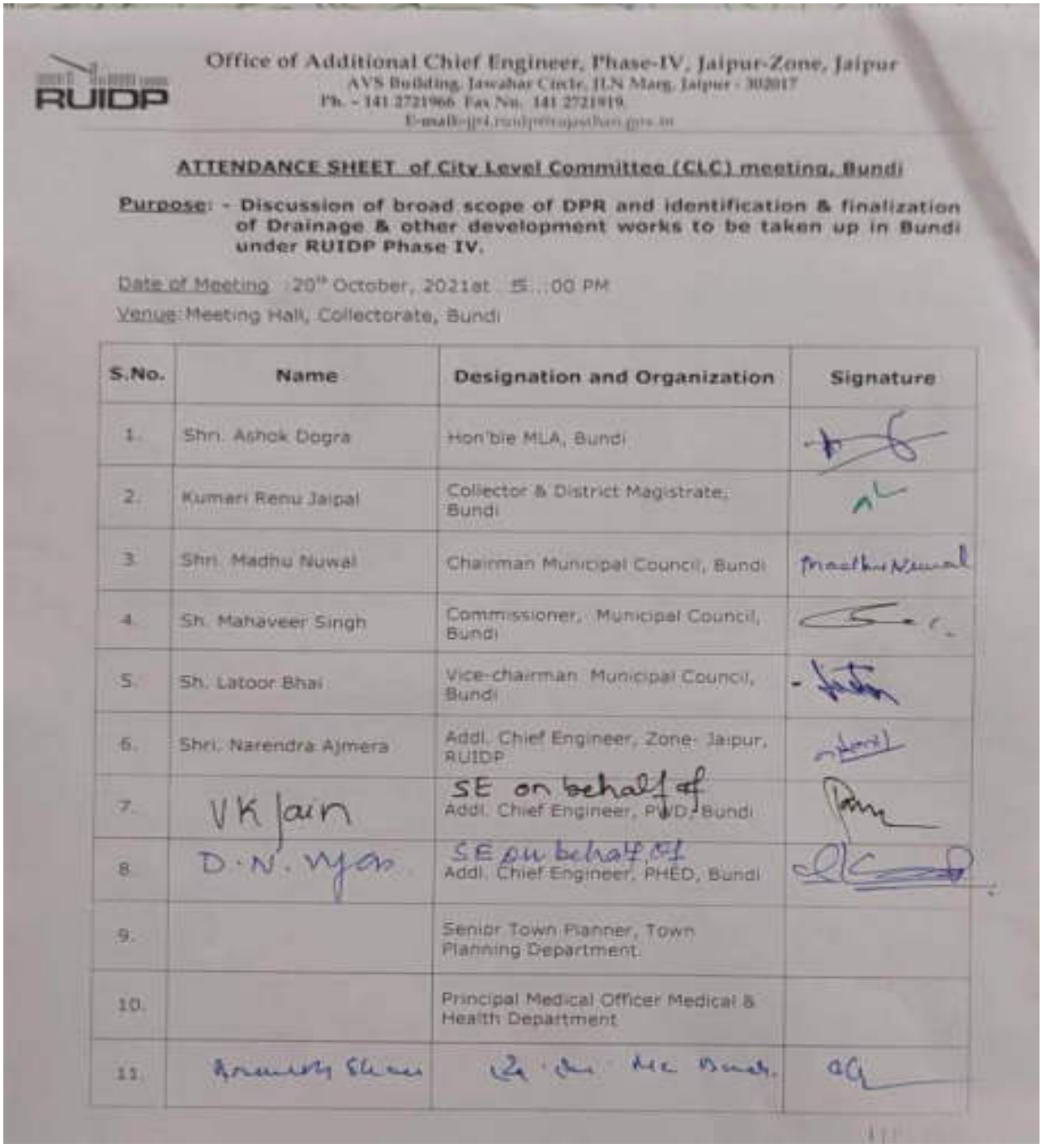
No. 1-4(F)/21/1310 to 1322

Copy to the following for information and necessary action:

1. PA to MLA, Bundi.
2. PA to District Collector & Chairman CLC, Bundi.
3. PA to Project Director, RUIDP, Jaipur.
4. Chairman, Municipal Council, Bundi.
5. Commisioner, Municipal Council, Bundi
6. Additional Project Director, RUIDP, Jaipur.
7. Addl. Chief Engineer, RUIDP, Jaipur.
8. Addl. Chief Engineer, RUIDP, Jaipur.
9. Addl. Chief Engineer, PWD/PHED, Bundi, Jaipur
10. Senior Town Planner, Town Planning Department, Bundi
11. Principal Medical Officer, Medical and Health Dept. Bundi
12. Superintending Engineer-I, RUIDP, Jaipur
13. Executive Engineer, Municipal Council, Bundi.

Commisioner
Municipal Council, Bundi

Attendance Sheet of CLC Meeting



RUIDP

Office of Additional Chief Engineer, Phase-IV, Jaipur-Zone, Jaipur
AVS Building, Jawahar Circle, JLN Marg, Jaipur - 302017
Ph. - 141 2721966 Fax No. 141 2721919
E-mail:-jp4.ruidpmrajasthan.gov.in

ATTENDANCE SHEET of City Level Committee (CLC) meeting, Bundi

Purpose: - Discussion of broad scope of DPR and identification & finalization of Drainage & other development works to be taken up in Bundi under RUIDP Phase IV.

Date of Meeting : 20th October, 2021at 5:.00 PM
Venue: Meeting Hall, Collectorate, Bundi

S.No.	Name	Designation and Organization	Signature
1.	Shri. Ashok Dogra	Hon'ble MLA, Bundi	
2.	Kumari Renu Jaipal	Collector & District Magistrate, Bundi	
3.	Shri. Madhu Nuwal	Chairman Municipal Council, Bundi	Madhu Nuwal
4.	Sh. Mahaveer Singh	Commissioner, Municipal Council, Bundi	
5.	Sh. Latoor Bhai	Vice-chairman Municipal Council, Bundi	
6.	Shri. Narendra Ajmera	Addl. Chief Engineer, Zone- Jaipur, RUIDP	
7.	V K Jain	SE on behalf of Addl. Chief Engineer, PWD, Bundi	
8.	D. N. Vyas	SE on behalf of Addl. Chief Engineer, PHED, Bundi	
9.		Senior Town Planner, Town Planning Department	
10.		Principal Medical Officer Medical & Health Department	
11.	[illegible]	[illegible]	

2. **Stakeholder Consultation and Community Awareness meeting held on 24.03.2023 at Collectorate Meeting Hall in Bundi Town: Minutes of Meeting**

Rajasthan Secondary Towns Development Sector Project

Community Awareness Program & Stakeholder Consultation

Title: Stakeholder Consultation on Environment and Social Safeguard.

Venue: Collectorate Meeting hall, Bundi

Data: 24th March 2023

No of Participants: 47 (Male-41, Female-06)

Objectives of Program:

The primary objective of workshop was to create the awareness, through which the people will be sensitized about the benefits of upcoming project in Bundi town along with potential social and environmental impacts and mitigation measures.

Minutes of the Public Awareness & Consultation

Public Awareness Program & Stakeholder Consultation was held on 24.03.2023 at Meeting Hall, Collectorate office, Bundi. Officials of Nagar Palika (Chairmen, Councillor), Official of PHED and SDM of Bundi town and local public & Public representative were shown their participation.

Mr. Chiranjilal, Gender Expert of CAPPC, RUIDP, welcomed the distinguished guests and participants.

Mr. Manish Arora, SE, PIU, Bundi in his introductory speech, briefed about the Project Development Objectives (PDO). He explained that newly developed area of Bundi is unable to cater the water demand due to growing population therefore under water supply scheme water treatment plant (WTP), CWR, OHSR, pipeline networks, house service connection etc are considered as per the requirements of the town. He also deliberated that the capacity of existing STP is not enough due to increase of sewer connections, hence additional 6.5 MLD capacity STP is proposed under sewer scheme. SE, PIU also apprised that in low lying areas where the sewerage line is not feasible, Feacal Sludge & Septage Management (FSSM) has been proposed. It was also informed that the project is based on Design Built & Operate (DBO) contract, hence contractor bounded to maintain the created project assets for 10 years.

It was also apprised by Mr. Manish Arora, SE, PIU, Bundi that Bundi is an important tourist destination in the state of Rajasthan and there are many tourist sites (Gates, Baoris, Chatris and Nawal Sagar Kunds).

Therefore, at **Nawal Sagar Lake-** Cleaning of Nawal Sagar Lake intercepting of drain

Team Leader
CMSC-01, Ph-IV
RUIDP, Jaipur

VARSHA SRIVASTAVA
ENVIRONMENTAL
SAFEGUARD PROFESSIONAL
CMSC-01 RUIDP-IV JAIPUR

GIS Professional
CMSC-01, PhIV

into Nawal Sagar, Enhancing the capacity of Nawal Sagar Lake, Beautification of the two sides of Lake Edge and at **Nawal Sagar Park**- Development of the entrance plaza, Development of the interconnection of three different parks into one, Development of alternate route for the public use, Interconnecting the park and Nawal Sagar lake, redesigning of road between the park and lake into the Promenade, Development of food court, public utilities and parking spaces etc.

The basic objective of this subproject is to improve the economic development by providing the infrastructure and service in the city beautification. The improvement of quality of life and thereby effective contribution of beneficiary people in the economic activity is expected.

Smt. Nishta Arya, Architect, PMCBC briefed about the proposed components through power point presentation to the participants.

Mr. Shrikant Jangir, EE, PIU, apprised that water logging is reported in rainy season in low laying areas of the town due to the lack of proper drainage and discharge resulting rain water comes on the roads and create water logging at various places. Hence for proper drainage and safely discharge of stagnated water and reduce incidences of water logging, improvement of 14.21 Km. existing drain improvement works is proposed for Bundi town under RUIDP project. The drain considered for improvement are: Ianka gate - Ice factory to UIDSSMT Nallah/drain, From Agarwal Dharamshala to Highway Nallah on Silor Road, From Khoja Gate to Ice Factory, From Gurudwara Devpura to Nanak bridge circle and from Jait Sagar to Devpura.

Mr. Vardan Srivastava, Environmental Safeguards Professional, CMSC-01, briefed them about the project activities and requirement of environmental monitoring periodically. He briefed about environmental laws and statutory clearances required for the project, environmental issues and mitigation measures, role and responsibility contractor to ensure environmental compliances. He emphasized that it is the responsibility of the contractor to ensure that hard barricading (for sewer line) with retro-reflective arrangements for all the open trenches with GI sheets should be provided so that no person or animal can enter/fall in trench. An information board should also be firmly fixed at every such location giving information about the duration of closure of works and contractor contact details for grievances, if any.

Mr. Bhupander Kaushik, Social Safeguard Support, PMCBC- RUIDP briefed them about the main features of ADB safeguard policy. He deliberated that works should be undertaken in such a way that impacts should be minimized. If any impacts will be envisaged, specially livelihood, compensation shall be paid as per ADB agreed framework. Grievances mechanism.

Mr. Chiranjilal, CAPPC briefed that throughout project, public awareness activities willbe carried out to develop the sense of ownership, so project can sustain for a long time through which local residents/people will get benefitted economically, socially

Team Leader
CMSC-01, Ph-IV
RUIDP, Jaipur

Smt. Madhu Nuwal, Chairman of Nagar Parishad stated that it is the responsibility of each participant to facilitate the project implementation team, so works can be executed without any hurdle. Project sustainability depends on the public, so it is also the responsibility of councilors to disseminate information to public in their respective ward to maintain the project assets once the project will be completed.

Mr. Sohan Lal, SDM requested to all the councilors to provide all required support to PIU/CMSC and Contractor for successful completion of proposed work in Bundi town

A vote of thanks given by SE, PIU to all the participants for their presence and contribution to an event.

Snapshot

Assistant Engineer
CMSC-01 Bundi

VARDAN SRIVASTAVA
ENVIRONMENT
SAFEGUARD PROF.
CMSC

Team Leader
CMSC-01, Ph-IV
RUIDP, Jaipur

GRS PROFESSIONAL
CMSC-01

Attendance Sheet

RUIDP राजस्थान नगरीय आधारभूत विकास परियोजना (RUIDP)

चतुर्थ चरण ट्रैंच -II, PIU, Bundi

दिनांक 24.03.2023 स्थान- जिला कलेक्ट्रेट सभागार, बूंदी

क्र. सं.	नाम	पद	लिंग पुरुष/महिला	मोबाईल नम्बर	हस्ताक्षर
1					
2					
3					
4	D.N. Vats	SE, PHED	Male		
5	Manish Arya	SE, RUIDP	M		
6					
7					
8					
9					
10					
11					
12					

[Shrikant Jangir]
Executive Engineer

Support Engineer
CMSC- 01 Bundi

Team Leader
CMSC-01, Ph-IV
RUIDP, Jaipur

GRS PROFESSIONAL
CMSC-01, PhIV

VARDAN SRIVASTAVA
ENVIRONMENTAL
CMSC- PROFESSIONAL

राजस्थान नगरीय आधारभूत विकास परियोजना (RUIDP)

चतुर्थ चरण ट्रेंच -II, PIU, Bundi

दिनांक 24.03.2023

स्थान- जिला कलेक्टर [illegible], बूंदी

क्र.सं.	नाम	पद	लिंग (पुरुष/महिला)	मोबाइल नम्बर	हस्ताक्षर
[illegible]	Raj [illegible]	[illegible]	m	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	m	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	m	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	m	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	F	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	F	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	M	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	M	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	M	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	M	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	M	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	M	[illegible]	[illegible]

Support Engineer
CMSC-01 Bundi

Team Leader
CMSC-01, Ph-IV
RUIDP, Jaipur

Alandey
GIS PROFESSIONAL
CMSC-01, Ph-IV

VARDAN SRIVASTAVA
ENVIRONMENTAL
SAFEGUARD PROFESSIONAL
CMSC-01 RUIDP-IV, JAIPUR

RUIDP राजस्थान नगरीय आधारभूत विकास परियोजना (RUIDP)

चतुर्थ चरण टूर्स -II, PIU, Bundi

दिनांक 24.03.2023 स्थान- डिक्ट कलेक्ट्रेट सभागार, बूंदी

क्र.सं.	नाम	पद	लिंग पुरुष/महिला	मोबाईल नम्बर	हस्ताक्षर
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

(Shrikant Jangir)
Executive Engineer
RUIDP PIU - Bundi

Support Engineer
CMSC- 01 Bundi

Team Leader
CMSC-01, Ph-IV
RUIDP, Jaipur

VARUN SRIVASTAVA
ENVIRONMEN
SA. EGUARD PROFE
CMSC - RUIDP

GRS PROFESSIONAL
CMSC-01, PhIV

RUIDP राजस्थान नगरीय आधारभूत विकास परियोजना (RUIDP)

कार्यालय सहायक इंजीनियर -II, PIU, Bundi

दिनांक 24.02.2020 स्थान- जिला कलेक्ट्रेट सभागार, बूंदी

क्र.सं.	नाम	पद	लिंग पुरुष/महिला	संपर्क नम्बर	हस्ताक्षर
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					

(Shrikant Jangir)
Executive Engineer
PIU, Bundi

Assistant Engineer
CMSC-01 Bundi

Team Leader
CMSC-01, Ph-IV
RUIDP, Jaipur

VARUN SRIVASTAVA
ENVIRONMEN
SAFEGUARD PROFE
CMSC-01 RUIDP

BFS PROFESSIONAL
CMSC-01, Ph IV

Transcript

Attendance Sheet

Name of participant	Designation
1. Smt. Madhu Nuwal	Chairperson, Municipal Council, Bundi
2. Mr. Mahender	Vice- Chairman, Municipal Council, Bundi
3. Mr. Sohan lal	Sub-Division Officer
4. Mr. D. N. Vyas	Superintending Engineer, PHED. Bundi
5. Mr. Manish Aroro	Superintending Engineer
6. Mr. Shrikant Jangid	Executive Engineer
7. Mr. Dilip Kr. Sharma	Executive Engineer, PHED, Bundi
8. Mr. Manish Kumar Meena	Executive Engineer, PWD, Bundi
9. Smt. Nishta Ariya	Sr. Architact, PMCBC, Jaipur
10. Mr. Surender Singh	Environmental Safeguard Specialist, PMCBC
11. Ms. Bhupander kaushik	Social Safeguard Support, PMCBC
12. Mr. Sandeep Panday	CAPPC
13. Mr. Anil Kumar Panday	G & S Prof. CMSC -01
14. Mr. Chinrangi Lal Chandel	CAPPC
15. Ms. Tahir Mir	Project Coordinator
16. Mr. Sameer	Ward Councilor
17. Mr. Rais	Ward Councilor
18. Mr. Hari Shankar Saini	Ward Councilor
19. Mr. Ranjeet Nayak	Ward Councilor
20. Mr. Santoah Kumar	P.R.O.
21. Mr. Sandhya Rawal	Ward Councilor
22. Ms. Mamta Sharma	Ward Councilor
23. Ms. Mahaveer Singh	Ward Councilor
24. Ms. Mohinudeen	Ward Councilor
25. Mr. Pradeep Kumar Jha	Team Leader, CMSC-01, Jaipur
26. Mr. Vardan Shrivastava	Environmental Safeguards Professional, CMSC-01, Jaipur
27. Mr. Mukesh Madhvani	Opposition Leader
28. Mr. Lokesh Dadhich	Shahar Upadhyaksh BJP
29. Mr. Rajedra Kumar Varma	Eng. KIPL
30. Mr. Laal Singh	Site Inch. KIPL
31. Mr. Kapil Soni	Support Eng. CMSC – 01
32. Mr. Manoj Sharma	KIPL
33. Mr. N. K Trivedi	KIPL
34. Mr. Lalit Trivedi	KIPL
35. Mr. Eshvarya Meena	Eng.
36. Mr. Sandeep Morya	Site Engg.
37. Mr. Bheru Lal	Engg.
38. Mr. Sandeep Mahajan	Trainee.
39. Mr. Ashok Kumar Prajapat	Eng.
40. Mr. Sanchit Agrawal	CA
41. Ms. Mukesh Sain	Ward Councilor
42. Mr. Dashraj Nayak	Ward Councilor
43. Mr.RamrajAjmera	Ward Councilor

(Shrikant Jangid)
Executive Engineer
PHED Bundi

Support Engineer
CMSC-01 Bundi

Team Leader
CMSC-01, Ph-IV
RUIDP, Jaipur

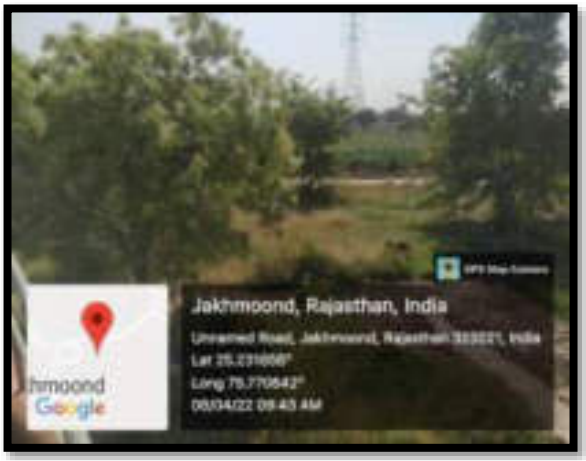
VARDAN SRIVASTAVA
ENVIRONMENTAL
SAFEGUARD PROFESSIONAL
CMSC-01 RUIDP

Appendix 5: Photographs of Existing Components and Proposed Component Locations

Existing STP (8 MLD)

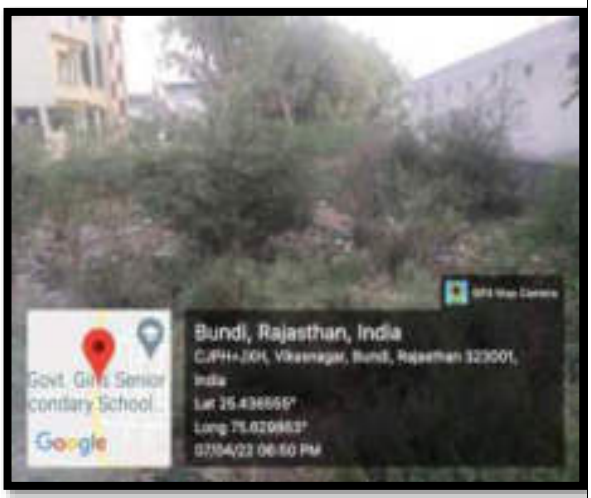
Proposed STP (6.5 MLD)

Existing WTP (26 MLD)



Proposed WTP (8 MLD)

Existing OHSR at Vikas Nagar



Proposed Land for OHSR (1W + 1S) at Vikas Nagar

	
Existing CWR at PHED campus, Nainwa road, Bundi	Proposed Land for CWR, Nainwa road, Bundi

Appendix 6: Audit Report of Existing STP

The Bundi town has three STPs in the town viz 8 MLD STP based on SBR treatment process (Constructed under RUIDP, Phase-II and under operation) and another two STPs each 0.50 MLD under AMRUT proposed and under construction stage.

The existing sewerage system of Bundi Town consists of the sewerage system established by RUIDP in phase-II under which 13 km sewer line, 950 nos. of house sewer connection and one STP of 8 MLD capacity executed. 5% network was covered under this project. In AMRUT Yojana, Works of sewer network in Zones 1, 2, 3, 4, 5, 6, 8 & 9 and two STPs of 0.5 MLD capacity each in zones 8 and 9 respectively are in progress under AMRUT Yojna.

The propored sub project will be interlinked with existing 8 MLD STP and its details are provided below.

<table>
<tr><td>1. Name of Plant and address:</td><td>Devpura Sewerage Treatment Plant; Near Ram Ganj Balaji ; Bundi</td></tr>
<tr><td>2. Capacity:</td><td>8 MLD</td></tr>
<tr><td>3. Technology:</td><td>Sequential Batch Reactor (SBR)</td></tr>
<tr><td>4. Executing agency:</td><td>GEO Miller & Co. Pvt. Ltd.</td></tr>
<tr><td>5. Implementing agency:</td><td>GEO Miller & Co. Pvt. Ltd.</td></tr>
<tr><td>6. Asset owner</td><td>Nagar Parishad (Bundi)</td></tr>
<tr><td>7. Project name under which this STP was constructed:</td><td>Rajasthan Urban Sector Development Investment Programme (RUSDIP-RUIDP, Phase-II)</td></tr>
<tr><td>8. Name of contractor:</td><td>GEO Miller & Co. Pvt. Ltd.</td></tr>
<tr><td>9. Date of start of the construction of STP:</td><td>24.08.2015</td></tr>
<tr><td>10. Status of work progress of STP: (completed/ uncompleted components with %)</td><td>Completed</td></tr>
<tr><td>11. Sewerage networks laid under the project (type, dia and length):

Note: Reinforced Cement Concrete(RCC)</td><td>
<table>
<tr><th>Pipe material</th><th>Dia</th><th>Length</th></tr>
<tr><td>RCC</td><td>200 mm</td><td>6483.800 m</td></tr>
<tr><td>RCC</td><td>250 mm</td><td>563.56 m</td></tr>
<tr><td>RCC</td><td>300 mm</td><td>207.425 m</td></tr>
<tr><td>RCC</td><td>350 mm</td><td>533.125 m</td></tr>
<tr><td>RCC</td><td>400 mm</td><td>1262.00 m</td></tr>
<tr><td>RCC</td><td>450 mm</td><td>445.98 m</td></tr>
<tr><td>RCC</td><td>500 mm</td><td>1031.10 m</td></tr>
<tr><td>RCC</td><td>700 mm</td><td>1266.83 m</td></tr>
<tr><td>RCC</td><td>900 mm</td><td>891.80 m</td></tr>
<tr><td>RCC</td><td>1000 mm</td><td>2089.87 m</td></tr>
<tr><td>Total Length</td><td>--</td><td>14775.50 m</td></tr>
</table>
</td></tr>
<tr><td>12. Nos., locations and capacities of SPS:</td><td>
<table>
<tr><th>Location of SPS</th><th>Capacity</th></tr>
<tr><td>No Existing Structure</td><td>--</td></tr>
<tr><td>No Existing Structure</td><td>--</td></tr>
</table>
</td></tr>
<tr><td>13. Cumulative Progress % (including STP/SPS/Network):</td><td>100 %</td></tr>
<tr><td>14. Areas of different units of plant (sq. mtrs):</td><td>
<table>
<tr><th>Units of STP</th><th>Area</th></tr>
</table>
</td></tr>
</table>

	Raw Sewage SUMP& Pump House	
	Grit Chamber 1&2	
	Sludge Pump House	
	Sludge Sump	
	SBR1 & SBR2	
	Chlorine Contact Tank (CCT)	
	Admin Building	
	PMCC Room	
	Blower Room	
	Control Room	
	Chlorination System	
	Service Water Tank	
	Laboratory Area	
	Total Area covered	**7600 sq. mtrs**
15. Total Area of land used for STP:	37430 sq. mtrs	
16. Land ownership details: (Khasra nos.)	Khasra No. 1265; Khasra No. 1266; Khasra No. 1274	
17. Estimated/Final cost of STP:	26.56 Crore	
18. O&M period of contract:	5 Years	
19. Tree plantations done under this project (nos. and types of trees):	5000 Numbers	
20. Date of completion of construction works of STP:	23.08.2016	
21. Reasons of delay, if any:	24.08.2017 (Structural Work Incompleted)	
22. Status of Consent to Establish (CTE) from Pollution Control Board: obtained/not obtained (attach copy)	Obtained, but copy was not available during audit (based on CTE, CTO was granted by RSPCB	
23. Validity of CTE:	Not Available	
24. Status of Consent to Operate (CTO) from Pollution Control Board: obtained/not obtained	Obtained	
25. Validity of CTO:	Consent to Operate (CTO) Validity: 09/11/2017 to 31/10/2022 under water act	
26. Details of total covered area with this STP: (ward nos.)	50 Wards	
27. Total Population covered (number and %):	100418 (83 %) – Current Status	
28. Whether trail run completed, if yes give date, if no give tentative date:	Completed	
29. Date of commissioning/Estimated date of commissioning of this STP:	Not Available	

<table>
<tr><td>30. What are the parameters of discharge of treated effluent:</td><td><table><tr><th>Parameters</th><th>Discharge value</th></tr><tr><td>BOD</td><td>Approx. 8.5 PPM</td></tr><tr><td>COD</td><td>Approx. 29PPM</td></tr><tr><td>TSS</td><td>Approx. 7 to 8</td></tr><tr><td>pH</td><td>Approx. 7.1</td></tr></table></td></tr>
<tr><td>31. Is there facility of laboratory for testing these parameters, if yes, give details</td><td>Yes, STP has facility laboratory and test results of treated water parameter shows, STP is working as the efficiency required by government norms</td></tr>
<tr><td>32. What are the proposals/methods for reuse/disposal of treated effluent from STP:</td><td>The treated water of STP is reused for plantation around the STP, for Agriculture uses and remaining is discharged in nearby drain for further use by downstream farmers.</td></tr>
<tr><td>33. What are the proposals/methods for reuse/disposal of treated sludge from STP:</td><td>The Digested and disinfected sludge is proposed to be used as manure (as quality of sludge from SBR process can be used in agriculture practices after testing of sludge for toxicity). The area around STP is area is predominantly under agricultural land use in a large area.</td></tr>
<tr><td>34. Is this plant anywhere related/dependent on proposed STP under RUIDP Phase-4 project:</td><td>Yes</td></tr>
<tr><td>35. Status and type of electricity connection: (connection number and approved load, KW)</td><td>200 KW Load</td></tr>
<tr><td>36. Whether DG set installed, if yes give capacity and type of DG set:</td><td>Installed; 200 KW; SUDHIR (Silent DG Set)</td></tr>
<tr><td>37. Whether consent from Pollution Control Board taken for DG set:</td><td>Yes; CTO for DG set is valid upto 30/06/2025</td></tr>
<tr><td>38. Fresh water requirements/day (for domestic use) and type of water supply:</td><td>4000 -5000 L/Day</td></tr>
<tr><td>39. If tube well installed, provide number and capacity of tube well and status of clearance from Ground Water Board for tube well:</td><td>01 Bore well Installed</td></tr>
<tr><td>40. Numbers of employees proposed for operation of plant (designation wise numbers of employees):</td><td>07 Employees (Designation: 01 (Chemist); 01 (Mechanic/Fitter);
01 (Electrician; 01 (Guard); 01 (Gardener); 02 (Labour).</td></tr>
<tr><td>41. Is rain water harvesting system established, if yes, provide details, drawing and cost of rain water harvesting</td><td>No</td></tr>
<tr><td>42. Power generation system installed, if yes, give details:</td><td>No</td></tr>
</table>

43. Is O&M manual prepared by contractor (submitted/ approved):	Not Available
44. Is Emergency operating system prepared for O&M:	Not Available
45. Whether provisions for odour control taken in design, if yes, give details:	Not Available
46. If provisions taken to protect inconvenience to nearby habitants, give details:	Not Available
47. Any other related information	No

Water quality report of STP

Date	Raw Water						STP Treated Water				
	pH	Turbidity	Color	BOD	COD	TSS	pH	Turbidity	BOD	COD	TSS
01.10.2021	8.2	55	Light Brown	75	205	110	7.5	12	5.5	30	9
02.10.2021	7.9	50	Light Brown	70	195	95	7.2	10	6.0	30	9
03.10.2021	8.4	52	Light Brown	80	190	100	7.4	10	5.0	28	9
04.10.2021	8.0	42	Light Brown	70	185	90	7.3	8	6.5	35	10
05.10.2021	8.2	45	Light Brown	75	195	95	7.2	9	6.0	35	8
06.10.2021	8.0	55	Light Brown	80	185	105	7.3	10	5.5	30	8
07.10.2021	8.4	57	Light Brown	85	185	110	7.5	9	6.5	35	8
08.10.2021	7.9	54	Light Brown	80	195	100	7.5	13	7.0	38	9
09.10.2021	7.8	48	Light Brown	75	190	90	7.4	11	6.0	32	8
01.10.2021	8.0	50	Light Brown	85	180	95	7.3	10	6.0	32	9

Compliance with Applicable National and State Laws, Rules, and Regulations

Law, Rules, and Regulations	Description and Requirement	STP at Ramganj
		Y = compliant (if applicable, specify expiration date of permit/clearance) N = non-compliant[28] N/A = not applicable (state justification)
EIA Notification	The EIA Notification of 2006 states that environmental clearance is	N/A

[28]Compliant = There is sufficient and appropriate evidence to demonstrate that the particular regulatory requirement has been complied with; non-compliant = clear evidence has been collected to demonstrate the particular regulatory requirement has not been complied with.

Law, Rules, and Regulations	Description and Requirement	STP at Ramganj
		Y = compliant (if applicable, specify expiration date of permit/clearance) N = non-compliant[28] N/A = not applicable (state justification)
	required for certain defined activities/projects.	Environmental clearance is not required as STPs are not listed in the EIA Notification's "Schedule of Projects Requiring Prior Environmental Clearance"
Manufacture, Storage, and Import of Hazardous Chemical Rules, 1989	Storage of chlorine (threshold quantity greater than 10 tons but less than 25 tons) in WTPs will require clearance from PESO	N/A No chlorine used or stored in the STP.
Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments	Consent to operate from RSPCB	Y The 8 MLD STP has valid CTO under water act from RSPCB Valid from 09/11/2017 to 31/10/2022 For disposal of treated effluent On Land For Plantation/Horticulture after adequate treatment.
Air (Prevention and Control of Pollution) Act of 1981, Rules of 1982 and amendments.	Consent to operate from RSPCB	The 8 MLD STP has valid CTO under air act from RSPCB CTO Valid upto – 30/06/2025 for 200.00 KVA DG set
Environment (Protection) Act, 1986 and CPCB Environmental Standards	Emissions and discharges from the facilities to be created, refurbished, or augmented shall comply with the notified standards. a. Wastewater disposal standards	N As per the CTO issued by RSPCB, STP effluent shall meet the following disposal standards: TSS - Not to exceed 100 mg/l, pH - 6.5 to 9.0, BOD - (3 days at 27C) Not to exceed 10 mg/l, Fecal Coliform not to exceed 230 MPN/100 ml
Noise Pollution (Regulation and Control) Rules, 2002 amended up to 2010	Applicable ambient noise standards with respect to noise for different areas/zones	Y No source of noise
National Institute of Occupational Safety and Health (NIOSH) Publication No. 2002-149	Compliance with NIOSH Guidance for Controlling Potential Risks to Workers Exposed to Class B Biosolids	N Training and proper PPEs are required
Forest (Conservation) Act, 1980 and Forest Conservation Rules, 2003 as amended	As per Rule 6, every user agency, who wants to use any forest land for non-forest purposes shall seek approval of the central government.	N/A
Ancient Monuments and Archaeological Sites and Remains Rules of 1959	No development activity is permitted in the "protected area," and all development activities likely to damage the protected property are not permitted in the "controlled area" without prior permission of the Archaeological Survey of India (ASI). Protected property includes the site, remains, and monuments protected by ASI or the State Department of Archaeology.	N/A

Law, Rules, and Regulations	Description and Requirement	STP at Ramganj
		Y = compliant (if applicable, specify expiration date of permit/clearance) N = non-compliant[28] N/A = not applicable (state justification)
The Child Labor (Prohibition and Regulation) Act, 1986	No child below 14 years of age will be employed or permitted to work in any of the occupations set forth in the Act's Part A of the Schedule or in any workshop wherein any of the processes set forth in Part B of the Schedule are present.	Y STP is operated by contract staff. No children are engaged.

CTO of Existing STP (8 MLD)

Head Office (PLG)

Rajasthan State Pollution Control Board

4, Institutional Area, Jhalana Doongari, Jaipur-302 004

Phone: 0141-5159600,5159695 Fax: 0141-5159697

Registered

File No : F(Tech)/Bundi(Bundi)/2653(1)/2020-2021/2553-2555

Order No : 2020-2021/PLG/1154

Date: 27/08/2020

Unit Id : 66029

M/s Nagar Parishad, Bundi

Commissioner, Nagar Parishad Bundi, Rajasthan , Bundi

Tehsil:Bundi

District:Bundi

Sub: Consent to Operate under section 25/26 of the Water (Prevention & Control of Pollution) Act, 1974.

Ref: Your application for Consent to Operate dated 17/04/2018 and subsequent correspondence.

Sir,

Consent to Operate under the provisions of section 25/26 of the Water (Prevention & Control of Pollution) Act, 1974 (hereinafter to be referred as the Water Act) as amended to date and rules & the orders issued thereunder is **hereby granted** for your **Sewage Treatment Plant Devpura** plant situated at **Khasra No 1265, 1266 and 1274 Devpura Tehsil:Bundi District:Bundi**, Rajasthan, subject to the following conditions:-

1 That this Consent to Operate is valid for a period from **17/04/2018** to **31/03/2023**.

2 That this Consent is granted for manufacturing / producing following products / by products or carrying out the following activities or operation/processes or providing following services with capacities given below:

Particular	Type	Quantity with Unit
SEWAGE TREATMENT PLANT	Service	8 MLD

3 That this consent to operate is for existing plant, process & capacity and separate consent to establish/operate is required to be taken for any addition / modification / alteration in process or change in capacity or change in fuel.

4 That the quantity of effluent generation along with mode of disposal for the treated effluent shall be as under:

Page 1 of 4

Signature valid

Digitally signed by Shiva Mathur

Date: 2020[illegible] 12:22:33 IST

Reason: Sanctioned

Location:

Head Office (PLG)

Rajasthan State Pollution Control Board

4, Institutional Area, Jhalana Doongari, Jaipur-302 004

Phone: 0141-5159600,5159695 Fax: 0141-5159697

Registered

File No : F(Tech)/Bundi(Bundi)/2653(1)/2020-2021/2553-2535

Order No : 2020-2021/PLG/1154 Date: 27/08/2020

Unit Id : 66029

Type of effluent	Max. effluent generation (KLD)	Recycled Qty of Effluent (KLD)	Disposed Qty of effluent (KLD)and mode of disposal
Domestic Sewage	8000.000	NIL	8,000.000 On Land For Plantation/Horticulture after adequate treatment

5 That the domestic sewage shall be treated before disposal so as to conform to the standards prescribed under the Environment (Protection) Act-1986for disposal into Inland Surface Water. The main parameters for regular monitoring shall be as under.

Parameters	Standards
pH Value	Between 5.5 to 9.0
Phosphate as P	Not to exceed 1.0 mg/l
Biochemical Oxygen Demand (3 days at 27C)	Not to exceed 10 mg/l
Chemical Oxygen Demand	Not to exceed 50 mg/l
Fecal Coliform	not to exceed 230 MPN/100 ml
N total	10 mg/l

6 In addition to above total suspended solids in the treated effluent before disposal shall not exceed 20 mg/l.

7 That no treated/untreated effluent shall be discharged into any water body and entire treated sewage shall be utilized in plantation/horticulture/ other gainful purposes.

8 That the sludge will be properly digested, de-watered and used as manure or disposed in a scientific manner.

9 That the unit shall undertake spray of insecticides from time to time to control fly/mosquito growth in the area.

10 That the unit shall undertake plantation in two rows of suitable species all along the periphery of the site of the STP to control foul smell.

Signature valid

Digitally signed by Braj Mathur

Date: 2020.08.27 12:22:33 IST

Reason: Sanctioned

Location:

Head Office (PLG)
Rajasthan State Pollution Control Board
4, Institutional Area, Jhalana Doongari, Jaipur-302 004
Phone: 0141-5159600,5159695 Fax: 0141-5159697

Registered

File No : F(Tech)/Bundi(Bundi)/2653(1)/2020-2021/2553-2555
Order No : 2020-2021/PLG/1154
Unit Id : 66029 Date: 27/08/2020

11 That above stated effluent standards are subject to the Hon'ble NGT order dated 30/4/2019 in matter of O.A. no 1069/2018 Nitin Shankar Deshpande Vs Union of India and Ors.

12 That efforts should be made to reuse the treated sewage to the maximum possible extent and minimize its discharge. A network of pipelines should be laid from the treated sewage collection tank to fields for utilization.

13 That adequate measures shall be taken to avoid foul odour during treatment and disposal of sewage and sludge.

14 That, not withstanding anything provided hereinabove, the State Board shall have power and reserves its right, as contained under section 27(2) of the Water Act to review anyone or all the conditions imposed here in above and to make such variation as it deemed fit for the purpose of Water Act.

15 That the grant of this Consent to Operate is issued from the environmental angle only, and does not absolve the project proponent from the other statutory obligations prescribed under any other law or any other instrument in force. The sole and complete responsibility to comply with the conditions laid down in all other laws for the time-being in force, rests with the industry/ unit/ project proponent.

16 That the grant of this Consent to Operate shall not, in any way, adversely affect or jeopardize the legal proceeding, if any, instituted in the past or that could be instituted against you by the State Board for violation of the provisions of the Act or the Rules made thereunder.

This Consent to Operate shall also be subject, besides the aforesaid specific conditions, to the general conditions given in the enclosed Annexure. The project proponent will comply with the provisions of the Water Act and to such other conditions as may, from time to time , be specified, by the State Board under the provisions of the aforesaid Act(s). Please note that, non compliance of any of the above stated conditions would tantamount to revocation of Consent to Operate and project proponent / occupier shall be liable for legal action under the relevant provisions of the said Act(s).

This issues the approval of the competent authority.

Yours Sincerely

Group Incharge(PLG)

Signature valid
Digitally signed by Niraj Mathur
Date: 2020[illegible]12:22:33 IST
Reason: Sc[illegible]ched
Location:

Head Office (PLG)

Rajasthan State Pollution Control Board

4, Institutional Area, Jhalana Doongari, Jaipur-302 004
Phone: 0141-5159600,5159695 Fax: 0141-5159697

Registered

File No : F(Tech)/Bundi(Bundi)/2653(1)/2020-2021/2553-2555
Order No : 2020-2021/PLG/1154 Date: 27/08/2020
Unit Id : 66029

(A) Copy To:-

1. Regional Officer, Regional Office, Rajasthan State Pollution Control Board, Kota to carry out inspection and sampling of the STP
2. Master File

Group Incharge(PLG)

Signature valid
Digitally signed by Neeraj Mathur
Date: 2020.08.27 12.22.33 IST
Reason: Se[illegible]sted
Location:

STP Plant CTE of DG Set

Head Office (PLG)
Rajasthan State Pollution Control Board
4, Institutional Area, Jhalana Doongri, Jaipur-302 [illegible]
Phone: 0141-[illegible] Fax: 0141-[illegible]

Registered

File No : F(Tech)/Bundi(Bundi)/[illegible]/2020-2021/[illegible]
Order No : 2020-2021/PLG/[illegible]
Unit Id : [illegible]
Dispatch Date : 27/08/2020

M/s Nagar Parishad, Bundi
Commissioner, Nagar Parishad Bundi, Rajasthan,
Bundi Tehsil Bundi
District Bundi

Sub: Consent to Establish under section 21(4) of the Air (Prevention & Control of Pollution) Act, 1981.

Ref: Your application(s) for Consent to Establish dated [illegible]/2020 and subsequent correspondence.

Sir,

Consent to Establish under the provisions of section 21(4) of the Air (Prevention & Control of Pollution) Act, 1981, (hereinafter to be referred as the Air Act) as amended to date and rules & the orders issued thereunder is hereby granted for your Sewage Treatment Plant Devpura plant situated / proposed at Khasra No 1265, 1266 and 1274 Devpura Tehsil Bundi District Bundi, Rajasthan under the provisions of the said Act(s). This consent is granted on the basis of examination of the information furnished by you in consent application(s) and the documents submitted therewith subject to the following conditions:-

1. That this Consent to Establish is valid for a period from 23/07/2020 to 30/06/2025 or date of commencement of production / commissioning of the project or activities whichever is earlier.
2. That this Consent is granted for manufacturing / producing following products / by products or carrying out the following activities or operation/processes or providing following services with capacities given below.

Particular	Type	Quantity / Capacity
D.G.SET	Service	[illegible] KVA

3. That in case of any increase in capacity or addition / modification / alteration or change in product mix or process or raw material or fuel the project proponent is required to obtain fresh consent to establish.
4. That the control equipment as proposed by the applicant shall be installed before trial operation is started for which prior consent to operate under the provision of the Air Act shall be obtained. This consent to establish shall not be treated as consent to operate.

Page 1 of 2

Signature valid
Digitally signed by [illegible] Mathur
Date: 2020[illegible] 12:22:53 IST
Reason: [illegible]
Location:

Head Office (PLG)

Rajasthan State Pollution Control Board

4, Institutional Area, Jhalana Doongari, Jaipur-302

Phone: 0141-5159600,5159695 Fax: 0141-5159697

Registered

File No : F(Tech)/Hundi(Hundi)/2653(1)/2020-2021/2556-2558

Order No : 2020-2021/PLG/1155 Dispatch Date: 27/08/2020

Unit Id : 66029

This bears the approval of the competent authority.

Yours Sincerely

Group Incharge[PLG]

(A) Copy To:-

1. Regional Officer, Regional Office, Rajasthan State Pollution Control Board,Kota to carry out inspection of the STP.
2. Master File.

Group Incharge[PLG]

Signature valid

Digitally signed by Viraj Mathur

Date: 2020.08.27 12:22:53 IST

Reason: Self Attested

Location:

Appendix 7: Existing Audit Report of WTP (26MLD)

Water Treatment Plant (WTP). One WTP of 26 MLD at Jhakhmund PHED site is supplying treated water to Bundi town. WTP was operational since 2017 and was constructed under Chambal – Bundi water supply project. This WTP is in good working condition and will be further used in Project along with Proposed WTP.

<table>
<tr><td>1. Name of Plant and address:</td><td>Jhakhmund Water Treatment Plant; Bundi</td></tr>
<tr><td>2. Capacity:</td><td>26 MLD</td></tr>
<tr><td>3. Technology:</td><td>Rapid Gravity filter</td></tr>
<tr><td>4. Executing agency:</td><td>PHED Project division Bundi</td></tr>
<tr><td>5. Implementing agency:</td><td>PHED Project division Bundi</td></tr>
<tr><td>6. Asset owner</td><td>PHED Project division Bundi</td></tr>
<tr><td>7. Project name under which this WTP was constructed:</td><td>Chambal Bundi Water Supply Project</td></tr>
<tr><td>8. Name of contractor:</td><td>Ms Vishnu Prakash Purulia</td></tr>
<tr><td>9. Date of start of the construction of WTP:</td><td>16.07.2015</td></tr>
<tr><td>10. Status of work progress of WTP: (completed/ uncompleted components with %)</td><td>Completed on 10.02.2017</td></tr>
<tr><td>11. Estimated / Final Cost of WTP</td><td>INR 8,06,00,000</td></tr>
<tr><td>12. Water supply networks laid under the project (type, dia and length):</td><td>Transmission Mains- 9.9 kms and for treated water 70.14 kms of DI K-9 from WTP to Mangli Head works to various OHSRs located in the city. dia of existing lines are from 100 mm to 600 mm.

Distribution networks About 250.1 km of water distribution network of AC, DI, HDPE and UPVC material

Sizes of HDPE pipes i.e., 75 mm to 315 mm dia & DI pipes i.e., 100mm to 250mm dia</td></tr>
<tr><td>13. Nos., locations and capacities of Pumping station</td><td><table><tr><th>Location of PS</th><th>Capacity</th></tr><tr><td>Jhakhmund</td><td>2 X 75 KW</td></tr></table></td></tr>
<tr><td>14. Areas of different units of plant (sq. mtrs):</td><td><table><tr><th>Components of WTP</th></tr><tr><td>Rapid Gravity Filter</td></tr><tr><td>Pump house</td></tr><tr><td>CWR 2 nos</td></tr><tr><td>Store</td></tr><tr><td>Sub Station</td></tr><tr><td>Labour residential quarters</td></tr><tr><td>OHSR</td></tr></table></td></tr>
<tr><td>15. Total Area of land used for WTP:</td><td>15 Acre</td></tr>
<tr><td>16. Land ownership details: (Khasra nos.)</td><td>Khasra No. 1095/655</td></tr>
<tr><td>17. O&M period of contract:</td><td>10 Years</td></tr>
<tr><td>18. Status of Consent to Establish (CTE) from Pollution Control Board: obtained/not obtained (attach copy)</td><td>Not obtained</td></tr>
</table>

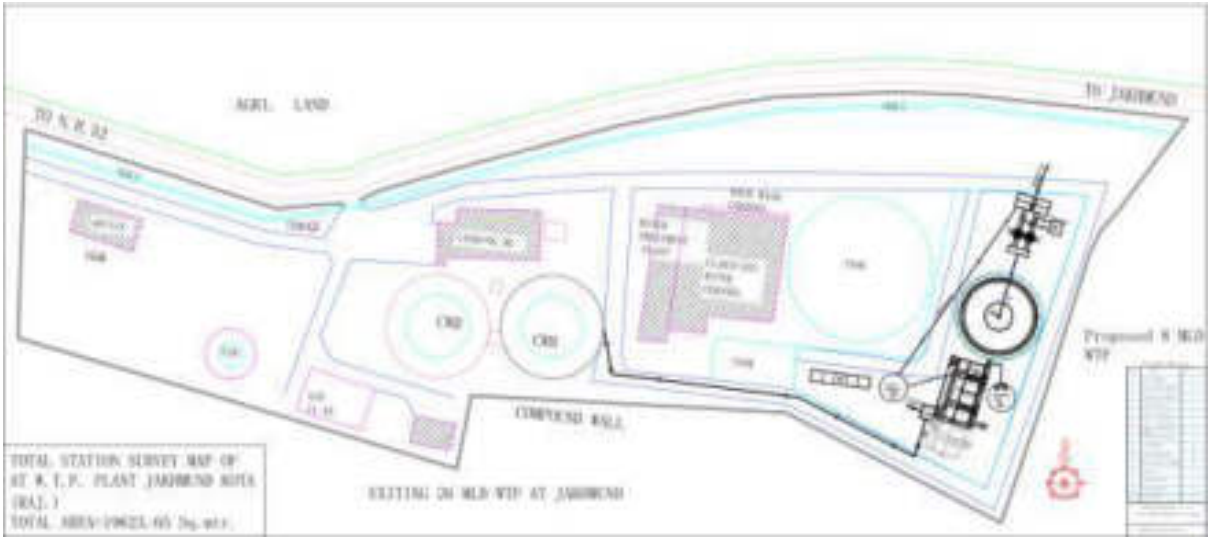
19. Validity of CTE:	Not Available
20. Status of Consent to Operate (CTO) from Pollution Control Board: obtained/not obtained	Not Obtained
21. Validity of CTO:	-
22. Details of total covered area with this WTP: (ward nos.)	Entire Bundi town
23. Total Population covered (number and %):	1,25,000
24. Whether trail run completed, if yes give date, if no give tentative date:	Completed
25. What are the parameters of discharge of treated effluent:	WTP is designed to treat water parameter as per Government of India's drinking water standard IS 10500
26. Is there facility of laboratory for testing these parameters, if yes, give details	Yes, but only to test pH turbidity and residual chlorine
27. What are the proposals/methods for reuse/disposal of treated effluent from WTP:	Backwash wastewater from the process is recovered and recirculated in the WTP, no wastewater will be generated from water treatment process.
28. What are the proposals/methods for reuse/disposal of treated sludge from WTP:	Sludge from sedimentation of particulate matter in raw water, flocculated and precipitated material resulting from chemical coagulation, residuals of excess chemical dosage, plankton etc.; and waste from rinsing and back washing of filter media containing debris, chemical precipitates, straining of organic debris and plankton. WTP has sludge drying beds and further its is used in filling up of low laying area within campus.
29. Is this plant anywhere related/dependent on proposed WTP under RUIDP Phase-4 project:	Yes , New plant will be constructed in Same Campus of existing WTP
30. Status and type of electricity connection: (connection number and approved load, KW)	300 KW Load
31. Whether DG set installed, if yes give capacity and type of DG set:	-
32. Numbers of employees proposed for operation of plant (designation wise numbers of employees):	-
33. Is rain water harvesting system established, if yes, provide details, drawing and cost of rain water harvesting	-
34. Power generation system installed, if yes, give details:	-
35. Is O&M manual prepared by contractor (submitted/ approved):	-
36. Is Emergency operating system prepared for O&M:	

37. Whether provisions for odour control taken in design, if yes, give details:	
38. If provisions taken to protect inconvenience to nearby habitants, give details:	
39. Any other related information	

A. Source /Intake

1. Source of raw water (river/dam/Tube Well): River
2. Location of intake: Chambal River at Kota Barrage
3. Capacity of intake: 26 MLD
4. Year of construction:2017
5. Average hours of operation/day:22 hr.
6. Existing Conditions: Running
7. Type of pumps: Centrifugal
8. Electric Consumption:
9. Numbers of employees for operation and maintenance of Intake(designation wise numbers of employees): 6 Nos.
10. Proposal under RUIDP Ph-IV (/repair/additional intake/no change):
11. If Tube wells are being used as raw water source, give following details-

Location of Tube wells	Capacity of water discharge	Water taken per day
Existing WTP Boundary Area	120,000L/month	4,000 L/day



I. Compliance with Applicable National and State Laws, Rules, and Regulations

Law, Rules, and Regulations	Description and Requirement	WTP at Jhakhmund
		Y = compliant (if applicable, specify expiration date of permit/clearance) N = non-compliant[29] N/A = not applicable (state justification)
EIA Notification	The EIA Notification of 2006 states that environmental clearance is required for certain defined activities/projects.	N/A Environmental clearance is not required as WTPs are not listed in the EIA Notification's "Schedule of Projects Requiring Prior Environmental Clearance"
Manufacture, Storage, and Import of Hazardous Chemical Rules, 1989	Storage of chlorine (threshold quantity greater than 10 tons but less than 25 tons) in WTPs will require clearance from PESO	N/A Less than 10 tons of Chlorine si stored at WTP required no permit
Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments	Consent to operate from RSPCB	No CTE and CTO was available at the time of Audit
Air (Prevention and Control of Pollution) Act of 1981, Rules of 1982 and amendments.	Consent to operate from RSPCB	No CTE and CTO was available at the time of Audit
Environment (Protection) Act, 1986 and CPCB Environmental Standards	Emissions and discharges from the facilities to be created, refurbished, or augmented shall comply with the notified standards. a. Wastewater disposal standards	N/A
Noise Pollution (Regulation and	Applicable ambient noise standards with respect to noise for different areas/zones	Y No source of noise

[29] Compliant = There is sufficient and appropriate evidence to demonstrate that the particular regulatory requirement has been complied with; non-compliant = clear evidence has been collected to demonstrate the particular regulatory requirement has not been complied with.

Law, Rules, and Regulations	Description and Requirement	WTP at Jhakhmund
		Y = compliant (if applicable, specify expiration date of permit/clearance) N = non-compliant[29] N/A = not applicable (state justification)
Control) Rules, 2002 amended up to 2010		
National Institute of Occupational Safety and Health (NIOSH) Publication No. 2002-149	Compliance with NIOSH Guidance for Controlling Potential Risks to Workers Exposed to Class B Biosolids	N Training and proper PPEs are required
Forest (Conservation) Act, 1980 and Forest Conservation Rules, 2003 as amended	As per Rule 6, every user agency, who wants to use any forest land for non-forest purposes shall seek approval of the central government.	N/A No Component of WTP is in forest land, land for WTP is allotted by disctric collector Bundi
Ancient Monuments and Archaeological Sites and Remains Rules of 1959	No development activity is permitted in the "protected area," and all development activities likely to damage the protected property are not permitted in the "controlled area" without prior permission of the Archaeological Survey of India (ASI). Protected property includes the site, remains, and monuments protected by ASI or the State Department of Archaeology.	N/A
The Child Labor (Prohibition and Regulation) Act, 1986	No child below 14 years of age will be employed or permitted to work in any of the occupations set forth in the Act's Part A of the Schedule or in any workshop wherein any of the processes set forth in Part B of the Schedule are present.	Y No children are engaged at WTP site.

Raw and Treated Water Quality of exiting 26 8 MLD WTP plant at Jakhmund, Bundi (As recorded from the Daily Water Quality register of M/s Vishnu Prakash R. Pungliya Ltd.

Date	Raw Water			WTP Treated Water		
	Turbidity (NTU)	pH	Residual Chlorine	Turbidity (NTU)	pH	Residual Chlorine (mg/l)
01.07.2022	5	6.7	1.0	1.0	6.5	2.5
03.07.2022	5	6.7	1.0	1.0	6.5	2.5
05.07.2022	5	6.6	1.0	1.0	6.5	2.5
06.07.2022	5	6.7	1.0	1.0	6.5	2.5
21.07.2022	5	6.7	1.0	1.0	6.5	2.5
22.07.2022	5	6.7	1.0	1.0	6.5	2.0
23.07.2022	5	6.7	1.0	1.0	6.5	2.0
24.07.2022	6	6.7	1.0	1.0	6.5	2.0
26.07.2022	20	7.8	1.0	1.0	6.9	3.0
27.07.2022	94.3	7.8	1.0	1.0	6.7	2.5
28.07.2022	29	7.8	1.0	1.0	6.9	2.5
29.07.2022	29	7.8	1.0	1.0	6.9	2.5
30.07.2022	23	7.6	1.0	1.0	6.7	2.5
31.07.2022	23	7.6	1.0	1.0	6.9	2.5
01.08.2022	26	7.8	1.0	1.0	6.9	2.5

Appendix 8: IBAT Assessment Checklist

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Integrated Biodiversity Assessment Tool

PROXIMITY REPORT
CWR (1200 KL) AT NAINWA ROAD

Country: India
Location: [25.4, 75.7]
Date of analysis: 04 May 2022 (GMT)
Buffers applied: 1 km | 10 km | 50 km
IUCN Red List Biomes: Freshwater, Terrestrial
Generated by: Noime Walican
Organisation: ADB

Overlaps with:

Protected Areas	0
Key Biodiversity Areas	3
IUCN Red List	37

Displaying project location and buffers: 1 km, 10 km, 50 km

KNOW YOUR ENVIRONMENT

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About this report

This report presents the results of [6274-30211] proximity analysis to identify the biodiversity features and species which are located within the following buffers: 1 km, 10 km, 50 km.

This report is one part of a package generated by IBAT on 04 May 2022 (GMT) that includes full list of all species, protected areas, Key Biodiversity Areas in CSV format, maps showing the area of interest in relation to these features, and a 'How to read IBAT reports' document.

WARNING: IBAT aims to provide the most up-to-date and accurate information available at the time of analysis. There is however a possibility of incomplete, incorrect or out-of-date information. All findings in this report must be supported by further desktop review, consultation with experts and/or on-the-ground field assessment. Please consult IBAT for any additional disclaimers or recommendations applicable to the information used to generate this report.

Please note, sensitive species data are currently not included in IBAT reports in line with the Sensitive Data Access Restrictions Policy for the IUCN Red List. This relates to sensitive Threatened species and KBAs triggered by sensitive species.

Data used to generate this report

- UNEP-WCMC and IUCN, 2022. Protected Planet: The World Database on Protected Areas (WDPA)[On-line], Cambridge, UK: UNEP-WCMC and IUCN. Available at: www.protectedplanet.net - May 2022.
- BirdLife International (on behalf of the KBA Partnership), 2022. Key Biodiversity Areas - April 2022.
- IUCN, 2021. IUCN Red List of Threatened Species - December 2021.
- IUCN. The IUCN Red List of Threatened Species. Version 2019-3. (2019). https://www.iucnredlist.org
- IUCN. Threats Classification Scheme (Version 3.2). (2019)
- Strassburg, B.B.N., Iribarrem, A., Beyer, H.L. et al. Global priority areas for ecosystem restoration. Nature 586, 724–729 (2020). https://doi.org/10.1038/s41586-020-2784-9

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Protected Areas

The following protected areas are found within 1 km, 10 km, 50 km of the area of interest.
For further details please refer to the associated csv file in the report folder.

No protected areas within buffer distance

Key Biodiversity Areas

The following key biodiversity areas are found within 1 km, 10 km, 50 km of the area of interest.
For further details please refer to the associated csv file in the report folder.

Area name	Distance
Bardha Dam	50 km
Jawahar Sagar Sanctuary	50 km
Ramsagar Lake	50 km

IUCN Red List of Threatened Species

The following threatened species are potentially found within 50km of the area of interest.

For the full IUCN Red List please refer to the associated csv in the report folder.

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Ardeotis nigriceps	Great Indian Bustard	AVES	CR	Decreasing	Terrestrial
Sypheotides indicus	Lesser Florican	AVES	CR	Decreasing	Terrestrial
Vanellus gregarius	Sociable Lapwing	AVES	CR	Decreasing	Terrestrial
Gyps bengalensis	White-rumped Vulture	AVES	CR	Decreasing	Terrestrial

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Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Sarcogyps calvus	Red-headed Vulture	AVES	CR	Decreasing	Terrestrial
Gyps indicus	Indian Vulture	AVES	CR	Decreasing	Terrestrial
Nilssonia gangetica	Indian Softshell Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
Platanista gangetica	South Asian River Dolphin	MAMMALIA	EN	Unknown	Freshwater
Rynchops albicollis	Indian Skimmer	AVES	EN	Decreasing	Terrestrial, Freshwater
Sterna acuticauda	Black-bellied Tern	AVES	EN	Decreasing	Terrestrial, Freshwater
Haliaeetus leucoryphus	Pallas's Fish-eagle	AVES	EN	Decreasing	Terrestrial, Freshwater
Neophron percnopterus	Egyptian Vulture	AVES	EN	Decreasing	Terrestrial, Freshwater
Falco cherrug	Saker Falcon	AVES	EN	Decreasing	Terrestrial, Marine, Freshwater
Leptoptilos dubius	Greater Adjutant	AVES	EN	Decreasing	Terrestrial, Freshwater
Manis crassicaudata	Indian Pangolin	MAMMALIA	EN	Decreasing	Terrestrial
Varanus flavescens	Yellow Monitor	REPTILIA	EN	Decreasing	Terrestrial
Aquila nipalensis	Steppe Eagle	AVES	EN	Decreasing	Terrestrial

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Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Panthera pardus	Leopard	MAMMALIA	VU	Decreasing	Terrestrial
Tetracerus quadricornis	Four-horned Antelope	MAMMALIA	VU	Decreasing	Terrestrial
Geochelone elegans	Indian Star Tortoise	REPTILIA	VU	Decreasing	Terrestrial
Rusa unicolor	Sambar	MAMMALIA	VU	Decreasing	Terrestrial
Saara hardwickii	Indian Spiny-tailed Lizard	REPTILIA	VU	Decreasing	Terrestrial
Saxicola macrorhynchus	White-browed Bushchat	AVES	VU	Decreasing	Terrestrial
Oryza malampuzhaensis		LILIOPSIDA	VU	Decreasing	Terrestrial

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Recommended citation

IBAT Proximity Report. Generated under licence 6274-30211 from the Integrated Biodiversity Assessment Tool on 04 May 2022 (GMT). www.ibat-alliance.org

How to use this report

This report provides an indication of the potential biodiversity-related features - protected areas, key biodiversity areas and species - close to the specified location. It provides an early indication of potential biodiversity concerns, and can provide valuable guidance in making decisions. For example, this information can be helpful when assessing the potential environmental risk and impact of a site, categorising investments/projects, preparing the terms of reference for an impact assessment, focusing attention on key species of conservation concern and sites of known conservation value, and reviewing the results of an impact assessment.

The report does not provide details of potential indirect, downstream or cumulative impacts. Furthermore, the report should be regarded as a "first-step", providing a set of conservation values sourced from global data sets, and is not a substitute for further investigation and due diligence, especially concerning national and/or local conservation priorities.

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About this report

The recommendations stated alongside any Protected Areas and Key Biodiversity Areas identified in this report are determined by the following:

Protected Areas:

- 'Highest risk. Seek expert help' is stated if the report identifies a designation that includes either 'natural' or 'mixed world heritage site'.
- 'Assess for Critical Habitat' is stated if the report identifies a Strict Nature Reserve, Wilderness Area or National Park as coded by IUCN protected area categories Ia, Ib and II.
- 'Assess for biodiversity risk' is stated if the report identifies any other type of protected area.

Key Biodiversity Areas:

- 'Highest risk. Seek expert help' is stated if the report identifies an Alliance for Zero Extinction site.
- 'Assess for Critical Habitat' is stated if the report identifies Critically Endangered or Endangered species OR species with restricted ranges OR congregatory species as coded in the IUCN Red List of Threatened Species.
- 'Assess for biodiversity risk' is stated if the report identifies any other type of Key Biodiversity Area.

IBAT provides initial screening for Critical Habitat values. Performance Standard 6 (PS6) defines these values for Critical Habitat (PS6: para. 16) and legally protected and internationally recognized areas (PS6: para. 20). PS6 will be triggered when IFC client activities are located in modified habitats containing "significant biodiversity value," natural habitats, Critical Habitats, legally protected areas, or areas that are internationally recognized for biodiversity. References to PS6 and Guidance Note 6 (GN6) are provided to guide further assessment and detailed definitions where necessary. Please see https://www.ifc.org/ps6 for full details on PS6 and GN6.

The report screens for known risks within a standard 50km buffer of the coordinates used for analysis. This buffer is not intended to indicate the area of impact. The report can be used to:

- Scope risks to include within an assessment of risks and impacts
- Identify gaps within an existing assessment of risks and impacts
- Prioritize between sites in a portfolio for further assessment of risks and impacts
- Inform a preliminary determination of Critical Habitat
- Assess the need for engaging a biodiversity specialist
- Identify additional conservation experts or organizations to inform further assessment or planning

WARNING: IBAT aims to provide the most up-to-date and accurate information available at the time of analysis. There is however a possibility of incomplete, incorrect or out-of-date information. All findings in this report must be supported by further desktop review, consultation with experts and/or on-the-ground field assessment as described in PS6 and GN6. Please consult IBAT for any additional disclaimers or recommendations applicable to the information used to generate this report.

Please note, sensitive species data are currently not included in IBAT reports in line with the Sensitive Data Access Restrictions Policy for the IUCN Red List. This relates to sensitive Threatened species and KBAs triggered by sensitive species.

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Priority Species

Habitat of significant importance to priority species will trigger Critical Habitat status (See PS6 para.16). IBAT provides a preliminary list of priority species that could occur within the 50km buffer. This list is drawn from the IUCN Red List of Threatened Species (IUCN RL). This list should be used to guide any further assessment, with the aim of confirming known or likely occurrence of these species within the project area. It is also possible that further assessment may confirm occurrence of additional priority species not listed here. It is strongly encouraged that any new species information collected by the project be shared with species experts and/or IUCN wherever possible in order to improve IUCN datasets.

IUCN Red List of Threatened Species - CR & EN

The following species are potentially found within 50km of the area of interest.
For the full IUCN Red List please refer to the associated csv in the report folder.

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Nilssonia gangetica	Indian Softshell Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
Platanista gangetica	South Asian River Dolphin	MAMMALIA	EN	Unknown	Freshwater
Rynchops albicollis	Indian Skimmer	AVES	EN	Decreasing	Terrestrial, Freshwater
Sterna acuticauda	Black-bellied Tern	AVES	EN	Decreasing	Terrestrial, Freshwater
Haliaeetus leucoryphus	Pallas's Fish-eagle	AVES	EN	Decreasing	Terrestrial, Freshwater
Neophron percnopterus	Egyptian Vulture	AVES	EN	Decreasing	Terrestrial, Freshwater
Falco cherrug	Saker Falcon	AVES	EN	Decreasing	Terrestrial, Marine, Freshwater
Leptoptilos dubius	Greater Adjutant	AVES	EN	Decreasing	Terrestrial, Freshwater

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Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Ardeotis nigriceps	Great Indian Bustard	AVES	CR	Decreasing	Terrestrial
Sypheotides indicus	Lesser Florican	AVES	CR	Decreasing	Terrestrial
Vanellus gregarius	Sociable Lapwing	AVES	CR	Decreasing	Terrestrial
Gyps bengalensis	White-rumped Vulture	AVES	CR	Decreasing	Terrestrial
Sarcogyps calvus	Red-headed Vulture	AVES	CR	Decreasing	Terrestrial
Gyps indicus	Indian Vulture	AVES	CR	Decreasing	Terrestrial
Manis crassicaudata	Indian Pangolin	MAMMALIA	EN	Decreasing	Terrestrial
Varanus flavescens	Yellow Monitor	REPTILIA	EN	Decreasing	Terrestrial
Aquila nipalensis	Steppe Eagle	AVES	EN	Decreasing	Terrestrial

Restricted Range Species

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Macrobrachium rosenbergii	Giant River Prawn	MALACOSTRACA	LC OR LR/LC	Unknown	Freshwater

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Biodiversity features which are likely to trigger Critical Habitat

Protected Areas

There are no protected areas to show for this report.

Key Biodiversity Areas

The following key biodiversity areas are found within 1 km and 10 km and 50 km of the area of interest.
For further details please refer to the associated csv file in the report folder.

Area name	Distance	IBA	AZE	Recommendation
Bardha Dam	50 km	Yes	No	Assess for critical habitat
Jawahar Sagar Sanctuary	50 km	Yes	No	Assess for critical habitat
Ramsagar Lake	50 km	Yes	No	Assess for critical habitat

Species with potential to occur

Area Taxonomic group	Total assessed species	Total (CR, EN & VU)	CR	EN	VU	NT	LC	DD
REPTILIA	52	7	0	2	5	3	41	1
MAMMALIA	62	7	0	2	5	4	51	0
AVES	308	20	6	7	7	14	274	0
ACTINOPTERYGII	34	2	0	0	2	2	29	1
AMPHIBIA	9	0	0	0	0	0	9	0
INSECTA	50	0	0	0	0	0	48	2

IBAT

Area Taxonomic group	Total assessed species	Total (CR, EN & VU)	CR	EN	VU	NT	LC	DD
GASTROPODA	23	0	0	0	0	0	22	1
POLYPODIOPSIDA	2	0	0	0	0	0	2	0
MAGNOLIOPSIDA	38	0	0	0	0	0	37	1
LILIOPSIDA	48	1	0	0	1	0	45	2
BIVALVIA	10	0	0	0	0	0	10	0
MALACOSTRACA	5	0	0	0	0	0	5	0
ARACHNIDA	1	0	0	0	0	0	1	0

IBAT

Recommended citation

IBAT PS6 & ESS6 Report. Generated under licence 6274-30210 from the Integrated Biodiversity Assessment Tool on 04 May 2022 (GMT). www.ibat-alliance.org

Recommended Experts and Organizations

For projects located in Critical Habitat, clients must ensure that external experts with regional expertise are involved in further assessment (GN6: GN22). Clients are encouraged to develop partnerships with recognized and credible conservation organizations and/or academic institutes, especially with respect to potential developments in natural or Critical Habitat (GN6: GN23). Where Critical Habitats are triggered by priority species, species specialists must be involved. IBAT provides data originally collected by a large network of national partners, while species information is sourced via the IUCN Red List and affiliated Species Specialist Groups. These experts and organizations are listed below. **Please note that this is not intended as a comprehensive list of organizations and experts. These organizations and experts are under no obligation to support any further assessment and do so entirely at their discretion and under their terms. Any views expressed or recommendations made by these stakeholders should not be attributed to the IFC or IBAT for IFC partners.**

Birdlife Partners

URL: https://www.birdlife.org/worldwide/partnership/birdlife-partners

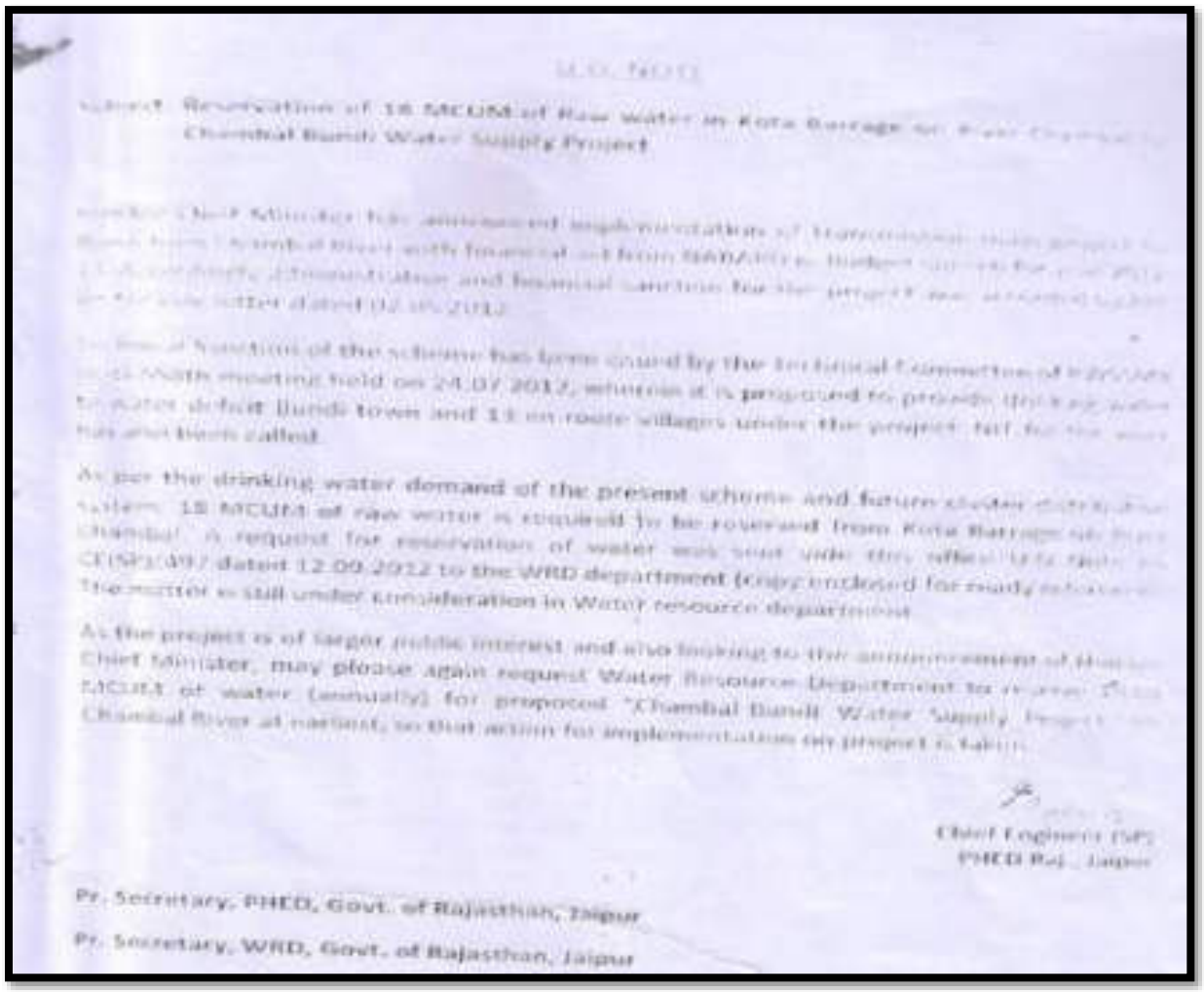
Directory for Species Survival Commission (SSC) Specialist Groups and Red List Authorities

URL: https://www.iucn.org/commissions/ssc-groups

Appendix 9: Source of Sustainability of Proposed Water Supply Work

Selection of water source. An existing intake well is available at Kota Barrage, Kota that a feasible and sustainable source of water supply to meet the ultimate design demand of Bundi town based on the techno-economic and environment considerations as elucidated below.

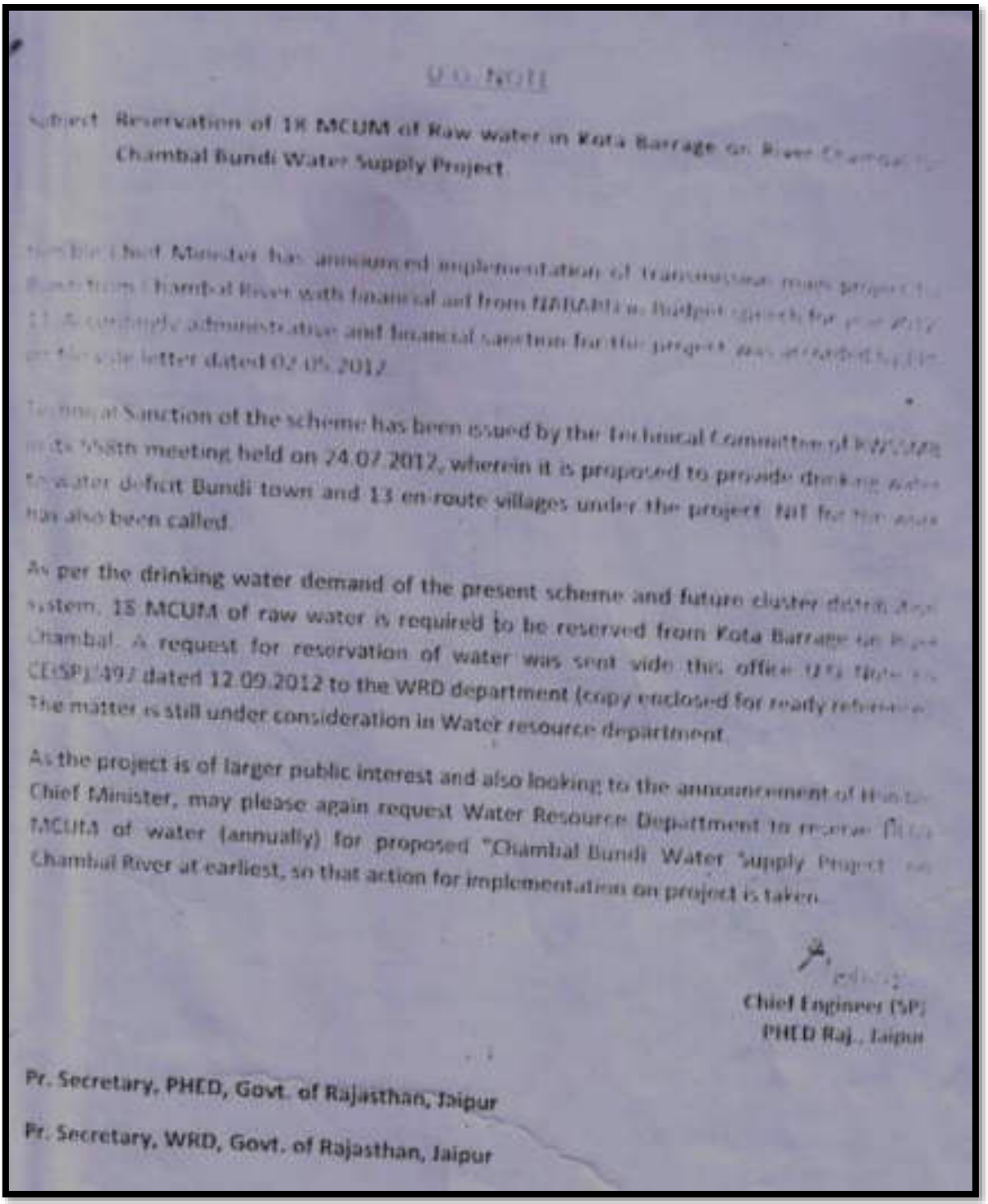
i. **Kota Barrage:** Kota Barrage is 35.7 km. from the town and it meets to Chambal River. Presently source of Water at Bundi town is surface water from Kota Barrage with reservation of 49.32 MLD (18 MCUM) for urban town which is enough for the project. So, this dam is taken as source for the proposed system. Letter of Allocation is at Fig. 1,2 & 3.



Pr. Secretary, PHED, Govt. of Rajasthan, Jaipur

Pr. Secretary, WRD, Govt. of Rajasthan, Jaipur

Fig. 1- Letter of Allocation



Subject: Reservation of 18 MCUM of Raw Water in Kota Barrage on River Chambal for Chambal Bundi Water Supply Project

Hon'ble Chief Minister has announced implementation of [illegible] project from Chambal River with financial aid from NABARD in Budget speech for year 2012-13. Accordingly administrative and financial sanction for the project was accorded by the Govt. vide letter dated 02.05.2012.

Technical Sanction of the scheme has been issued by the Technical Committee of PHED in its 168th meeting held on 24.07.2012, wherein it is proposed to provide drinking water to water deficit Bundi town and 13 en-route villages under the project. NIT for the work has also been called.

As per the drinking water demand of the present scheme and future cluster [illegible] system, 18 MCUM of raw water is required to be reserved from Kota Barrage on River Chambal. A request for reservation of water was sent vide this office U.O. No. CE(SP)/497 dated 12.09.2012 to the WRD department (copy enclosed for ready reference). The matter is still under consideration in Water resource department.

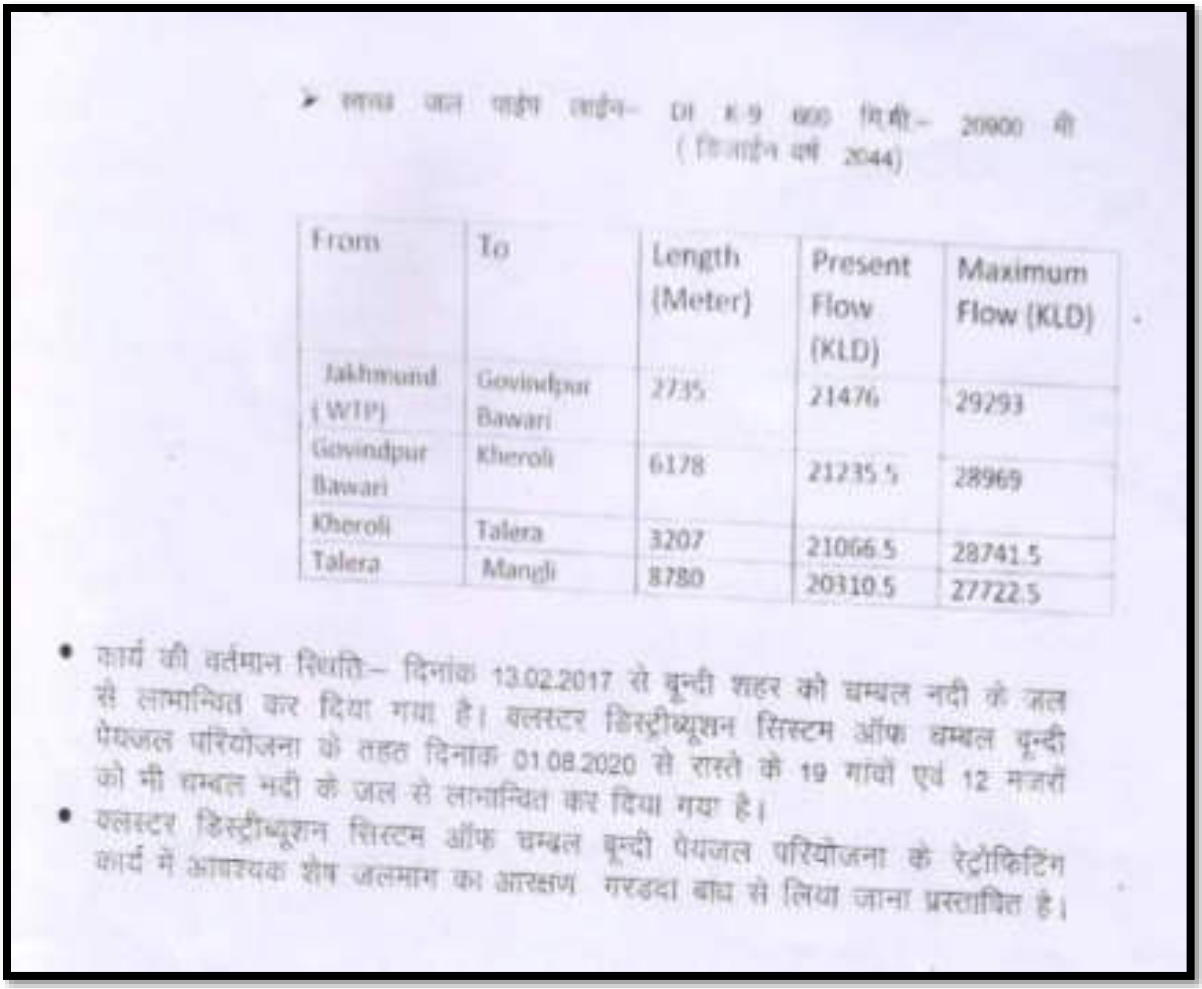
As the project is of larger public interest and also looking to the announcement of Hon'ble Chief Minister, may please again request Water Resource Department to reserve [illegible] MCUM of water (annually) for proposed "Chambal Bundi Water Supply Project" on Chambal River at earliest, so that action for implementation on project is taken.

Chief Engineer (SP)
PHED Raj., Jaipur

Pr. Secretary, PHED, Govt. of Rajasthan, Jaipur

Pr. Secretary, WRD, Govt. of Rajasthan, Jaipur

Fig. 2- Letter of Allocation



➢ स्लाक जल पाईप लाईन- DI K 9 600 मि.मी.- 20900 मी
(डिजाईन वर्ष 2044)

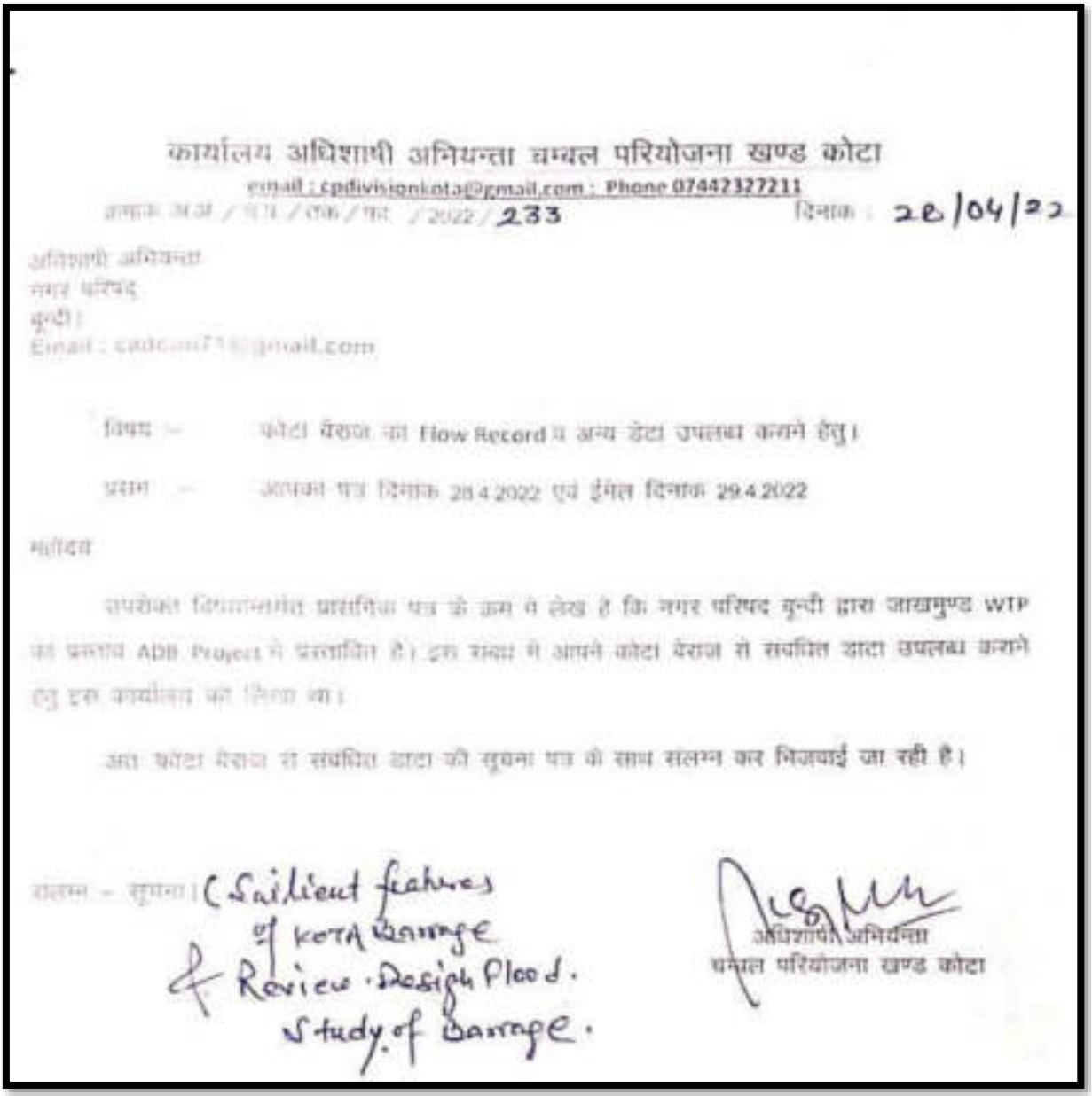
From	To	Length (Meter)	Present Flow (KLD)	Maximum Flow (KLD)
Jakhmund (WTP)	Govindpur Bawari	2735	21476	29293
Govindpur Bawari	Kheroli	6178	21235.5	28969
Kheroli	Talera	3207	21066.5	28741.5
Talera	Mangli	8780	20310.5	27722.5

- कार्य की वर्तमान स्थिति– दिनांक 13.02.2017 से बून्दी शहर को चम्बल नदी के जल से लाभान्वित कर दिया गया है। क्लस्टर डिस्ट्रीब्यूशन सिस्टम ऑफ चम्बल बून्दी पेयजल परियोजना के तहत दिनांक 01.08.2020 से रास्ते के 19 गांवों एवं 12 मजरों को भी चम्बल नदी के जल से लाभान्वित कर दिया गया है।
- क्लस्टर डिस्ट्रीब्यूशन सिस्टम ऑफ चम्बल बून्दी पेयजल परियोजना के रेट्रोफिटिंग कार्य में आवश्यक शेष जलभाग का आरक्षण गरडदा बांध से लिया जाना प्रस्तावित है।

Fig. 3- Letter of Allocation

a. Location

The Kota Barrage is situated about 35.7 Km from District head quarter Bundi. The latitude and longitude are 25°10'37.05"N and 75°49'32.03"E respectively. The intake is approachable by a tar road of length 500 meter. Details of the dam are available at Fig. 4, 5, 6, 7.



कार्यालय अधिशाषी अभियन्ता चम्बल परियोजना खण्ड कोटा

email : cpdivisionkota@gmail.com : Phone 07442327211

क्रमांक ... / ... / ... / ... / 2022 / 233 दिनांक : 28/04/22

अधिशाषी अभियन्ता
नगर परिषद
बून्दी।
Email : ...@gmail.com

विषय :- कोटा बैराज का Flow Record व अन्य डेटा उपलब्ध कराने हेतु।

प्रसंग :- आपका पत्र दिनांक 28.4.2022 एवं ईमेल दिनांक 29.4.2022

महोदय

उपरोक्त विषयान्तर्गत प्रसंगित पत्र के क्रम में लेख है कि नगर परिषद बून्दी द्वारा जाखमुण्ड WTP का प्रस्ताव ADB Project में प्रस्तावित है। इस संबंध में आपने कोटा बैराज से संबंधित डाटा उपलब्ध कराने हेतु इस कार्यालय को लिखा था।

अतः कोटा बैराज से संबंधित डाटा की सूचना पत्र के साथ संलग्न कर भिजवाई जा रही है।

संलग्न - सूचना (Salient features of KOTA Barrage & Review - Design Flood - Study of Barrage.

अधिशाषी अभियन्ता
चम्बल परियोजना खण्ड कोटा

Fig. 4- Details of Kota Barrage

Government of India
Central Water Commission
Hydrology (South) Directorate
3rd Floor (S), Sewa Bhawan
R.K. Puram, New Delhi-110066
Phone/Fax 011-26585507
Email: hydsouth@nic.in

विषय: **Design Flood Study Review of Kota Barrage Project, Rajasthan under DRIP Phase-II reg.**

संदर्भ: Lr No 18/1/Rajasthan-Design Flood R/DSR/(DRIP-II)/2018/908 dated 31.05.2018

Reference is invited to the above cited letter of DSR Directorate vide which salient features of Kota Barrage project under DRIP-II, was sent to this office for estimation of design flood. It is to mentioned that no design flood report had been submitted. So far, 82 nos. of design flood reports/ salient features of projects have been received. Out of this, the design flood studies of 71 nos. Projects had been approved and conveyed to project authorities. Beside, the design flood studies of Kota barrage Project have also been carried out now and details are as under:

The latitude and longitude of Kota Barrage site are 25° 10'35" N and 75°50'34" E respectively. The reservoir with full reservoir level (FRL) at EL. 260.30 m has gross storage capacity of 112.5 MCM. The maximum height of the dam above deepest foundation level is about 37.35 m. As per IS: 11223-1985 criteria, the Kota Barrage qualifies for Probable Maximum Flood (PMF) as its design flood. The catchment area of Kota barrage is intercepted by Gandhi Sagar, Rana Pratap Sagar and Jawahar Sagar dam projects respectively. Therefore, the study has been done with emphasis on design flood of Gandhi Sagar, Rana Pratap Sagar and Jawahar Sagar Projects.

This office has carried out the design flood studies of the above project using hydro-meteorological approach. The peak of PMF works out to be of the order of 24953 m³/sec, which may be adopted as design flood in dam safety review of the project. The design flood review study report of Kota Barrage Project is enclosed.

This issues with the approval of Chief Engineer, HSO, CWC.

Encl: As Above

(NITYA NAND RAI)
(Director)

Director, Dam Safety and Rehabilitation Dte,CWC, Library Building, R.K.Puram, New Delhi
CWC U.O 7/Rajasthan -16/2018-Hyd(S)/343-344 Dated 11.11.2019

Copy for information to:

1. Director, Hydrology (DSR) Directorate, CWC

Fig. 5- Details of Kota Barrage

SALIENT FEATURES OF KOTA BARRAGE

			MKS	FPS
1	location		Near Kota city in Rajasthan across river chambal	Near Kota city in Rajasthan across river chambal
	(i)	Longitude	75°49'32" E	75°49'32" E
	(ii)	Latitude	25°10'36" N	25°10'36" N
2	Commencement		sept.1953	sept.1953
3	Completion		nov.1960	nov.1960
4	Drainage Basin Characteristics			
	(i)	Catchment area gross and free catchment are below	2.74×10^{10} Sqm	10600 sq.miles
		R.P.S. Dam	2.58×10^{9} Sqm	1000 Sq miles
	(ii)	Maximum annual precipitation (in the year 1944)	1.32 m	52"
	(iii)	Average annual precipitation	47 year period 0.81m	32" (47 year period)
5	Stream Flow Data			
	(i)	Max. recorded flood	24918.835	881000 cusecs
	(ii)	Surplussing capacity taking absorption in the upper		
		Reservoirs into account	21237.6349	750000 cusecs
	(iii)	Max. runoff (in 1944)	14185 Mcum	11.500 M.A.ft.
	(iv)	Min. runoff (in 1981)	1235948.8 Mcum	1002 M.A. ft.
	(v)	Average annual runoff	5448.29 Mcum	4.417 M.A ft
	(vi)	Silt reserve	9.25 Mcum	0.0075 M.A.ft.
	(vii)	Storage Capacity	98.67 M.cum	3484.23 Mcft.
6	Reservoir			
	(i)	Average bed level of the river at the site	227.38 m	EL 746.00 ft.
	(ii)	Full reservoir level	260.29 m	EL 854.00 ft.
	(iii)	Max. water level	261.366 m	EL 857.50 ft.
	(iv)	Submergence area at FRL	5.82 Sqkm	5.82 Sqkm
	(v)	Minimum Draw down level	254.80 Mtr	834.744 ft.
7	Barrage			
	(i)	Type	Earthen Dam with Gated Spillway	Earthen Dam with Gated Spillway
	(ii)	Length	551.68 m at crest	1810' at crest
	(iii)	Elevation of road at top	262.90 m	862.50
	(iv)	Top width of road	6.24m	20'-6"

Fig. 6- Details of Kota Barrage

			MKS	FPS
8	Profile of Earthen Section			
	(i)	Front Slop	3:1	3:1
	(ii)	Rear Slope	2.5:1	2.5:1
	(iii)	Width at Top	8.76m	28'-9"
	(iv)	Max. width of bottom	275.844 m at RL 740.00	905' at RL 740.00
	(v)	Max. height above foundation	37.338 m	122.5 ft
9	Overflow section			
	(i)	Length of spillway	304.80 m	1000'
	(ii)	Radial gates 19 Nos	12.20m x12.80 m	40'x42'
	(iii)	Sluice gate 2 Nos	2.74m x3.35 m	9'x11'
	(iv)	Moderated discharge	24941 cumec	881000 cusecs
	(v)	Crest of spillway	247.5 m	812.00
	(vii)	Control-hoist bridge raising 30 above barrage		
	(viii)	Mode of energy dissipation	Bucket with 60' radius	Bucket with 60' radius
10	Canal			
	(i)	Right Main Canal	372 km	231.15 miles
	(ii)	Left Main Canal	2.58 km	1.6 miles
	(iii)	Right Main Canal discharge at head	188.47 cumecs	6656 cusecs
	(iv)	Right Main canal discharge at Madhya Pradesh border	110.43 cumecs	3900 cusecs
	(v)	Left Main canal discharge at head	42.46 cumecs	1499.56 cusecs
	(vi)	Length of branches, distributaries and minors of right Main canal	1376 km	855 miles
	(vii)	Length of branches, distributaries and minors of left Main canal	1076 km	668.6 miles
	(viii)	Gross command area in Rajasthan in M.P. Total	 4.85 Lacs ha 7.10 Lacs ha 11.95 Lacs ha.	 11.97 Lacs acre 17.53 Lacs acre 29.50 Lacs acre
	(ix)	Culturable command area in Rajasthan in MP Total	 2.29 Lacs ha 2.29 Lacs ha 4.58 Lacs ha.	 5.65 Lacs acre 5.65 Lacs acre 11.30 Lacs acre

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खण्ड कोटा

Fig. 7- Details of Kota Barrage

b. Catchment Area

As per available records with of the Central water commission the gross catchment area is about $2.74 * 10^{10}$ sq m, front slope is 3:1 and rear slope is 2.5:1. The peak flood discharge as per CWC report is 24953 m3/sec. It is located on the banks of Chambal River. The catchment area of Kota Barrage is intercepted by Gandhi Sagar, Rana Pratap Sagar and Jawahar Sagar Dam Projects respectively. Kota Barrage has a total storage capacity of 112.06 mcm

c. Selection of Site

The existing intake well is available which has the capacity to supply 34 MLD of water at Kota Barrage is proposed to be used in the project.

d. Climate

Kota has a semi-arid climate with high temperatures throughout the year. Summers are long, hot, and dry, starting in late March and lasting till the end of June. The temperatures average above 40 °C in May and June, frequently exceed 45 °C with temperatures as high as 48.4 °C also been recorded. The monsoon season follows with comparatively lower temperatures, but higher humidity and frequent, torrential downpours. The monsoons subside in October and temperatures rise again. The brief, mild winter starts in late November and lasts until the last week of February. Temperatures hover between 26.7 °C (max) to 12.0 °C (min).

e. Rainfall

The catchment area is too big i.e., 27332 sq.km. spreading across Rajasthan and there are number of rain gauge stations in the catchment area. The nearest rain gauge station is at Kota and annual rainfall is 700 mm. The Rainfall date is as follows: -

Bundi 30Years Rainfall data														
YEAR	**Total Rain fall**	**January**	**Feb**	**March**	**April**	**May**	**June**	**July**	**August**	**Sept.**	**Oct.**	**Nov.**	**Dec.**	**Av. Yearly Rainfall**
	mm	**mm**	**mm**	**mm**	**mm**	**mm**	**mm**	**mm**	**mm**	**mm**	**mm**	**mm**	**mm**	**mm**
1991	**488.1**	0	0	0	20.5	0	0	251.9	163.9	51.8	0	0	0	**40.68**
1992	**502.5**	6	0	0	0	6.3	31	182.1	199.3	52.2	25.6	0	0	**41.88**
1993	**662.6**	0	6	0	3	0	127.1	219.5	87.4	209.3	10.3	0	0	**55.22**
1994	**792.6**	16.3	0	0	9.4	0	103.8	278.4	251.7	133	0	0	0	**66.05**
1995	**563.5**	25.6	0	1.3	0	0	17	201	205.4	113.2	0	0	0	**46.96**
1996	**769.4**	11	2.5	0	2.5	9.4	174	270	185	115	0	0	0	**64.12**
1997	**899**	0	0	0	52	11	139	283	242	83	55	0	34	**74.92**
1998	**599.7**	0	6	0	17.2	0	58.3	178.7	129.5	141.5	68.5	0	0	**49.98**
1999	**565**	0	5	0	0	4	90	343	52.4	49.6	21	0	0	**47.08**
2000	**606**	0	0	0	9	49	15	365	149	19	0	0	0	**50.50**
2001	**824**	0	0	0	4	55	116	591	58	0	0	0	0	**68.67**
2002	**275.5**	0	17	0	0	0	114	1	134.5	9	0	0	0	**22.96**
2003	**754**	0	8.2	0	0	1.8	142	257	217	128	0	0	0	**62.83**
2004	**848**	0	0	0	0	8	70	127	617	22	4	0	0	**70.67**
2005	**545.8**	0	0	13	8	0	52	213	19.8	240	0	0	0	**45.48**
2006	**707**	0	0	20	0	4	95	225	251	112	0	0	0	**58.92**

Bundi 30Years Rainfall data														
YEAR	Total Rain fall	January	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Av. Yearly Rainfall
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
2007	**748.5**	0	58.5	15	0	0	153	300	127	90	0	0	5	**62.38**
2008	**602**	0	0	2	16	12	158	197	81	127	6	3	0	**50.17**
2009	**575**	0	0	0	0	5	18	396	113	11	9	23	0	**47.92**
2010	**662**	0	1	0	0	0	53	108	303	85	0	106	6	**55.17**
2011	**750**	0	0	0	0	0	195	194	212	149	0	0	0	**62.50**
2012	**736**	0	0	0	11	9	22	148	442	104	0	0	0	**61.33**
2013	**701**	0	22	0	0	0	34	380	195	35	33	0	2	**58.42**
2014	**739**	55	2	0	5	18	10	106	423	81	39	0	0	**61.58**
2015	**836**	29	0	89	6	12	213	293	192	2	0	0	0	**69.67**
2016	**1060**	2	0	2	0	9	167	353	425	95	7	0	0	**88.33**
2017	**620**	8	8	22	0	14	89	230	202	47	0	0	0	**51.67**
2018	**679**	0	0	0	2	0	79	141	261	196	0	0	0	**56.58**
2019	**1330**	0	6	0	15	11	62	462	502	270	2	0	0	**110.83**
2020	**520**	3	0	12	0	34	74	59	232	76	8	22	0	**43.33**
2021	**1209**	**23**	**0**	**7**	**1**	**26**	**39**	**260**	**507**	**235**	**52**	**31**	**28**	**100.75**
Av.	**715.17**	**5.77**	**4.59**	**5.91**	**5.86**	**9.63**	**87.43**	**245.60**	**231.61**	**99.41**	**10.98**	**5.97**	**2.42**	**59.60**

f. Runoff

Peak flood discharge as per Central Water Commission is 24953 m3/sec (Fig 5). A river gauging site (G&D site) of C.W.C.

g. Submergence

The gross storage capacity of the Dam is 112.23 mcmthe height of the Barrage is 37.35 m above deepest foundation level.

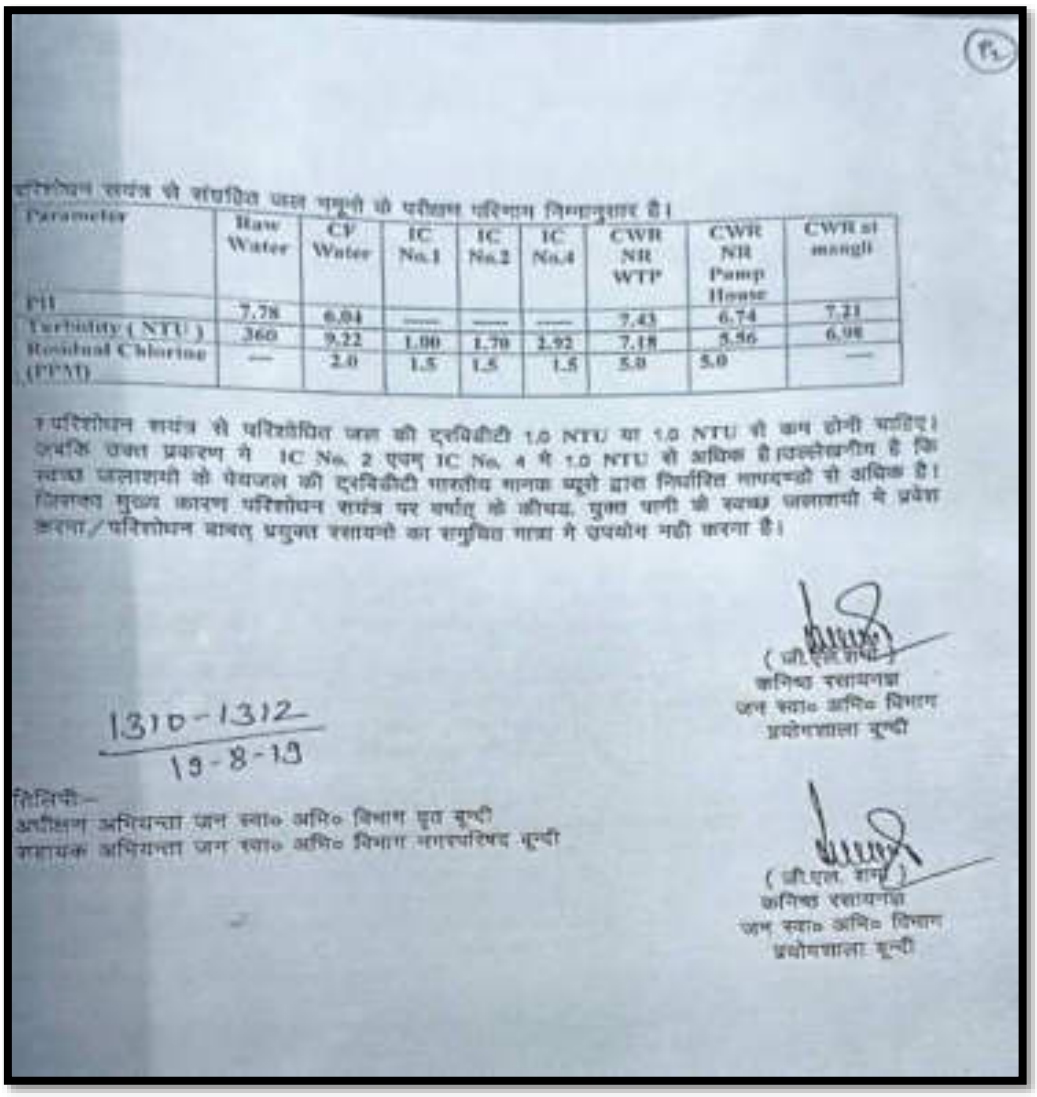
h. Storage Capacity

The gross storage capacity of Kota barrage is 112 mcm (Fig. 5) and the Storage Capacity is 69.83 mcm .

As there is no other reliable source in the vicinity of town. Given the dependability, sustainability and government permissions, the Kota Barrage is selected as water source for Bundi town water supply scheme. It has sufficient amount of storage capacity of water to serve the people of Bundi up to ultimate year 2055.

Kota Barrage water sustainability and environmental considerations. The storage capacity of Kota Barrage is 69.83 .Cum, while the water requirement of ultimate year (2055) for the project is 45.94 MLD or 16.77 MCUM per year, which is about 16.6% of storage capacity of Kota Barrage, which is adequate to meet the project yearly demand of the design year. Since storage capacity is 5 times more than the annual water demand of Bundi town. Also, during the dry summer months, the drawl would be less than compared to the water storage available. It is evident that the Kota Barrage is full to its crest level at the end of monsoon season (September), which gradually reduced to its minimum in summer and up to the arrival of monsoon flows in June-July.

Kota Barrage Water quality. Catchment area of the dam is spread over 27332 sq. km. Therefore, no significant impacts on surface water quality envisaged. Water quality sampling is taken up from existing WTP Jakhmund and water quality data of Kota Barrage are as follows:-



परिशोधन संयंत्र से संबंधित जल नमूनों के परीक्षण परिणाम निम्नानुसार है।

Parameter	Raw Water	CP Water	IC No.1	IC No.2	IC No.4	CWR NR WTP	CWR NR Pump House	CWR at mangli
PH	7.78	6.04	----	----	----	7.43	6.74	7.21
Turbidity (NTU)	360	9.22	1.00	1.70	2.92	7.15	5.56	6.98
Residual Chlorine (FRM)	—	2.0	1.5	1.5	1.5	5.0	5.0	—

1.परिशोधन संयंत्र से परिशोधित जल की टर्बिडीटी 1.0 NTU या 1.0 NTU से कम होनी चाहिए। जबकि उक्त प्रकरण में IC No. 2 एवम् IC No. 4 में 1.0 NTU से अधिक है।विश्लेषणीय है कि स्वच्छ जलाशयों के पेयजल की टर्बिडीटी भारतीय मानक ब्यूरो द्वारा निर्धारित मानदण्डों से अधिक है। जिसका मुख्य कारण परिशोधन संयंत्र पर वर्षात् के दौरान, दूषित पानी जो स्वच्छ जलाशयों में प्रवेश करना/परिशोधन हेतु प्रयुक्त रसायनों का समुचित मात्रा में उपयोग नहीं करना है।

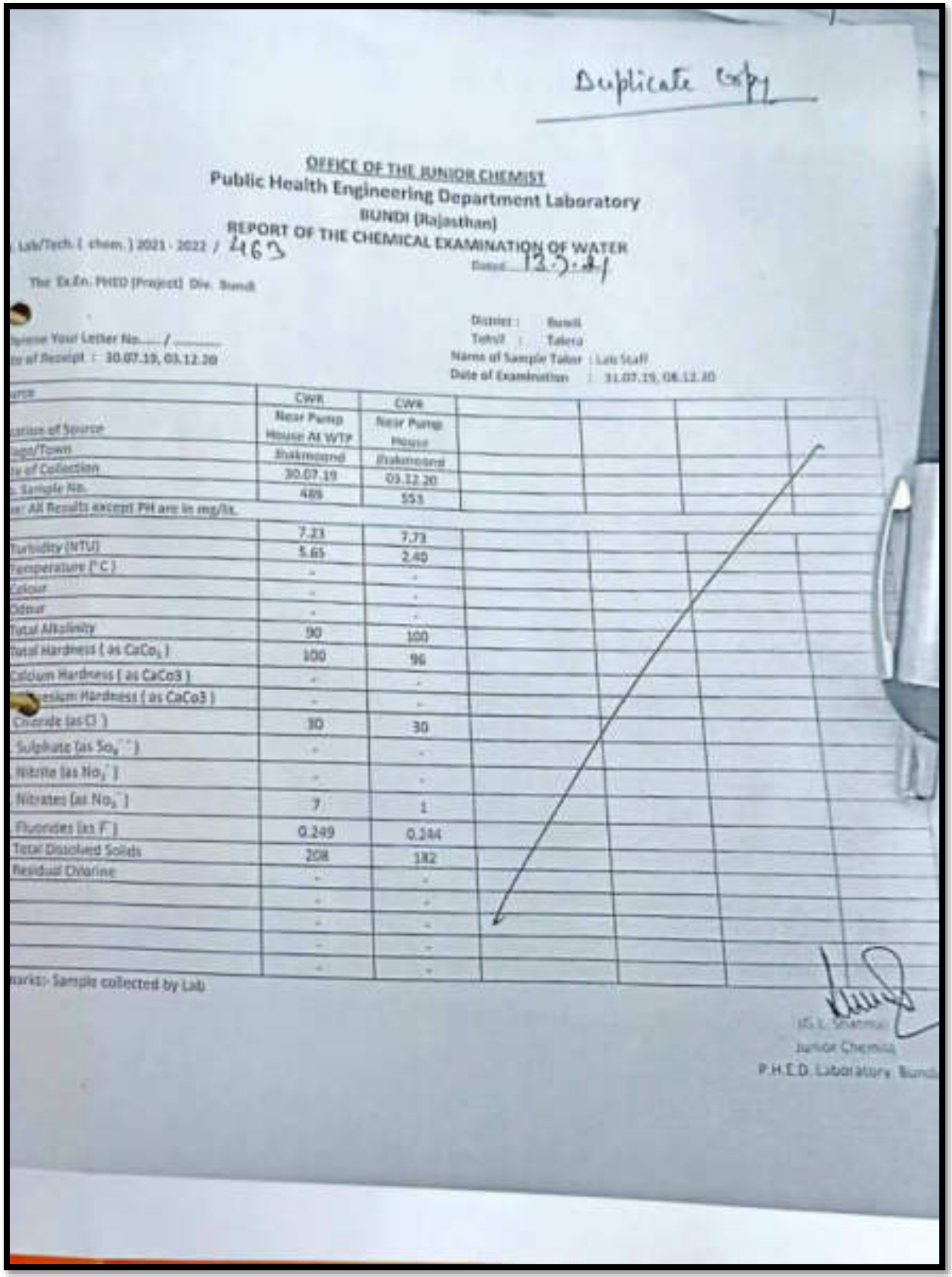
(जी.एल. शर्मा)
कनिष्ठ रसायनज्ञ
जल स्वा० अभि० विभाग
प्रयोगशाला बून्दी

1310-1312
19-8-13

प्रतिलिपी –
अधीक्षण अभियन्ता जल स्वा० अभि० विभाग दूत बून्दी
सहायक अभियन्ता जल स्वा० अभि० विभाग नगरपरिषद बून्दी

(जी.एल. शर्मा)
कनिष्ठ रसायनज्ञ
जल स्वा० अभि० विभाग
प्रयोगशाला बून्दी

Fig. 8- Water Quality Report of Kota Barrage



Duplicate Copy

OFFICE OF THE JUNIOR CHEMIST
Public Health Engineering Department Laboratory
BUNDI (Rajasthan)

REPORT OF THE CHEMICAL EXAMINATION OF WATER

Lab/Tech. (chem.) 2021 - 2022 / 463 Dated 13.2.21

The Ex.En. PHED (Project) Div. Bundi

Reference Your Letter No...../.....
Date of Receipt : 30.07.19, 03.12.20

District : Bundi
Tehsil : Talera
Name of Sample Taker : Lab Staff
Date of Examination : 31.07.19, 08.12.20

Source	CWR	CWR				
Name of Source	Near Pump House At WTP	Near Pump House				
Village/Town	Jhakmoond	Jhakmoond				
Date of Collection	30.07.19	03.12.20				
Lab. Sample No.	489	553				
Note: All Results except PH are in mg/lit.						
Turbidity (NTU)	7.23	7.73				
Temperature (°C)	5.65	2.49				
Colour	-	-				
Odour	-	-				
Total Alkalinity	90	100				
Total Hardness (as $CaCo_3$)	100	96				
Calcium Hardness (as CaCo3)	-	-				
Magnesium Hardness (as CaCo3)	-	-				
Chloride (as Cl^-)	30	30				
Sulphate (as So_4^{--})	-	-				
Nitrite (as No_2^-)	-	-				
Nitrates (as No_3^-)	7	1				
Fluorides (as F^-)	0.249	0.244				
Total Dissolved Solids	208	182				
Residual Chlorine	-	-				
	-	-				
	-	-				
	-	-				
	-	-				

Remarks:- Sample collected by Lab

(G. L. Sharma)
Junior Chemist
P.H.E.D. Laboratory, Bundi

Fig. 9- Water Quality Report of Jakhmund WTP

Appendix 10: Environmental Monitoring Report: Pre-construction Phase

Pre-construction environmental monitoring has been conducted by contractor at different working site locations in January 2023 and submitted their environmental monitoring report on dated 03.02.2023. All environmental monitoring parameters meet out CPCB&CC guideline and come under environmental standard permissible limit. Following are the environmental monitoring reports:

NAKSHATRA ENVIRO SERVICES

M. 94136-66777
M. 80038-96245

Office : 66/40, Heera Path Mansarovar, Jaipur - 302020 | Website : www.nakshatraenviro.in
Lab: 46, Solitaire Industrial Park, Phase-I, Near RSCO Industrial Area, Bagru (Ext.), Dahmi Kalan, Jaipur-303007
E-mail : neslab2004@gmail.com, nakshatraenviro@gmail.com

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Reference No.: NES230130001 Date: 03/02/2023

TEST CERTIFICATE
AMBIENT AIR QUALITY MONITORING

Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur.
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTDSP/BUN /01.
Registered Contractor Address		2734, Sajjangarh Main Road, Malla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

SAMPLE DETAILS

Sampling Location	CWR, Nainwa Road Pump House, Bundi
Date of Sampling	28/01/2023
Ambient Temperature	Max. 23°C & Min. 6°C
Relative Humidity	52%
Weather Conditions	Clear Sky
Period of Testing	30/01/2023 to 03/02/2023

TEST RESULTS

Sl. No.	Parameters	Values Found	NAAQS	Unit	Protocol
1.	PM_{10}	80.22	100	$\mu g/m^3$	IS 5182 (P-23):2006 (RA 2017)
2.	$PM_{2.5}$	35.26	60	$\mu g/m^3$	As per CPCB guidelines
3.	Sulphur dioxide (SO_2)	8.71	80	$\mu g/m^3$	IS 5182 (P-02):2001 (RA 2017)
4.	Oxides of Nitrogen (NO_X)	23.04	80	$\mu g/m^3$	IS 5182 (P-06):2006 (RA 2017)
5.	Carbon Monoxide (CO)	0.53	2.00	mg/m^3	IS 5182 (P-10):1999 (RA 2019)

Note: NAAQS: National Ambient Air Quality Standards

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- Total liability of this laboratory is limited to the invoice amount.
- The results enlisted refer only to the above sample and applicable parameters endorsement of products is neither inferred nor implied.
- Samples will be destroyed after 15 days from the date of issuing of analysis of report unless otherwise specified.

(Sajjan Singh Bhangarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

*** END OF REPORT ***

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7.	Permeability	9.10	cm/hr	IS 2720 (P-17):1986 (RA 2017)
8.	Total Nitrogen (as TKN)	597.42	mg/kg	IS 14684:1999 (RA 2014)
9.	Sodium (as Na)	75.80	mg/kg	As per USEPA Method
10.	Phosphorous (as P)	194.74	mg/kg	As per USEPA Method
11.	Potassium (as K)	68.95	mg/kg	IS 9497:1980 (RA 2020)
12.	Organic Matter	0.63	%	IS 2720 (P-22):1972 (RA 2015)
13.	Oil & Grease	B.D.L.	mg/kg	As per USEPA Method

Note: N.R. – No Relaxation; B.D.L. – Below Detection Limit

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(Sohan Singh Changarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

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Reference No.: NES230130022 Date: 03/02/2023

TEST CERTIFICATE
SOIL ANALYSIS REPORT

Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTHSP/BUN /01.
Registered Contractor Address		2734, Sajjangarh Main Road, Mulla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

SAMPLE DETAILS

Sampling Location	PHED, Vikash Nagar, Bundi
Sample Quantity	1 Kilogram (1 Kg)
Sample Condition	Sealed
Sample Collected By	NES Representative
Date of Sample Collection	29/01/2023
Period of Testing	30/01/2023 to 03/02/2023

TEST RESULTS

Sl. No.	Parameters	Values Found	Unit	Test Protocol
1.	pH	7.52	--	IS 2720 (P-26):1987 (RA 2016)
2.	Electrical Conductivity	697.40	µS/cm	IS 14767:2000 (RA 2016)
3.	Moisture	25.43	%	IS 2720 (P-18):1992 (RA 2016)
4.	Texture	Sandy Laom	--	IS 2720 (P-04):1985 (RA 2015)
	Sand	64.20	%	
	Silt	13.85	%	
	Clay	21.95	%	
5.	Calcium (as Ca)	14.85	mg/kg	As per USEPA Method
6.	Magnesium (as Mg)	5.24	mg/kg	As per USEPA Method

(Shaitan Singh Khangarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

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7.	Permeability	10.40	cm/hr	IS 2720 (P-17):1986 (RA 2017)
8.	Total Nitrogen (as TKN)	622.80	mg/kg	IS 14684:1999 (RA 2014)
9.	Sodium (as Na)	95.23	mg/kg	As per USEPA Method
10.	Phosphorous (as P)	167.85	mg/kg	As per USEPA Method
11.	Potassium (as K)	63.74	mg/kg	IS 9497:1980 (RX'2020)
12.	Organic Matter	0.72	%	IS 2720 (P-22):1972 (RA 2015)
13.	Oil & Grease	B.D.L.	mg/kg	As per USEPA Method

Note: N.R. – No Relaxation; B.D.L. – Below Detection Limit

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- Samples will be destroyed after 15 days from the date of issuing of analysis of report unless otherwise specified.

(Sajjan Singh Khangarot)
Review By

Seal

(Jag Mohan Sharma)
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Reference No.: NES230130021 Date: 03/02/2023

TEST CERTIFICATE
SOIL ANALYSIS REPORT

Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTDSP/BUN /01.
Registered Contractor Address		2734, Sajjangarh Main Road, Mulla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

SAMPLE DETAILS

Sampling Location	Public Health Office, Kagji – Dewara, Bundi
Sample Quantity	1 Kilogram (1 Kg)
Sample Condition	Sealed
Sample Collected By	NES Representative
Date of Sample Collection	29/01/2023
Period of Testing	30/01/2023 to 03/02/2023

TEST RESULTS

Sl. No.	Parameters	Values Found	Unit	Test Protocol
1.	pH	7.41	--	IS 2720 (P-26):1987 (RA 2016)
2.	Electrical Conductivity	685.24	µS/cm	IS 14767:2000 (RA 2016)
3.	Moisture	19.52	%	IS 2720 (P-18):1992 (RA 2016)
4.	Texture	Sandy Loam	--	IS 2720 (P-04):1985 (RA 2015)
	Sand	62.85	%	
	Silt	16.52	%	
	Clay	20.63	%	
5.	Calcium (as Ca)	9.98	mg/kg	As per USEPA Method
6.	Magnesium (as Mg)	18.74	mg/kg	As per USEPA Method

(Sajjan Singh Khangarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

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7.	Permeability	8.50	cm/hr	IS 2720 (P-17):1986 (RA 2017)
8.	Total Nitrogen (as TKN)	522.34	mg/kg	IS 14684:1999 (RA 2014)
9.	Sodium (as Na)	75.24	mg/kg	As per USEPA Method
10.	Phosphorous (as P)	189.63	mg/kg	As per USEPA Method
11.	Potassium (as K)	85.42	mg/kg	IS 9497:1980 (RA 2020)
12.	Organic Matter	0.62	%	IS 2720 (P-22):1972 (RA 2015)
13.	Oil & Grease	B.D.L.	mg/kg	As per USEPA Method

Note: N.R. – No Relaxation; B.D.L. – Below Detection Limit

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(Bajrang Singh Khangarot)
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Reference No.: NES230130020 Date: 03/02/2023

TEST CERTIFICATE
SOIL ANALYSIS REPORT

Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTDSP/BUN /01.
Registered Contractor Address		2734, Sajjangarh Main Road, Mulla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

SAMPLE DETAILS

Sampling Location	WTP Site, Jakhmun, Bundi
Sample Quantity	1 Kilogram (1 Kg)
Sample Condition	Sealed
Sample Collected By	NES Representative
Date of Sample Collection	28/01/2023
Period of Testing	30/01/2023 to 03/02/2023

TEST RESULTS

Sl. No.	Parameters	Values Found	Unit	Test Protocol
1.	pH	7.52	--	IS 2720 (P-26):1987 (RA 2016)
2.	Electrical Conductivity	761.40	µS/cm	IS 14767:2000 (RA 2016)
3.	Moisture	26.50	%	IS 2720 (P-18):1992 (RA 2016)
4.	Texture	Sandy Loam	--	IS 2720 (P-04):1985 (RA 2015)
	Sand	63.50	%	
	Silt	13.52	%	
	Clay	22.98	%	
5.	Calcium (as Ca)	13.65	mg/kg	As per USEPA Method
6.	Magnesium (as Mg)	22.45	mg/kg	As per USEPA Method

(Rajan Singh Changarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

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7.	Permeability	8.50	cm/hr	IS 2720 (P-17):1986 (RA 2017)
8.	Total Nitrogen (as TKN)	594.72	mg/kg	IS 14684:1999 (RA 2014)
9.	Sodium (as Na)	95.42	mg/kg	As per USEPA Method
10.	Phosphorous (as P)	156.80	mg/kg	As per USEPA Method
11.	Potassium (as K)	75.26	mg/kg	IS 9497:1980 (RA 2020)
12.	Organic Matter	0.68	%	IS 2720 (P-22):1972 (RA 2015)
13.	Oil & Grease	B.D.L.	mg/kg	As per USEPA Method

Note: N.R. – No Relaxation; B.D.L. – Below Detection Limit

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(Sajjan Singh Khangarot)
Review By

Seal

(Jag Mohan Sharma)
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Reference No.: NES230130019 Date: 03/02/2023

TEST CERTIFICATE
SOIL ANALYSIS REPORT

Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTDSP/BUN /01.
Registered Contractor Address		2734, Sajjangarh Main Road, Mulla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

SAMPLE DETAILS

Sampling Location	STP Site, Ramganj, Bundi
Sample Quantity	1 Kilogram (1 Kg)
Sample Condition	Sealed
Sample Collected By	NES Representative
Date of Sample Collection	28/01/2023
Period of Testing	30/01/2023 to 03/02/2023

TEST RESULTS

Sl. No.	Parameters	Values Found	Unit	Test Protocol
1.	pH	7.14	--	IS 2720 (P-26):1987 (RA 2016)
2.	Electrical Conductivity	722.65	µS/cm	IS 14767:2000 (RA 2016)
3.	Moisture	28.45	%	IS 2720 (P-18):1992 (RA 2016)
4.	Texture	Sandy Loam	--	IS 2720 (P-04):1985 (RA 2015)
	Sand	70.14	%	
	Silt	12.34	%	
	Clay	17.52	%	
5.	Calcium (as Ca)	9.75	mg/kg	As per USEPA Method
6.	Magnesium (as Mg)	6.34	mg/kg	As per USEPA Method

(Bhajan Singh Khangarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

NAKSHATRA ENVIRO SERVICES

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M. 80038-96245

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7.	Permeability	7.40	cm/hr	IS 2720 (P-17):1986 (RA 2017)
8.	Total Nitrogen (as TKN)	627.45	mg/kg	IS 14684:1999 (RA 2014)
9.	Sodium (as Na)	90.58	mg/kg	As per USEPA Method
10.	Phosphorous (as P)	295.46	mg/kg	As per USEPA Method
11.	Potassium (as K)	131.56	mg/kg	IS 9497:1980 (RA 2020)
12.	Organic Matter	0.64	%	IS 2720 (P-22):1972 (RA 2015)
13.	Oil & Grease	B.D.L.	mg/kg	As per USEPA Method

Note: N.B. – No Reference; B.D.L. – Below Detection Limit

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- Samples will be destroyed after 15 days from the date of issuing of analysis of report unless otherwise specified.

(Sajjan Singh Changarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

*** END OF REPORT ***

NAKSHATRA ENVIRO SERVICES

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Reference No.: NES230130018 Date: 03/02/2023

TEST CERTIFICATE
SOIL ANALYSIS REPORT

Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTDSP/BUN /01.
Registered Contractor Address		2734, Sajjangarh Main Road, Mulla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

SAMPLE DETAILS

Sampling Location	CWR, Nainwa Road Pump House, Bundi
Sample Quantity	1 Kilogram (1 Kg)
Sample Condition	Sealed
Sample Collected By	NES Representative
Date of Sample Collection	28/01/2023
Period of Testing	30/01/2023 to 03/02/2023

TEST RESULTS

Sl. No.	Parameters	Values Found	Unit	Test Protocol
1.	pH	7.85	--	IS 2720 (P-26):1987 (RA 2016)
2.	Electrical Conductivity	875.42	µS/cm	IS 14767:2000 (RA 2016)
3.	Moisture	32.54	%	IS 2720 (P-18):1992 (RA 2016)
4.	Texture	Sandy Loam	--	IS 2720 (P-04):1985 (RA 2015)
	Sand	61.24	%	
	Silt	8.45	%	
	Clay	30.31	%	
5.	Calcium (as Ca)	15.82	mg/kg	As per USEPA Method
6.	Magnesium (as Mg)	10.24	mg/kg	As per USEPA Method

(Sajjan Singh Khangarot)
Review By

Seal

(Jag Mohan Sharma)
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11.	Residual Free Chlorine	mg/l	B.D.L.	0.2	1.0	IS 3025 (P-26):1986, RA 2019
12.	Sulphate (as SO_4)	mg/l	22.54	< 200	< 400	IS 3025 (P-24):1986, RA 2019
13.	Iron (as Fe)	mg/l	0.08	< 0.3	N.R.	IS 3025 (P-53):2003, RA 2019
14.	Fluoride (as F)	mg/l	0.17	< 1.0	< 1.5	IS 3025 (P-60):2008, RA 2019
15.	Sodium (as Na)	mg/l	132.18	--	--	IS 3025 (P-45):1993, RA 2019
16.	Potassium (as K)	mg/l	58.14	--	--	IS 3025 (P-45):1993, RA 2019
17.	Zinc (as Zn)	mg/l	0.11	05	15	IS 3025 (P-49):1994, RA 2019
18.	Copper (as Cu)	mg/l	0.02	0.05	1.5	IS 3025 (P-42):1992, RA 2019
19.	Manganese (as Mn)	mg/l	B.D.L.	0.1	0.3	IS 3025 (P-59):2006, RA 2017
20.	Mercury (as Hg)	mg/l	B.D.L.	0.001	N.R.	IS 3025 (P-48):1994, RA 2019
21.	Cyanide (as CN)	mg/l	B.D.L.	< 0.1	N.R.	IS 3025 (P-27):1986, RA 2019
22.	Cadmium (as Cd)	mg/l	B.D.L.	0.003	N.R.	IS 3025 (P-41):1992, RA 2019
23.	Arsenic (as As)	mg/l	B.D.L.	0.01	0.05	IS 3025 (P-37):1988, RA 2019
24.	Lead (as Pb)	mg/l	B.D.L.	0.01	N.R.	IS 3025 (P-47):1994, RA 2019
25.	Boron (as B)	mg/l	B.D.L.	0.5	1.0	IS 3025 (P-57):2005, RA 2017
26.	Selenium (as Se)	mg/l	B.D.L.	0.01	N.R.	IS 3025 (P-56):2006, RA 2019
27.	Aluminium (as Al)	mg/l	B.D.L.	0.03	0.2	IS 3025 (P-55):2003, RA 2019
28.	Hexa Chromium (Cr^{+6})	mg/l	B.D.L.	--	--	IS 3025 (P-52):2003, RA 2019
29.	Dissolved Oxygen	mg/l	1.07	--	--	IS 3025 (P-38):1989, RA 2019
30.	BOD	mg/l	59.75	--	--	IS 3025 (P-44):1993, RA 2019
31.	COD	mg/l	187.22	--	--	IS 3025 (P-58):2006, RA 2017

Note: N.R. – No Relaxation; B.D.L. – Below Detection Limit

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- Samples will be destroyed after 15 days from the date of issuing of analysis of report unless otherwise specified.

(Sajjan Singh Khangarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

*** END OF REPORT ***

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NABL Accredited, ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018 Certified Laboratory

Reference No.: NES/2301/30017 — Date: 03/02/2023

TEST CERTIFICATE
WATER QUALITY ANALYSIS

Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTDSP/BUN /01.
Registered Contractor Address		2734, Sajjangarh Main Road, Mulla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

SAMPLE DETAILS

Sampling Location	Inlet of STP (Raw Sewage), Ramganj, Bundi
Sample Source	Surface Water
Sample Quantity	1.0 Litre
Sample Condition	Sealed & Refrigerated
Sample Collected By	NES Representative
Date of Sample Collection	29/01/2023
Period of Testing	30/01/2023 to 03/02/2023

TEST RESULTS

Sl. No.	Parameters	Unit	Values Found	Standards as per IS 10500 : 2012		
				Desirable Limits	Permissible Limits	Test Method
1.	pH	-	7.54	6.5 to 8.5	N.R.	IS 3025 (P-11):1983, RA 2017
2.	Turbidity (NTU)	NTU	< 01	< 01	< 05	IS 3025 (P-10):1984, RA 2017
3.	Total Dissolved Solids	mg/l	885.20	< 500	< 2000	IS 3025 (P-16):1984, RA 2017
4.	Total Suspended Solids	mg/l	112.46	–	–	IS 3025 (P-17):1984, RA 2017
5.	Total Hardness	mg/l	296.04	< 200	< 600	IS 3025 (P-21):2009, RA 2019
6.	Calcium (as Ca)	mg/l	98.80	< 75	< 200	IS 3025 (P-40):1991, RA 2019
7.	Magnesium (as Mg)	mg/l	12.18	< 30	< 100	IS 3025 (P-46):1994, RA 2019
8.	Total Alkalinity	mg/l	451.29	< 200	< 600	IS 3025 (P-23):1986, RA 2019
9.	Nitrate (as NO_3)	mg/l	42.08	< 45	N.R.	IS 3025 (P-34):1988, RA 2019
10.	Chloride (as Cl)	mg/l	75.32	< 250	< 1000	IS 3025 (P-32):1988, RA 2019

(Rajan Singh Khangarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

NAKSHATRA ENVIRO SERVICES

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11.	Residual Free Chlorine	mg/l	B.D.L.	0.2	1.0	IS 3025 (P-26):1986, RA 2019
12.	Sulphate (as SO_4)	mg/l	14.29	< 200	< 400	IS 3025 (P-24):1986, RA 2019
13.	Iron (as Fe)	mg/l	0.04	< 0.3	N.R.	IS 3025 (P-53):2003, RA 2019
14.	Fluoride (as F)	mg/l	0.09	< 1.0	< 1.5	IS 3025 (P-60):2008, RA 2019
15.	Sodium (as Na)	mg/l	38.44	--	--	IS 3025 (P-45):1993, RA 2019
16.	Potassium (as K)	mg/l	17.28	--	--	IS 3025 (P-45):1993, RA 2019
17.	Zinc (as Zn)	mg/l	0.02	05	15	IS 3025 (P-49):1994, RA 2019
18.	Copper (as Cu)	mg/l	B.D.L.	0.05	1.5	IS 3025 (P-42):1992, RA 2019
19.	Manganese (as Mn)	mg/l	B.D.L.	0.1	0.3	IS 3025 (P-59):2006, RA 2017
20.	Mercury (as Hg)	mg/l	B.D.L.	0.001	N.R.	IS 3025 (P-48):1994, RA 2019
21.	Cyanide (as CN)	mg/l	B.D.L.	< 0.1	N.R.	IS 3025 (P-27):1986, RA 2019
22.	Cadmium (as Cd)	mg/l	B.D.L.	0.003	N.R.	IS 3025 (P-41):1992, RA 2019
23.	Arsenic (as As)	mg/l	B.D.L.	0.01	0.05	IS 3025 (P-37):1988, RA 2019
24.	Lead (as Pb)	mg/l	B.D.L.	0.01	N.R.	IS 3025 (P-47):1994, RA 2019
25.	Boron (as B)	mg/l	B.D.L.	0.5	1.0	IS 3025 (P-57):2005, RA 2017
26.	Selenium (as Se)	mg/l	B.D.L.	0.01	N.R.	IS 3025 (P-56):2006, RA 2019
27.	Aluminium (as Al)	mg/l	B.D.L.	0.03	0.2	IS 3025 (P-55):2003, RA 2019
28.	Hexa Chromium (Cr^{+6})	mg/l	B.D.L.	--	--	IS 3025 (P-52):2003, RA 2019
29.	Dissolved Oxygen	mg/l	4.56	--	--	IS 3025 (P-38):1989, RA 2019
30.	BOD	mg/l	2.41	--	--	IS 3025 (P-44):1993, RA 2019
31.	COD	mg/l	B.D.L.	--	--	IS 3025 (P-58):2006, RA 2017

Note: N.R. – No Relaxation; B.D.L. – Below Detection Limit

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(Bajrang Singh Khangarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

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Reference No.: NES230130016 Date: 03/02/2023

TEST CERTIFICATE
WATER QUALITY ANALYSIS

Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTDSP/BUN /01.
Registered Contractor Address		2734, Sajjangarh Main Road, Mulla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

SAMPLE DETAILS

Sampling Location	Kota Barrage
Sample Source	Surface Water
Sample Quantity	1.0 Litre
Sample Condition	Sealed & Refrigerated
Sample Collected By	NES Representative
Date of Sample Collection	29/01/2023
Period of Testing	30/01/2023 to 03/02/2023

TEST RESULTS

Sl. No.	Parameters	Unit	Values Found	Standards as per IS 10500 : 2012		
				Desirable Limits	Permissible Limits	Test Method
1.	pH	-	7.18	6.5 to 8.5	N.R.	IS 3025 (P-11):1983, RA 2017
2.	Turbidity (NTU)	NTU	< 01	< 01	< 05	IS 3025 (P-10):1984, RA 2017
3.	Total Dissolved Solids	mg/l	375.40	< 500	< 2000	IS 3025 (P-16):1984, RA 2017
4.	Total Suspended Solids	mg/l	22.65	--	--	IS 3025 (P-17):1984, RA 2017
5.	Total Hardness	mg/l	182.10	< 200	< 600	IS 3025 (P-21):2009, RA 2019
6.	Calcium (as Ca)	mg/l	40.52	< 75	< 200	IS 3025 (P-40):1991, RA 2019
7.	Magnesium (as Mg)	mg/l	19.48	< 30	< 100	IS 3025 (P-46):1994, RA 2019
8.	Total Alkalinity	mg/l	128.94	< 200	< 600	IS 3025 (P-23):1986, RA 2019
9.	Nitrate (as NO_3)	mg/l	11.52	< 45	N.R.	IS 3025 (P-34):1988, RA 2019
10.	Chloride (as Cl)	mg/l	47.64	< 250	< 1000	IS 3025 (P-32):1988, RA 2019

(Rajvir Singh Khangarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

NAKSHATRA ENVIRO SERVICES

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11.	Residual Free Chlorine	mg/l	B.D.L.	0.2	1.0	IS 3025 (P-26):1986, RA 2019
12.	Sulphate (as SO_4)	mg/l	24.18	< 200	< 400	IS 3025 (P-24):1986, RA 2019
13.	Iron (as Fe)	mg/l	0.06	< 0.3	N.R.	IS 3025 (P-53):2003, RA 2019
14.	Fluoride (as F)	mg/l	0.13	< 1.0	< 1.5	IS 3025 (P-60):2008, RA 2019
15.	Sodium (as Na)	mg/l	70.82	--	--	IS 3025 (P-45):1993, RA 2019
16.	Potassium (as K)	mg/l	31.52	--	--	IS 3025 (P-45):1993, RA 2019
17.	Zinc (as Zn)	mg/l	0.05	05	15	IS 3025 (P-49):1994, RA 2019
18.	Copper (as Cu)	mg/l	B.D.L.	0.05	1.5	IS 3025 (P-42):1992, RA 2019
19.	Manganese (as Mn)	mg/l	B.D.L.	0.1	0.3	IS 3025 (P-59):2006, RA 2017
20.	Mercury (as Hg)	mg/l	B.D.L.	0.001	N.R.	IS 3025 (P-48):1994, RA 2019
21.	Cyanide (as CN)	mg/l	B.D.L.	< 0.1	N.R.	IS 3025 (P-27):1986, RA 2019
22.	Cadmium (as Cd)	mg/l	B.D.L.	0.003	N.R.	IS 3025 (P-41):1992, RA 2019
23.	Arsenic (as As)	mg/l	B.D.L.	0.01	0.05	IS 3025 (P-37):1988, RA 2019
24.	Lead (as Pb)	mg/l	B.D.L.	0.01	N.R.	IS 3025 (P-47):1994, RA 2019
25.	Boron (as B)	mg/l	B.D.L.	0.5	1.0	IS 3025 (P-57):2005, RA 2017
26.	Selenium (as Se)	mg/l	B.D.L.	0.01	N.R.	IS 3025 (P-56):2006, RA 2019
27.	Aluminium (as Al)	mg/l	B.D.L.	0.03	0.2	IS 3025 (P-55):2003, RA 2019
28.	Hexa Chromium (Cr^{+6})	mg/l	B.D.L.	--	--	IS 3025 (P-52):2003, RA 2019
29.	Dissolved Oxygen	mg/l	4.26	--	--	IS 3025 (P-38):1989, RA 2019
30.	BOD	mg/l	B.D.L.	--	--	IS 3025 (P-44):1993, RA 2019
31.	COD	mg/l	B.D.L.	--	--	IS 3025 (P-58):2006, RA 2017

Note: N.R. – No Relaxation; B.D.L. – Below Detection Limit

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(Gajraj Singh Jhangarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

*** END OF REPORT ***

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Reference No.: NES230130015 Date: 03/02/2023

TEST CERTIFICATE
WATER QUALITY ANALYSIS

Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTDSP/BUN /01.
Registered Contractor Address		2734, Sajjangarh Main Road, Mulla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

SAMPLE DETAILS

Sampling Location	PHED, Kagji – Dewara, Bundi
Sample Source	Borewell Water
Sample Quantity	1.0 Litre
Sample Condition	Sealed & Refrigerated
Sample Collected By	NES Representative
Date of Sample Collection	29/01/2023
Period of Testing	30/01/2023 to 03/02/2023

TEST RESULTS

Sl. No.	Parameters	Unit	Values Found	Standards as per IS 10500 : 2012		
				Desirable Limits	Permissible Limits	Test Method
1.	pH	-	7.25	6.5 to 8.5	N.R.	IS 3025 (P-11):1983, RA 2017
2.	Turbidity (NTU)	NTU	< 01	< 01	< 05	IS 3025 (P-10):1984, RA 2017
3.	Total Dissolved Solids	mg/l	624.20	< 500	< 2000	IS 3025 (P-16):1984, RA 2017
4.	Total Suspended Solids	mg/l	3.52	--	--	IS 3025 (P-17):1984, RA 2017
5.	Total Hardness	mg/l	293.40	< 200	< 600	IS 3025 (P-21):2009, RA 2019
6.	Calcium (as Ca)	mg/l	81.03	< 75	< 200	IS 3025 (P-40):1991, RA 2019
7.	Magnesium (as Mg)	mg/l	21.92	< 30	< 100	IS 3025 (P-46):1994, RA 2019
8.	Total Alkalinity	mg/l	236.39	< 200	< 600	IS 3025 (P-23):1986, RA 2019
9.	Nitrate (as NO_3)	mg/l	21.15	< 45	N.R.	IS 3025 (P-34):1988, RA 2019
10.	Chloride (as Cl)	mg/l	80.99	< 250	< 1000	IS 3025 (P-32):1988, RA 2019

(Bhagwan Singh Khangarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

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11.	Residual Free Chlorine	mg/l	B.D.L.	0.2	1.0	IS 3025 (P-26):1986, RA 2019
12.	Sulphate (as SO_4)	mg/l	25.54	< 200	< 400	IS 3025 (P-24):1986, RA 2019
13.	Iron (as Fe)	mg/l	0.05	< 0.3	N.R.	IS 3025 (P-53):2003, RA 2019
14.	Fluoride (as F)	mg/l	0.12	< 1.0	< 1.5	IS 3025 (P-60):2008, RA 2019
15.	Sodium (as Na)	mg/l	66.55	--	--	IS 3025 (P-45):1993, RA 2019
16.	Potassium (as K)	mg/l	30.62	--	--	IS 3025 (P-45):1993, RA 2019
17.	Zinc (as Zn)	mg/l	0.11	05	15	IS 3025 (P-49):1994, RA 2019
18.	Copper (as Cu)	mg/l	B.D.L.	0.05	1.5	IS 3025 (P-42):1992, RA 2019
19.	Manganese (as Mn)	mg/l	B.D.L.	0.1	0.3	IS 3025 (P-59):2006, RA 2017
20.	Mercury (as Hg)	mg/l	B.D.L.	0.001	N.R.	IS 3025 (P-48):1994, RA 2019
21.	Cyanide (as CN)	mg/l	B.D.L.	< 0.1	N.R.	IS 3025 (P-27):1986, RA 2019
22.	Cadmium (as Cd)	mg/l	B.D.L.	0.003	N.R.	IS 3025 (P-41):1992, RA 2019
23.	Arsenic (as As)	mg/l	B.D.L.	0.01	0.05	IS 3025 (P-37):1988, RA 2019
24.	Lead (as Pb)	mg/l	B.D.L.	0.01	N.R.	IS 3025 (P-47):1994, RA 2019
25.	Boron (as B)	mg/l	B.D.L.	0.5	1.0	IS 3025 (P-57):2005, RA 2017
26.	Selenium (as Se)	mg/l	B.D.L.	0.01	N.R.	IS 3025 (P-56):2006, RA 2019
27.	Aluminium (as Al)	mg/l	B.D.L.	0.03	0.2	IS 3025 (P-55):2003, RA 2019
28.	Hexa Chromium (Cr^{+6})	mg/l	B.D.L.	--	--	IS 3025 (P-52):2003, RA 2019
29.	Dissolved Oxygen	mg/l	4.21	--	--	IS 3025 (P-38):1989, RA 2019
30.	BOD	mg/l	B.D.L.	--	--	IS 3025 (P-44):1993, RA 2019
31.	COD	mg/l	B.D.L.	--	--	IS 3025 (P-58):2006, RA 2017

Note: N.R. – No Relaxation; B.D.L. – Below Detection Limit

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- Samples will be destroyed after 15 days from the date of issuing of analysis of report unless otherwise specified.

(Bajrang Singh Khangarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

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NAKSHATRA ENVIRO SERVICES

M. 94136-66777
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Reference No.: NES230130014 Date: 03/02/2023

TEST CERTIFICATE
WATER QUALITY ANALYSIS

Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTDSP/BUN /01.
Registered Contractor Address		2734, Sajjangarh Main Road, Mulla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

SAMPLE DETAILS

Sampling Location	PHED, Vikash Nagar, Bundi
Sample Source	Borewell Water
Sample Quantity	1.0 Litre
Sample Condition	Sealed & Refrigerated
Sample Collected By	NES Representative
Date of Sample Collection	29/01/2023
Period of Testing	30/01/2023 to 03/02/2023

TEST RESULTS

Sl. No.	Parameters	Unit	Values Found	Standards as per IS 10500 : 2012		
				Desirable Limits	Permissible Limits	Test Method
1.	pH	-	7.21	6.5 to 8.5	N.R.	IS 3025 (P-11):1983, RA 2017
2.	Turbidity (NTU)	NTU	< 01	< 01	< 05	IS 3025 (P-10):1984, RA 2017
3.	Total Dissolved Solids	mg/l	571.50	< 500	< 2000	IS 3025 (P-16):1984, RA 2017
4.	Total Suspended Solids	mg/l	2.56	--	--	IS 3025 (P-17):1984, RA 2017
5.	Total Hardness	mg/l	242.80	< 200	< 600	IS 3025 (P-21):2009, RA 2019
6.	Calcium (as Ca)	mg/l	72.93	< 75	< 200	IS 3025 (P-40):1991, RA 2019
7.	Magnesium (as Mg)	mg/l	14.61	< 30	< 100	IS 3025 (P-46):1994, RA 2019
8.	Total Alkalinity	mg/l	225.64	< 200	< 600	IS 3025 (P-23):1986, RA 2019
9.	Nitrate (as NO_3)	mg/l	21.14	< 45	N.R.	IS 3025 (P-34):1988, RA 2019
10.	Chloride (as Cl)	mg/l	85.76	< 250	< 1000	IS 3025 (P-32):1988, RA 2019

(Sajjan Singh Khangarot)
Review By

Seal

(Jag Mohan Sharma)
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NAKSHATRA ENVIRO SERVICES

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NABL Accredited, ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018 Certified Laboratory

11.	Residual Free Chlorine	mg/l	B.D.L.	0.2	1.0	IS 3025 (P-26):1986, RA 2019
12.	Sulphate (as SO_4)	mg/l	15.60	< 200	< 400	IS 3025 (P-24):1986, RA 2019
13.	Iron (as Fe)	mg/l	0.04	< 0.3	N.R.	IS 3025 (P-53):2003, RA 2019
14.	Fluoride (as F)	mg/l	0.08	< 1.0	< 1.5	IS 3025 (P-60):2008, RA 2019
15.	Sodium (as Na)	mg/l	48.34	--	--	IS 3025 (P-45):1993, RA 2019
16.	Potassium (as K)	mg/l	21.60	--	--	IS 3025 (P-45):1993, RA 2019
17.	Zinc (as Zn)	mg/l	0.01	05	15	IS 3025 (P-49):1994, RA 2019
18.	Copper (as Cu)	mg/l	B.D.L.	0.05	1.5	IS 3025 (P-42):1992, RA 2019
19.	Manganese (as Mn)	mg/l	B.D.L.	0.1	0.3	IS 3025 (P-59):2006, RA 2017
20.	Mercury (as Hg)	mg/l	B.D.L.	0.001	N.R.	IS 3025 (P-48):1994, RA 2019
21.	Cyanide (as CN)	mg/l	B.D.L.	< 0.1	N.R.	IS 3025 (P-27):1986, RA 2019
22.	Cadmium (as Cd)	mg/l	B.D.L.	0.003	N.R.	IS 3025 (P-41):1992, RA 2019
23.	Arsenic (as As)	mg/l	B.D.L.	0.01	0.05	IS 3025 (P-37):1988, RA 2019
24.	Lead (as Pb)	mg/l	B.D.L.	0.01	N.R.	IS 3025 (P-47):1994, RA 2019
25.	Boron (as B)	mg/l	B.D.L.	0.5	1.0	IS 3025 (P-57):2005, RA 2017
26.	Selenium (as Se)	mg/l	B.D.L.	0.01	N.R.	IS 3025 (P-56):2006, RA 2019
27.	Aluminium (as Al)	mg/l	B.D.L.	0.03	0.2	IS 3025 (P-55):2003, RA 2019
28.	Hexa Chromium (Cr^{+6})	mg/l	B.D.L.	--	--	IS 3025 (P-52):2003, RA 2019
29.	Dissolved Oxygen	mg/l	6.21	--	--	IS 3025 (P-38):1989, RA 2019
30.	BOD	mg/l	B.D.L.	--	--	IS 3025 (P-44):1993, RA 2019
31.	COD	mg/l	B.D.L.	--	--	IS 3025 (P-58):2006, RA 2017

Note: N.R. – No Relaxation, B.D.L. – Below Detection Limit

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Reference No.: NES2301300[3] Date: 03/02/2023

TEST CERTIFICATE
WATER QUALITY ANALYSIS

Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTDSP/BUN /01.
Registered Contractor Address		2734, Sajjangarh Main Road, Mulla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

SAMPLE DETAILS

Sampling Location	Intake Kota Barrage, Bundi
Sample Source	Borewell Water
Sample Quantity	1.0 Litre
Sample Condition	Sealed & Refrigerated
Sample Collected By	NES Representative
Date of Sample Collection	28/01/2023
Period of Testing	30/01/2023 to 03/02/2023

TEST RESULTS

Sl. No.	Parameters	Unit	Values Found	Standards as per IS 10500 : 2012		
				Desirable Limits	Permissible Limits	Test Method
1.	pH	-	7.14	6.5 to 8.5	N.R.	IS 3025 (P-11):1983, RA 2017
2.	Turbidity (NTU)	NTU	< 01	< 01	< 05	IS 3025 (P-10):1984, RA 2017
3.	Total Dissolved Solids	mg/l	410.50	< 500	< 2000	IS 3025 (P-16):1984, RA 2017
4.	Total Suspended Solids	mg/l	2.30	–	–	IS 3025 (P-17):1984, RA 2017
5.	Total Hardness	mg/l	182.10	< 200	< 600	IS 3025 (P-21):2009, RA 2019
6.	Calcium (as Ca)	mg/l	36.46	< 75	< 200	IS 3025 (P-40):1991, RA 2019
7.	Magnesium (as Mg)	mg/l	21.92	< 30	< 100	IS 3025 (P-46):1994, RA 2019
8.	Total Alkalinity	mg/l	161.77	< 200	< 600	IS 3025 (P-23):1986, RA 2019
9.	Nitrate (as NO_3)	mg/l	13.84	< 45	N.R.	IS 3025 (P-34):1988, RA 2019
10.	Chloride (as Cl)	mg/l	52.40	< 250	< 1000	IS 3025 (P-32):1988, RA 2019

(Sajjan Singh Changarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

NAKSHATRA ENVIRO SERVICES

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11.	Residual Free Chlorine	mg/l	B.D.L.	0.2	1.0	IS 3025 (P-26):1986, RA 2019
12.	Sulphate (as SO_4)	mg/l	60.04	< 200	< 400	IS 3025 (P-24):1986, RA 2019
13.	Iron (as Fe)	mg/l	0.14	< 0.3	N.R.	IS 3025 (P-53):2003, RA 2019
14.	Fluoride (as F)	mg/l	0.26	< 1.0	< 1.5	IS 3025 (P-60):2008, RA 2019
15.	Sodium (as Na)	mg/l	109.51	--	--	IS 3025 (P-45):1993, RA 2019
16.	Potassium (as K)	mg/l	49.08	--	--	IS 3025 (P-45):1993, RA 2019
17.	Zinc (as Zn)	mg/l	0.10	05	15	IS 3025 (P-49):1994, RA 2019
18.	Copper (as Cu)	mg/l	B.D.L.	0.05	1.5	IS 3025 (P-42):1992, RA 2019
19.	Manganese (as Mn)	mg/l	B.D.L.	0.1	0.3	IS 3025 (P-59):2006, RA 2017
20.	Mercury (as Hg)	mg/l	B.D.L.	0.001	N.R.	IS 3025 (P-48):1994, RA 2019
21.	Cyanide (as CN)	mg/l	B.D.L.	< 0.1	N.R.	IS 3025 (P-27):1986, RA 2019
22.	Cadmium (as Cd)	mg/l	B.D.L.	0.003	N.R.	IS 3025 (P-41):1992, RA 2019
23.	Arsenic (as As)	mg/l	B.D.L.	0.01	0.05	IS 3025 (P-37):1988, RA 2019
24.	Lead (as Pb)	mg/l	B.D.L.	0.01	N.R.	IS 3025 (P-47):1994, RA 2019
25.	Boron (as B)	mg/l	B.D.L.	0.5	1.0	IS 3025 (P-57):2005, RA 2017
26.	Selenium (as Se)	mg/l	B.D.L.	0.01	N.R.	IS 3025 (P-56):2006, RA 2019
27.	Aluminium (as Al)	mg/l	B.D.L.	0.03	0.2	IS 3025 (P-55):2003, RA 2019
28.	Hexa Chromium (Cr^{+6})	mg/l	B.D.L.	--	--	IS 3025 (P-52):2003, RA 2019
29.	Dissolved Oxygen	mg/l	5.24	--	--	IS 3025 (P-38):1989, RA 2019
30.	BOD	mg/l	B.D.L.	--	--	IS 3025 (P-44):1993, RA 2019
31.	COD	mg/l	B.D.L.	--	--	IS 3025 (P-58):2006, RA 2017

Note: N.R. – No Relaxation, B.D.L. – Below Detection Limit

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Reference No.: NES2301300012 Date: 03/02/2023

TEST CERTIFICATE
WATER QUALITY ANALYSIS

Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTDSP/BUN /01.
Registered Contractor Address		2734, Sajjangarh Main Road, Mulla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

SAMPLE DETAILS

Sampling Location	STP Site, Ramganj, Bundi
Sample Source	Borewell Water
Sample Quantity	1.0 Litre
Sample Condition	Sealed & Refrigerated
Sample Collected By	NES Representative
Date of Sample Collection	28/01/2023
Period of Testing	30/01/2023 to 03/02/2023

TEST RESULTS

Sl. No.	Parameters	Unit	Values Found	Standards as per IS 10500 : 2012		
				Desirable Limits	Permissible Limits	Test Method
1.	pH	-	7.48	6.5 to 8.5	N.R.	IS 3025 (P-11):1983, RA 2017
2.	Turbidity (NTU)	NTU	< 01	< 01	< 05	IS 3025 (P-10):1984, RA 2017
3.	Total Dissolved Solids	mg/l	1371.50	< 500	< 2000	IS 3025 (P-16):1984, RA 2017
4.	Total Suspended Solids	mg/l	6.20	--	--	IS 3025 (P-17):1984, RA 2017
5.	Total Hardness	mg/l	580.45	< 200	< 600	IS 3025 (P-21):2009, RA 2019
6.	Calcium (as Ca)	mg/l	190.42	< 75	< 200	IS 3025 (P-40):1991, RA 2019
7.	Magnesium (as Mg)	mg/l	70.62	< 30	< 100	IS 3025 (P-46):1994, RA 2019
8.	Total Alkalinity	mg/l	365.35	< 200	< 600	IS 3025 (P-23):1986, RA 2019
9.	Nitrate (as NO_3)	mg/l	33.08	< 45	N.R.	IS 3025 (P-34):1988, RA 2019
10.	Chloride (as Cl)	mg/l	200.11	< 250	< 1000	IS 3025 (P-32):1988, RA 2019

(Sajjan Singh Khangarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

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11.	Residual Free Chlorine	mg/l	B.D.L.	0.2	1.0	IS 3025 (P-26):1986, RA 2019
12.	Sulphate (as SO_4)	mg/l	45.73	< 200	< 400	IS 3025 (P-24):1986, RA 2019
13.	Iron (as Fe)	mg/l	0.11	< 0.3	N.R.	IS 3025 (P-53):2003, RA 2019
14.	Fluoride (as F)	mg/l	0.21	< 1.0	< 1.5	IS 3025 (P-60):2008, RA 2019
15.	Sodium (as Na)	mg/l	122.44	--	--	IS 3025 (P-45):1993, RA 2019
16.	Potassium (as K)	mg/l	54.84	--	--	IS 3025 (P-45):1993, RA 2019
17.	Zinc (as Zn)	mg/l	0.03	05	15	IS 3025 (P-49):1994, RA 2019
18.	Copper (as Cu)	mg/l	B.D.L.	0.05	1.5	IS 3025 (P-42):1992, RA 2019
19.	Manganese (as Mn)	mg/l	B.D.L.	0.1	0.3	IS 3025 (P-59):2006, RA 2017
20.	Mercury (as Hg)	mg/l	B.D.L.	0.001	N.R.	IS 3025 (P-48):1994, RA 2019
21.	Cyanide (as CN)	mg/l	B.D.L.	< 0.1	N.R.	IS 3025 (P-27):1986, RA 2019
22.	Cadmium (as Cd)	mg/l	B.D.L.	0.003	N.R.	IS 3025 (P-41):1992, RA 2019
23.	Arsenic (as As)	mg/l	B.D.L.	0.01	0.05	IS 3025 (P-37):1988, RA 2019
24.	Lead (as Pb)	mg/l	B.D.L.	0.01	N.R.	IS 3025 (P-47):1994, RA 2019
25.	Boron (as B)	mg/l	B.D.L.	0.5	1.0	IS 3025 (P-57):2005, RA 2017
26.	Selenium (as Se)	mg/l	B.D.L.	0.01	N.R.	IS 3025 (P-56):2006, RA 2019
27.	Aluminium (as Al)	mg/l	B.D.L.	0.03	0.2	IS 3025 (P-55):2003, RA 2019
28.	Hexa Chromium (Cr^{+6})	mg/l	B.D.L.	--	--	IS 3025 (P-52):2003, RA 2019
29.	Dissolved Oxygen	mg/l	6.20	--	--	IS 3025 (P-38):1989, RA 2019
30.	BOD	mg/l	B.D.L.	--	--	IS 3025 (P-44):1993, RA 2019
31.	COD	mg/l	B.D.L.	--	--	IS 3025 (P-58):2006, RA 2017

Note: N.R. – No Relaxation, B.D.L. – Below Detection Limit

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(Rajan Singh Changarot)
Review By

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NAKSHATRA ENVIRO SERVICES

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Reference No.: NES230130011 Date: 03/02/2023

TEST CERTIFICATE
WATER QUALITY ANALYSIS

Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTDSP/BUN /01.
Registered Contractor Address		2734, Sajjangarh Main Road, Mulla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

SAMPLE DETAILS

Sampling Location	CWR, Naiswa Road Pump House, Bundi
Sample Source	Borewell Water
Sample Quantity	1.0 Litre
Sample Condition	Sealed & Refrigerated
Sample Collected By	NES Representative
Date of Sample Collection	28/01/2023
Period of Testing	30/01/2023 to 03/02/2023

TEST RESULTS

Sl. No.	Parameters	Unit	Values Found	Standards as per IS 10500 : 2012		
				Desirable Limits	Permissible Limits	Test Method
1.	pH	-	7.52	6.5 to 8.5	N.R.	IS 3025 (P-11):1983, RA 2017
2.	Turbidity (NTU)	NTU	< 01	< 01	< 05	IS 3025 (P-10):1984, RA 2017
3.	Total Dissolved Solids	mg/l	1114.20	< 500	< 2000	IS 3025 (P-16):1984, RA 2017
4.	Total Suspended Solids	mg/l	21.50	--	--	IS 3025 (P-17):1984, RA 2017
5.	Total Hardness	mg/l	536.20	< 200	< 600	IS 3025 (P-21):2009, RA 2019
6.	Calcium (as Ca)	mg/l	149.91	< 75	< 200	IS 3025 (P-40):1991, RA 2019
7.	Magnesium (as Mg)	mg/l	38.96	< 30	< 100	IS 3025 (P-46):1994, RA 2019
8.	Total Alkalinity	mg/l	408.31	< 200	< 600	IS 3025 (P-23):1986, RA 2019
9.	Nitrate (as NO_3)	mg/l	38.52	< 45	N.R.	IS 3025 (P-34):1988, RA 2019
10.	Chloride (as Cl)	mg/l	152.46	< 250	< 1000	IS 3025 (P-32):1988, RA 2019

(Sajjan Singh Khangarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

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E-mail : neslab2004@gmail.com, nakshatraenviro@gmail.com

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Reference No.: NES230130010 Date: 03/02/2023

TEST CERTIFICATE
NOISE LEVEL MONITORING DATA

Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTDSP/BUN /01.
Registered Contractor Address		2734, Sajjangarh Main Road, Mulla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

MONITORING DETAILS

Sampling Location	PHED, Vikash Nagar, Bundi
Date of Sampling	29/01/2023
Ambient Temperature	Max. 23°C & Min. 9°C
Relative Humidity	55%
Meteorological Conditions	Clear Sky
Control Measures, if any	Nil
Protocol	IS 9989 : 1981 (Reaffirmed Year 2014)

RESULTS

Sl. No.	Time of Measurement	Parameter	Unit	Noise Level Measured	Limits
1.	Noise Level Day Time (6 am to 10 pm)	L_{Day}	dB (A)	56.0	65.0
2.	Noise Level Night Time (10 pm to 6 am)	L_{night}	dB (A)	42.8	55.0

Note:

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- The results enlisted relate only to the above sample and applicable parameters endorsement of products is neither inferred nor implied.

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Review By

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Reference No.: NES230130009 Date: 03/02/2023

TEST CERTIFICATE
NOISE LEVEL MONITORING DATA

Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTDSP/BUN /01.
Registered Contractor Address		2734, Sajjangarh Main Road, Malla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

MONITORING DETAILS

Sampling Location	Public Health Office, Kagji – Dewara, Bundi
Date of Sampling	29/01/2023
Ambient Temperature	Max. 23°C & Min. 9°C
Relative Humidity	55%
Meteorological Conditions	Clear Sky
Control Measures, if any	Nil
Protocol	IS 9989 : 1981 (Reaffirmed Year 2014)

RESULTS

Sl. No.	Time of Measurement	Parameter	Unit	Noise Level Measured	Limits
1.	Noise Level Day Time (6 am to 10 pm)	L_{Day}	dB (A)	58.4	65.0
2.	Noise Level Night Time (10 pm to 6 am)	L_{Night}	dB (A)	42.0	55.0

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(Sajjan Singh Khangarot)
Review By

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(Jag Mohan Sharma)
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Reference No.: NES230130008 Date: 03/02/2023

TEST CERTIFICATE
NOISE LEVEL MONITORING DATA

Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTDSP/BUN /01.
Registered Contractor Address		2734, Sajjangarh Main Road, Mulla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

MONITORING DETAILS

Sampling Location	WTP Site, Jakhmun, Bundi
Date of Sampling	28/01/2023
Ambient Temperature	Max. 23°C & Min. 6°C
Relative Humidity	52%
Meteorological Conditions	Clear Sky
Control Measures, if any	Nil
Protocol	IS 9989 : 1981 (Reaffirmed Year 2014)

RESULTS

Sl. No.	Time of Measurement	Parameter	Unit	Noise Level Measured	Limits
1.	Noise Level Day Time (6 am to 10 pm)	L_{Day}	dB (A)	68.8	75.0
2.	Noise Level Night Time (10 pm to 6 am)	L_{Night}	dB (A)	43.5	70.0

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(Sajjan Singh Khangarot)
Review By

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Authorized Signatory

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Reference No.: NES230130007 Date: 03/02/2023

TEST CERTIFICATE
NOISE LEVEL MONITORING DATA

Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTDSP/BUN /01.
Registered Contractor Address		2734, Sajjangarh Main Road, Mulla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

MONITORING DETAILS

Sampling Location	STP Site, Ramganj, Bundi
Date of Sampling	28/01/2023
Ambient Temperature	Max. 23°C & Min. 6°C
Relative Humidity	52%
Meteorological Conditions	Clear Sky
Control Measures, if any	Nil
Protocol	IS 9989 : 1981 (Reaffirmed Year 2014)

RESULTS

Sl. No.	Time of Measurement	Parameter	Unit	Noise Level Measured	Limits
1.	Noise Level Day Time (6 am to 10 pm)	L_{Day}	dB (A)	61.8	75.0
2.	Noise Level Night Time (10 pm to 6 am)	L_{night}	dB (A)	44.0	70.0

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(Jagjeet Singh Khangarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

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Reference No.: NES230130006 Date: 03/02/2023

TEST CERTIFICATE
NOISE LEVEL MONITORING DATA

Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTDSP/BUN /01.
Registered Contractor Address		2734, Sajjangarh Main Road, Mulla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

MONITORING DETAILS

Sampling Location	CWR, Nainwa Road Pump House, Bundi
Date of Sampling	28/01/2023
Ambient Temperature	Max. 23°C & Min. 6°C
Relative Humidity	52%
Meteorological Conditions	Clear Sky
Control Measures, if any	Nil
Protocol	IS 9989 : 1981 (Reaffirmed Year 2014)

RESULTS

Sl. No.	Time of Measurement	Parameter	Unit	Noise Level Measured	Limits
1.	Noise Level Day Time (6 am to 10 pm)	L_{Day}	dB (A)	61.2	75.0
2.	Noise Level Night Time (10 pm to 6 am)	L_{Night}	dB (A)	47.5	70.0

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(Mohan Singh Khangarot)
Review By

Seal

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Reference No.: NES230130005 Date: 03/02/2023

TEST CERTIFICATE
AMBIENT AIR QUALITY MONITORING

Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur.
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTDSP/BUN /01.
Registered Contractor Address		2734, Sajjangarh Main Road, Mulla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

SAMPLE DETAILS

Sampling Location	PHED, Vikash Nagar, Bundi
Date of Sampling	29/01/2023
Ambient Temperature	Max. 23°C & Min. 9°C
Relative Humidity	55%
Weather Conditions	Clear Sky
Period of Testing	30/01/2023 to 03/02/2023

TEST RESULTS

Sl. No.	Parameters	Values Found	NAAQS	Unit	Protocol
1.	PM_{10}	75.49	100	$\mu g/m^3$	IS 5182 (P-23):2006 (RA 2017)
2.	$PM_{2.5}$	30.26	60	$\mu g/m^3$	As per CPCB guidelines
3.	Sulphur dioxide (SO_2)	7.16	80	$\mu g/m^3$	IS 5182 (P-02):2001 (RA 2017)
4.	Oxides of Nitrogen (NO_X)	21.34	80	$\mu g/m^3$	IS 5182 (P-06):2006 (RA 2017)
5.	Carbon Monoxide (CO)	0.50	2.00	mg/m^3	IS 5182 (P-10):1999 (RA 2019)

Note: NAAQS: National Ambient Air Quality Standards

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- Samples will be destroyed after 15 days from the date of issuing of analysis of report unless otherwise specified.

(Sajjan Singh Khangarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

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Reference No.: NES230130004 Date: 03/02/2023

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AMBIENT AIR QUALITY MONITORING

Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur.
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTDSP/BUN /01.	
Registered Contractor Address		2734, Sajjangarh Main Road, Mulla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

SAMPLE DETAILS

Sampling Location	Public Health Office, Kagji – Dewara, Bundi
Date of Sampling	29/01/2023
Ambient Temperature	Max. 23°C & Min. 9°C
Relative Humidity	55%
Weather Conditions	Clear Sky
Period of Testing	30/01/2023 to 03/02/2023

TEST RESULTS

Sl. No.	Parameters	Values Found	NAAQS	Unit	Protocol
1.	PM_{10}	77.02	100	$\mu g/m^3$	IS 5182 (P-23):2006 (RA 2017)
2.	$PM_{2.5}$	31.65	60	$\mu g/m^3$	As per CPCB guidelines
3.	Sulphur dioxide (SO_2)	7.85	80	$\mu g/m^3$	IS 5182 (P-02):2001 (RA 2017)
4.	Oxides of Nitrogen (NO_x)	20.65	80	$\mu g/m^3$	IS 5182 (P-06):2006 (RA 2017)
5.	Carbon Monoxide (CO)	0.53	2.00	mg/m^3	IS 5182 (P-10):1999 (RA 2019)

Note: NAAQS: National Ambient Air Quality Standards

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(Mohan Singh Khangarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

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Reference No.: NES230130003 Date: 03/02/2023

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Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur.
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTDSP/BUN /01.
Registered Contractor Address		2734, Sajjangarh Main Road, Mulla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

SAMPLE DETAILS

Sampling Location	WTP Site, Jakhmun, Bundi
Date of Sampling	28/01/2023
Ambient Temperature	Max. 23°C & Min. 6°C
Relative Humidity	52%
Weather Conditions	Clear Sky
Period of Testing	30/01/2023 to 03/02/2023

TEST RESULTS

Sl. No.	Parameters	Values Found	NAAQS	Unit	Protocol
1.	PM_{10}	79.62	100	$\mu g/m^3$	IS 5182 (P-23):2006 (RA 2017)
2.	$PM_{2.5}$	34.25	60	$\mu g/m^3$	As per CPCB guidelines
3.	Sulphur dioxide (SO_2)	7.96	80	$\mu g/m^3$	IS 5182 (P-02):2001 (RA 2017)
4.	Oxides of Nitrogen (NO_x)	23.69	80	$\mu g/m^3$	IS 5182 (P-06):2006 (RA 2017)
5.	Carbon Monoxide (CO)	0.51	2.00	mg/m^3	IS 5182 (P-10):1999 (RA 2019)

Note: NAAQS: National Ambient Air Quality Standards

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(Sohan Singh Khangarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

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Reference No.: NES230136002 Date: 03/02/2023

TEST CERTIFICATE
AMBIENT AIR QUALITY MONITORING

Issued to	Client	Superintending Engineer, RUIDP, PIU, Phase IV, Nathdwara
	Design Consultant	STC, PMCBC, RUIDP PH-IV
	Monitoring Consultant	CMSC I, Jaipur.
	Contractor	Khilari Infrastructure Private Limited
Name of Project		Construction of Works of Water Supply Production and Distribution Network Improvements with house service connections for nonrevenue water reduction and continuous water supply and construction of Sewage Treatment Plant and all allied Works and operation services of the WTP with raw and Clear Water Pumping System in water supply system & STP and allied works in sewerage system for 10 years at Bundi RSTDSP/BUN /01.
Registered Contractor Address		2734, Sajjangarh Main Road, Mulla Talai, District – Udaipur, Rajasthan – IN, Pincode – 313001
Industrial Activity		Bundi Wastewater Treatment and Water Supply Project

SAMPLE DETAILS

Sampling Location	STP Site, Ramganj, Bundi
Date of Sampling	28/01/2023
Ambient Temperature	Max. 23°C & Min. 6°C
Relative Humidity	52%
Weather Conditions	Clear Sky
Period of Testing	30/01/2023 to 03/02/2023

TEST RESULTS

Sl. No.	Parameters	Values Found	NAAQS	Unit	Protocol
1.	PM_{10}	83.65	100	$\mu g/m^3$	IS 5182 (P-23):2006 (RA 2017)
2.	$PM_{2.5}$	39.52	60	$\mu g/m^3$	As per CPCB guidelines
3.	Sulphur dioxide (SO_2)	8.54	80	$\mu g/m^3$	IS 5182 (P-02):2001 (RA 2017)
4.	Oxides of Nitrogen (NO_2)	24.51	80	$\mu g/m^3$	IS 5182 (P-06):2006 (RA 2017)
5.	Carbon Monoxide (CO)	0.52	2.00	mg/m^3	IS 5182 (P-10):1999 (RA 2019)

Note: NAAQS: National Ambient Air Quality Standards

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(Shyam Singh Khangarot)
Review By

Seal

(Jag Mohan Sharma)
Authorized Signatory

*** END OF REPORT ***

Appendix 11: Induction cum Orientation Safety Training Programme for Contactors staff & Technical personals

Induction cum Orientation Safety Training Programme for Contactors & Technical personals was organised on 05.06.2023 for various EMP provision, employment, Health and Safety standards and compliances. Training was imparted by Environmental Safeguards Personnel of CMSC-01, Jaipur and was attended by contractor's employees as well as technical staff of PIU. Various provision, requirements and compliances regarding Environment Health and Safety were discussed in detail. Photographs and attendance of training are attached below:

Environment Safeguard Training at PIU-Bundi Office with CMSC-01 Site Staff, CAPP & Contractor Teams (WW-WS & Drainage) Project

Rajasthan Secondary Town Development Sector Project (RSTDSP-Ph-IV)

Attendance Sheet of Environment Safeguard Training

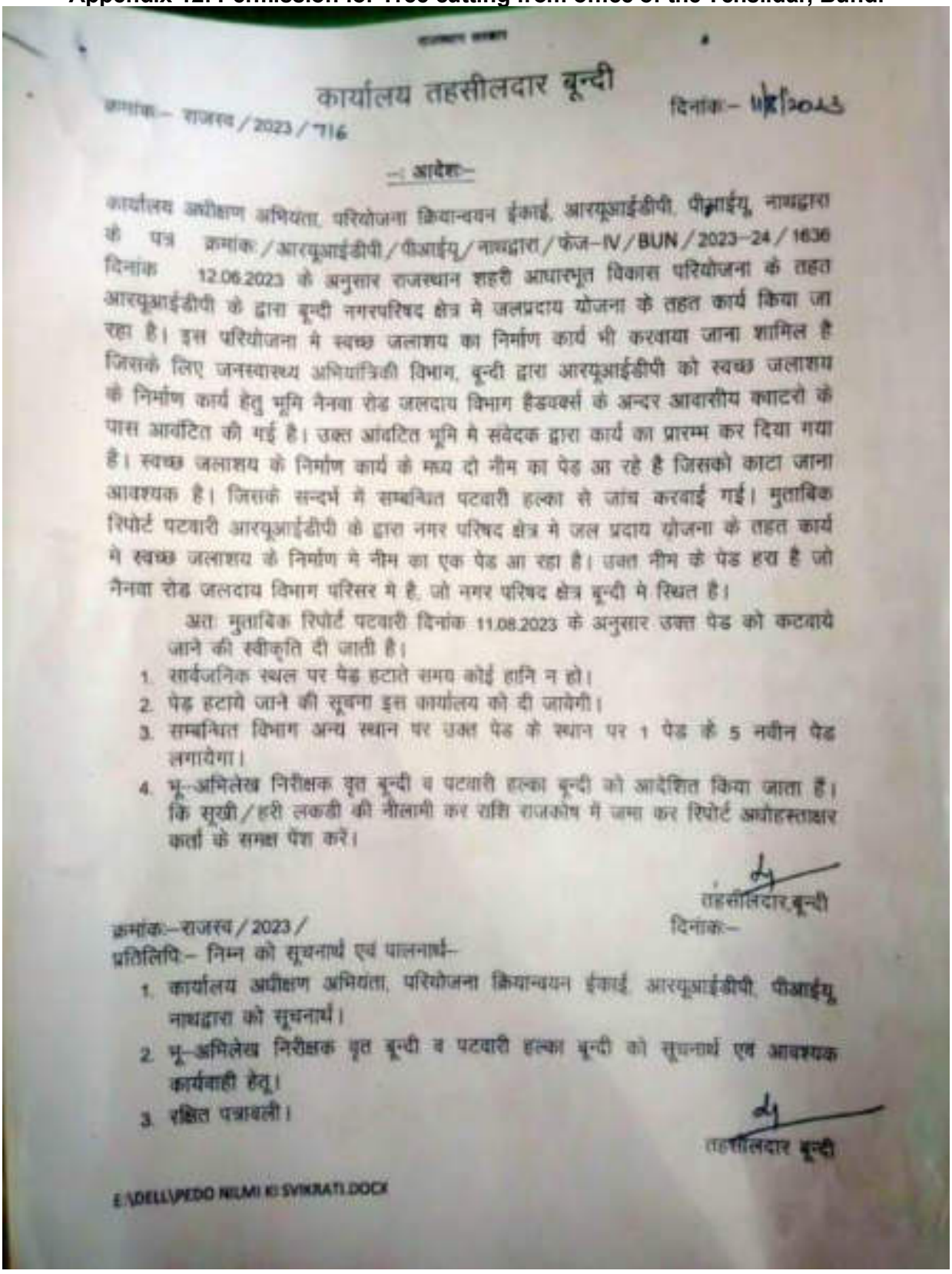
S.No.	Date/Time	Location	Name	Designation	Signature
1.	05.06.23	STP ; Bundi	Dileep Kr. Sharma	[illegible]	[illegible]
2.	05-06-23	STP ; Bundi	Vardan Srivastava	Environmental Safeguard Expert	[illegible]
3.	05-06-2023	STP ; Bundi	Mani Kumari	Safeguard Intern (Env. & Safety)	[illegible]
4.	05-06-2023	STP ; Bundi	LAL SINGH	Planning Engineer	[illegible]
5.	05-06-2023	RUIDP office	Sawan Sharma	SOT	[illegible]
06.	05-06-2023	Ruidp office	Ashutosh Kumar	Env. KPM	[illegible]
07.	05-06-2023	Ruidp office	Anoop Kumar	Site Engg.	[illegible]
08	05-06-2023	Ruidp office	BHERU LAL	[illegible]	[illegible]
09.	05-06-2023	Ruidp office, Bundi	[illegible]	Support Engineer	[illegible]
10.	05/06/2023	RUIDP office, Bundi	Neelesh [illegible]	Support Eng.	[illegible]
11	5/06/2023	RUIDP office Bundi	Vijay Pareek	Support Engg.	[illegible]
12	5/06/2023	STP ; Bundi	[illegible] meena	SOT	[illegible]
13	5/06/2023	STP ; Bundi	[illegible]	SOT	[illegible]

Rajasthan Secondary Town Development Sector Project (RSTDSP-Ph-IV)

Attendance Sheet of Environment Safeguard Training

S.No.	Date/Time	Location	Name	Designation	Signature
14	05/6/2023	RUIDP office; Bundi	[illegible]	Q.C. Engineer	[illegible]
15	5/06/2023	RUIDP office, Bundi	Rajendra Kumar Verma	Sr. Engg.	[illegible]
16	5/06/2023	RUIDP office, Bundi	Krishna Saini	RSD cum GIS	[illegible]
17	5/06/2023	RUIDP office Bundi	Vishal Jain	Site Engg.)	Vishal
18	05/06/2023	RUIDP office Bundi	[illegible] Singh	Drawings (Sd. Engg.)	[illegible]

Appendix 12: Permission for Tree cutting from office of the Tehsildar, Bundi



कार्यालय तहसीलदार बून्दी

क्रमांक:– राजस्व / 2023 / 716 दिनांक– 11/8/2023

–: आदेश:–

कार्यालय अधीक्षण अभियंता, परियोजना क्रियान्वयन ईकाई, आरयूआईडीपी, पीआईयू, नाथद्वारा के पत्र क्रमांक / आरयूआईडीपी / पीआईयू / नाथद्वारा / फेज–IV / BUN / 2023–24 / 1636 दिनांक 12.06.2023 के अनुसार राजस्थान शहरी आधारभूत विकास परियोजना के तहत आरयूआईडीपी के द्वारा बून्दी नगरपरिषद क्षेत्र मे जलप्रदाय योजना के तहत कार्य किया जा रहा है। इस परियोजना मे स्वच्छ जलाशय का निर्माण कार्य भी करवाया जाना शामिल है जिसके लिए जनस्वास्थ्य अभियांत्रिकी विभाग, बून्दी द्वारा आरयूआईडीपी को स्वच्छ जलाशय के निर्माण कार्य हेतु भूमि नैनवा रोड जलदाय विभाग हैडवर्क्स के अन्दर आवासीय क्वाटरो के पास आवंटित की गई है। उक्त आवंटित भूमि मे संवेदक द्वारा कार्य का प्रारम्भ कर दिया गया है। स्वच्छ जलाशय के निर्माण कार्य के मध्य दो नीम का पेड़ आ रहे है जिसको काटा जाना आवश्यक है। जिसके सन्दर्भ मे सम्बन्धित पटवारी हल्का से जांच करवाई गई। मुताबिक रिपोर्ट पटवारी आरयूआईडीपी के द्वारा नगर परिषद क्षेत्र मे जल प्रदाय योजना के तहत कार्य मे स्वच्छ जलाशय के निर्माण मे नीम का एक पेड आ रहा है। उक्त नीम के पेड हरा है जो नैनवा रोड जलदाय विभाग परिसर मे है, जो नगर परिषद क्षेत्र बून्दी मे स्थित है।

अतः मुताबिक रिपोर्ट पटवारी दिनांक 11.08.2023 के अनुसार उक्त पेड को कटवाये जाने की स्वीकृति दी जाती है।

1. सार्वजनिक स्थल पर पेड़ हटाते समय कोई हानि न हो।
2. पेड़ हटाये जाने की सूचना इस कार्यालय को दी जावेगी।
3. सम्बन्धित विभाग अन्य स्थान पर उक्त पेड के स्थान पर 1 पेड के 5 नवीन पेड लगायेगा।
4. भू–अभिलेख निरीक्षक वृत बून्दी व पटवारी हल्का बून्दी को आदेशित किया जाता है। कि सूखी / हरी लकडी की नीलामी कर राशि राजकोष में जमा कर रिपोर्ट अधोहस्ताक्षर कर्ता के समक्ष पेश करे।

तहसीलदार,बून्दी

क्रमांक:–राजस्व / 2023 / दिनांक:–

प्रतिलिपि– निम्न को सूचनार्थ एवं पालनार्थ–

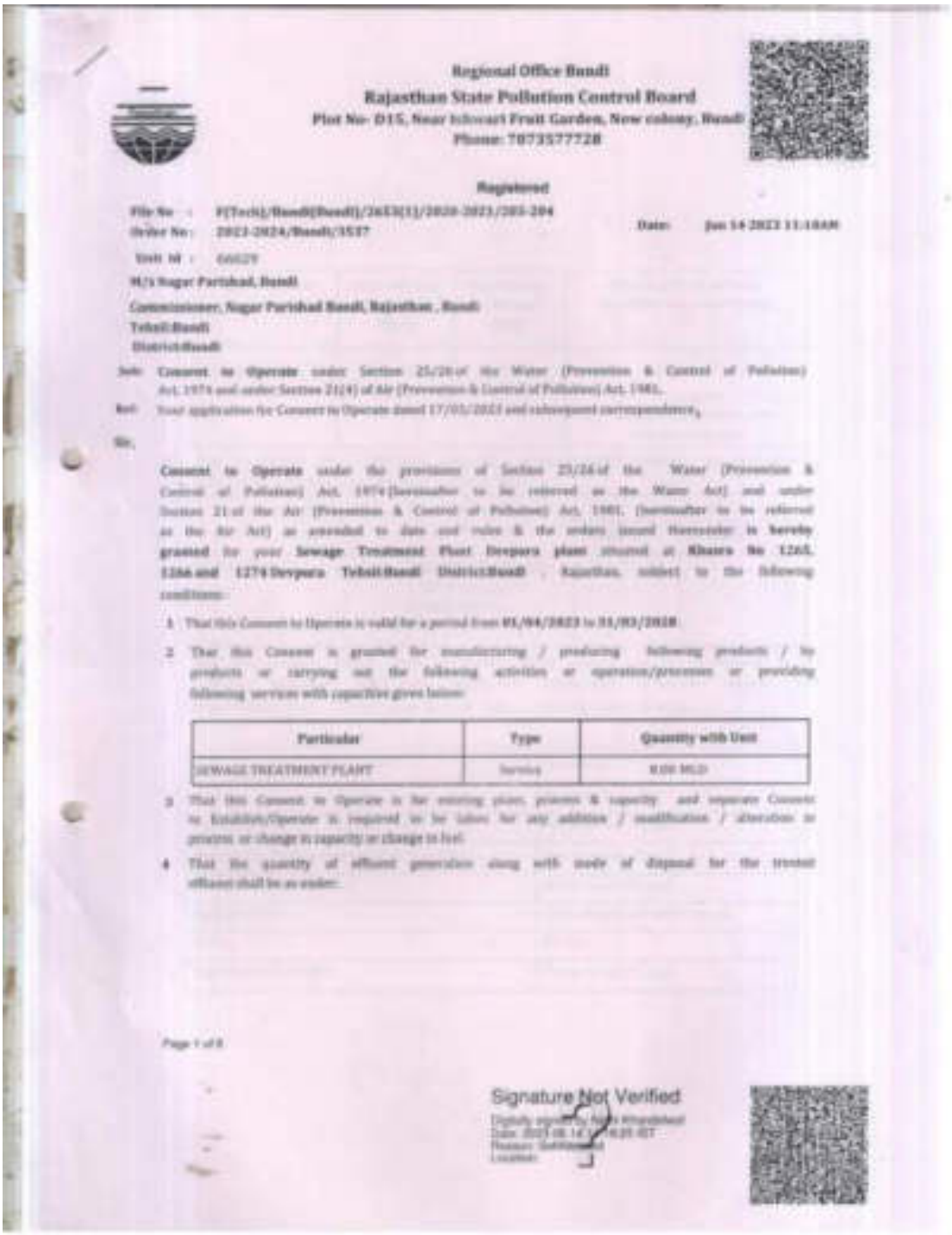
1. कार्यालय अधीक्षण अभियंता, परियोजना क्रियान्वयन ईकाई, आरयूआईडीपी, पीआईयू, नाथद्वारा को सूचनार्थ।
2. भू–अभिलेख निरीक्षक वृत बून्दी व पटवारी हल्का बून्दी को सूचनार्थ एवं आवश्यक कार्यवाही हेतु।
3. रक्षित पत्रावली।

तहसीलदार बून्दी

E:\DELL\PEDO NILMI KI SVIKRATI.DOCX

Appendix 13: Consent to Operate (CTO) permission of the Existing STP (8.0 MLD)

I.



Regional Office Bundi
Rajasthan State Pollution Control Board
Plot No- D15, Near Ishwari Fruit Garden, New colony, Bundi
Phone: 7073577728

Registered

File No : F(Tech)/Bundi(Bundi)/26332(1)/2020-2021/203-204
Order No : 2023-2024/Bundi/3537 Date: Jun 14 2023 11:18AM

Unit Id : 66029

M/s Nagar Parishad, Bundi

Commissioner, Nagar Parishad Bundi, Rajasthan , Bundi
Tehsil:Bundi
District:Bundi

Sub: Consent to Operate under Section 25/26 of the Water (Prevention & Control of Pollution) Act, 1974 and under Section 21(4) of Air (Prevention & Control of Pollution) Act, 1981.

Ref: Your application for Consent to Operate dated 17/05/2023 and subsequent correspondence.

Sir,

Consent to Operate under the provisions of Section 25/26 of the Water (Prevention & Control of Pollution) Act, 1974 (hereinafter to be referred as the Water Act) and under Section 21 of the Air (Prevention & Control of Pollution) Act, 1981, (hereinafter to be referred as the Air Act) as amended to date and rules & the orders issued thereunder is hereby granted for your Sewage Treatment Plant Deepura plant situated at Khasra No 1265, 1266 and 1274 Deepura Tehsil:Bundi District:Bundi , Rajasthan, subject to the following conditions:

1 That this Consent to Operate is valid for a period from 01/04/2023 to 31/03/2028.

2 That this Consent is granted for manufacturing / producing following products / by products or carrying out the following activities or operation/processes or providing following services with capacities given below:

Particular	Type	Quantity with Unit
SEWAGE TREATMENT PLANT	Service	8.00 MLD

3 That this Consent to Operate is for existing plant, process & capacity and separate Consent to Establish/Operate is required to be taken for any addition / modification / alteration in process or change in capacity or change in fuel.

4 That the quantity of effluent generation along with mode of disposal for the treated effluent shall be as under:

Page 1 of 8

Signature Not Verified
Digitally signed by Rajiv Khandelwal
Date: 2023.06.14 11:18:35 IST
Reason: Sanctioned
Location:

Regional Office Bundi
Rajasthan State Pollution Control Board
Plot No- D15, Near Ishwari Fruit Garden, New colony, Bundi
Phone: 7073577728

Registered

File No : F(Tech)/Bundi(Bundi)/2653(1)/2020-2021/203-204
Order No : 2023-2024/Bundi/1537
Unit Id : 66029

Date: Jun 14 2023 11:18AM

Yours sincerely,

Regional Officer(Bundi)

(A): Copy to:-
1 Master File.

Regional Officer(Bundi)

Signature Not Verified
Digitally signed by [illegible]
Date: 2023.06.14 [illegible] IST
Reason: Sanctioned
Location:

Copy of CTE for New 6.5 MLD STP

Regional Office Bundi
Rajasthan State Pollution Control Board
Plot No- D15, Near Ishwari Fruit Garden, New colony, Bundi
Phone: 7073577728

Registered

File No : F(Tech)/Bundi(Bundi)/2653(1)/2020-2021/721-722
Order No : 2023-2024/Bundi/3646 **Dispatch Date:** Jan 23 2024 4:12PM

Unit Id : 66029

M/s Nagar Parishad, Bundi

Commissioner, Nagar Parishad Bundi, Rajasthan ,
Bundi Tehsil:Bundi
District:Bundi

Sub: **Consent to Establish** under Section 25/26 of the Water (Prevention & Control of Pollution) Act, 1974 and under Section 21(4) of Air (Prevention & Control of Pollution) Act, 1981.

Ref: Your application(s) for Consent to Establish dated 10/10/2023 and subsequent correspondence.

Sir,

Consent to Establish under the provisions of Section 25/26 of the Water (Prevention & Control of Pollution) Act, 1974 (hereinafter to be referred as the Water Act) and under Section 21 of the Air (Prevention & Control of Pollution) Act, 1981, (hereinafter to be referred as the Air Act) as amended to date and rules & the orders issued thereunder **,is hereby granted** for your **Sewage Treatment Plant plant** situated / proposed at **Khasra No 1265, 1266 and 1274 Devpura Tehsil:Bundi District:Bundi** , Rajasthan under the provisions of the said Act(s). This consent is granted on the basis of examination of the information furnished by you in consent application(s) and the documents submitted therewith, subject to the following conditions:-

1. That this Consent to Establish is valid for a period from **10/10/2023** to **30/09/2028 or date of commencement of production / commissioning of the project or activities whichever is earlier .**
2. That this Consent is granted for manufacturing / producing following products / by products or carrying out the following activities or operation/processes or providing following services with capacities given below:

Particular	Type	Quantity / Capacity
SEWAGE TREATMENT PLANT	Activity	6.50 MLD

3. That in case of any increase in capacity or addition / modification / alteration or change in product mix or process or raw material or fuel, the project proponent is required to obtain fresh consent to establish.

Digitally signed by Nidhi Khandelwal
Date: 2024.01.23 16:12:19 IST
Reason: SelfAttested
Location:

Regional Office Bundi

Rajasthan State Pollution Control Board

Plot No- D15, Near Ishwari Fruit Garden, New colony, Bundi

Phone: 7073577728

Registered

File No : F(Tech)/Bundi(Bundi)/2653(1)/2020-2021/721-722

Order No : 2023-2024/Bundi/3646 **Dispatch Date:** Jan 23 2024 4:12PM

Unit Id : 66029

4 That the control equipment as proposed by the applicant shall be installed before trial operation is started for which prior consent to operate under the provision of the **Water Act and Air Act** shall be obtained. This consent to establish shall not be treated as consent to operate.

5 That the quantity of effluent generation and disposal along with mode of disposal for the treated effluent shall be as under:

Type of effluent	Max. effluent generation (KLD)	Quantity of effluent to be recycled (KLD)	Quantity of treated effluent to be disposed (KLD) and mode of disposal
Domestic Sewage	6500.000	NIL	6,500.000 On Land For Plantation/Horticulture after adequate treatment

6 That the sources of air emissions along with pollution control measures and the emission standards for the prescribed parameters shall be as under:

Sources of Air Emissions	Pollution Control Measures	Prescribed	
		Parameter	Standard
DG set(500KVA)	ACOUSTIC ENCLOSURE , WITH ADEQUATE STACK HEIGHT	--	--

7 That the Domestic Sewage shall be treated before disposal so as to conform to the standards prescribed by the Board as notified under the Environment (Protection) Act-1986 for disposal **Into Inland Surface Water**. The main parameters for regular monitoring shall be as under:

Digitally signed by Nidhi Khandelwal
Date: 2024.01.23 16:12:19 IST
Reason: SetAttested
Location:

Regional Office Bundi
Rajasthan State Pollution Control Board
Plot No- D15, Near Ishwari Fruit Garden, New colony, Bundi
Phone: 7073577728

Registered

File No : F(Tech)/Bundi(Bundi)/2653(1)/2020-2021/721-722
Order No : 2023-2024/Bundi/3646 Dispatch Date: Jan 23 2024 4:12PM
Unit Id : 66029

Parameters	Standards
Phosphate as P	Not to exceed 1.0 mg/l
pH Value	Between 6.0 to 9.0
Biochemical Oxygen Demand (3 days at 27C)	Not to exceed 10 mg/l
Chemical Oxygen Demand	Not to exceed 50 mg/l
NH4 (N)	5 mg/l
N total	10 mg/l
Total Suspended Solids	Not to exceed 20 mg/l
Fecal Coliform (MPN per 100 ml)	Not to exceed 100

Digitally signed by Nidhi Khandelwal
Date: 2024.01.23 16:12:19 IST
Reason: SetAttested
Location:

Regional Office Bundi
Rajasthan State Pollution Control Board
Plot No- D15, Near Ishwari Fruit Garden, New colony, Bundi
Phone: 7073577728

Registered

File No : F(Tech)/Bundi(Bundi)/2653(1)/2020-2021/721-722
Order No : 2023-2024/Bundi/3646 Dispatch Date: Jan 23 2024 4:12PM

Unit Id : 66029

8 a) That this consent is being issued for capital investment of Rs. 15.40 Cr on the plant. The unit shall have to obtain separate consent to establish & operate as well for any expansion/addition/alteration made thereafter.
b) That no treated/untreated effluent shall be discharged into any water body and entire treated sewage shall be utilized in plantation/horticulture/ other gainful purposes.
c) That the sludge will be properly digested, de-watered and used as manure or disposed in a scientific manner.
d) That the unit shall undertake spray of insecticides from time to time to control fly/mosquito growth in the area.
e) That the unit shall undertake plantation in two rows of suitable species all along the periphery of the site of the STP to control foul smell.
f) That efforts should be made to reuse the treated sewage to the maximum possible extent and minimize its discharge. A network of pipelines should be laid from the treated sewage collection tank to fields for utilization.
g) That adequate measures shall be taken to avoid foul odour during treatment and disposal of sewage and sludge.
h) That the unit shall obtain Environmental Clearance from competent authority under EIA Notification dated 14.09.2006 for any such activity which attracts Environmental clearance under EIA Notification dated 14.09.2006.
i) That the unit shall maintain plantation in at least 33% of total area, using concept of the social forestry and development of green belt outside project premises in adjacent areas wherever adequate land is not available within the unit premises.
j) That no Single Use Plastic (SUP) item, which is banned vide Ministry of Environment, Forest and Climate Change (MOEF &CC), Government of India notification dated 12.08.2021 shall be used in the unit premises.

Digitally signed by Nidhi Khandelwal
Date: 2024.01.23 16:12:19 IST
Reason: SatAttested
Location:

Regional Office Bundi
Rajasthan State Pollution Control Board
Plot No- D15, Near Ishwari Fruit Garden, New colony, Bundi
Phone: 7073577728

Registered

File No : F(Tech)/Bundi(Bundi)/2653(1)/2020-2021/721-722
Order No : 2023-2024/Bundi/3646 Dispatch Date: Jan 23 2024 4:12PM

Unit Id : 66029

9 **a) That the unit shall provide and maintain acoustic enclosure and adequate stack height with D.G. Set of 500 KVA.**
b) The unit shall comply with the standard as per prescribed vide MOEF notification NO.GSR 826(E) dated 16. Nov'2009 with respect to National Ambient Air Quality Standards.
c) That the unit shall ensure compliance of ambient air quality standards in respect of noise as prescribed under the Environment (Protection) Act, 1986 & Rules made therein.
d) That the unit shall comply with the State Board's order dated 28.02.2023 regarding noise pollution from industries and under Noise Rules, 2000 in order to control ambient noise in industrial area.
e) That Online Continuous Effluent Monitoring System(OCEMS) for parameters namely pH, TSS, COD, BOD and flow shall be installed and more than 85 % data availability shall be ensured with the servers of State Board and CPCB.
f) That maintenance and operation of the OCEMS with tamper-proof mechanism with facilities for calibration shall be ensured.
g) That guidelines prescribed by CPCB for OCEMS for effluents and Standard Operating Procedure(SOP) for Verification of Installation and Calibration of UV-Vis Dual Beam Scanning & Multipoint calibration mechanism technology-based OCEMS (Effluent) used in STPs shall be followed.
h) That the unit shall install PTZ camera covering the area of discharge points and shall configure the same to the State Board and CPCB's server.
i) Record of chemical/chlorine dosing & sludge generation from STP must be maintained in logbook.

10 That, notwithstanding anything provided hereinabove, the State Board shall have the power and reserves its right, as contained **under Section 27(2) of the Water Act and under Section 21(6) of the Air Act** to review anyone or all of the conditions imposed here in above and to make such variation as it deems fit for the purpose of compliance of the **Water Act and Air Act**.

11 That the grant of this **Consent to Establish** is issued from the environmental angle only, and does not absolve the project proponent from the other statutory obligations prescribed under any other law or any other instrument in force. The sole and complete responsibility, to comply with the conditions laid down in all other laws for the time-being in force, rests with the industry/ unit/ project proponent.

Digitally signed by Nidhi Khandelwal
Date: 2024.01.23 16:12:19 IST
Reason: SetAttested
Location:

Regional Office Bundi

Rajasthan State Pollution Control Board

Plot No- D15, Near Ishwari Fruit Garden, New colony, Bundi

Phone: 7073577728

Registered

File No : F(Tech)/Bundi(Bundi)/2653(1)/2020-2021/721-722

Order No : 2023-2024/Bundi/3646 **Dispatch Date:** Jan 23 2024 4:12PM

Unit Id : 66029

12 That the grant of this **Consent to Establish** shall not, in any way, adversely affect or jeopardize the legal proceedings, if any, instituted in the past or that could be instituted against you by the State Board for violation of the provisions of the Act or the Rules made thereunder.

This **Consent to Establish** shall also be subject, besides the aforesaid specific conditions, to the general conditions given in the enclosed Annexure. The project proponent will comply with the provisions of the **Water Act and Air Act** and to such other conditions as may, from time to time, be specified by the State Board under the provisions of the aforesaid Act(s). Please note that, non compliance of any of the above stated conditions would tantamount to revocation of **Consent to Establish** and project proponent / occupier shall be liable for legal action under the relevant provisions of the said Act(s).

Yours sincerely,

Regional Officer[Bundi]

(A): **Copy to:-**

1 Master File.

Regional Officer[Bundi]

Digitally signed by Nidhi Khandelwal
Date: 2024.01.23 16:12:19 IST
Reason: SelfAttested
Location:

Appendix 14: Asbestos Containing Material (ACM) Management Plan

1. Background of Asbestos

1. 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. Asbestos includes the mineral fibers chrysotile, amosite, crocidolite, tremolite, anthophyllite, actinotile and any of these materials that have been chemically treated or altered. The most abundant asbestos used in the world is chrysotile. The use of ACM propagated due to its economic viability.

2. Asbestos has been used in products, such as insulation for pipes (steam lines for example), floor tiles, building materials, and in vehicle brakes and clutches. Heavy exposures tend to occur in the construction industry and in ship repair, particularly during the removal of asbestos materials due to renovation, repairs, or demolition. Workers are also likely to be exposed during the manufacture of asbestos products (such as textiles, friction products, insulation, and other building materials) and during automotive brake and clutch repair work. In the construction industry, asbestos is found in installed products such as sprayed-on fireproofing, pipe insulation, floor tiles, cement pipe and sheet, roofing felts and shingles, ceiling tiles, fire-resistant drywall, drywall joint compounds, and acoustical products. Because very few asbestos containing products are being installed today, most worker exposures occur during the removal of asbestos and the renovation and maintenance of buildings and structures containing asbestos.

3. **Health Hazards of Asbestos**. Asbestos is well recognized as a health hazard and its use is now highly regulated by both OSHA and EPA. Asbestos fibers associated with these health risks are too small to be seen with the naked eye. Breathing asbestos fibers can cause a buildup of scar-like tissue in the lungs called asbestosis and result in loss of lung function that often progresses to disability and death. Asbestos also causes cancer of the lung and other diseases such as mesothelioma of the pleura which is a fatal malignant tumor of the membrane lining the cavity of the lung or stomach. Epidemiologic evidence has increasingly shown that all asbestos fiber types, including the most commonly used form of asbestos, chrysotile, causes mesothelioma in humans.

4. Asbestos fibers enter the body when a person inhales or ingests airborne particles that become embedded in the tissues of the respiratory or digestive systems. Exposure to asbestos can cause disabling or fatal diseases such as asbestosis, an emphysema-like condition; lung cancer; mesothelioma, a cancerous tumor that spreads rapidly in the cells of membranes covering the lungs and body organs; and gastrointestinal cancer. The symptoms of these diseases generally do not appear for 20 or more years after initial exposure.

5. Worker exposure to asbestos hazards are addressed in specific OSHA standards for the construction industry, general industry and shipyard employment sectors. These standards reduce the risk to workers by requiring that employers provide personal exposure monitoring to assess the risk and hazard awareness training for operations where there is any potential exposure to asbestos. Airborne levels of asbestos are never to exceed legal worker exposure limits. There is no "safe" level of asbestos exposure for any type of asbestos fiber. Asbestos exposures as short in duration as a few days have caused mesothelioma in humans. Every occupational exposure to asbestos can cause injury of disease; every occupational exposure to asbestos contributes to the risk of getting an asbestos related disease. 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.

6. Where there is exposure, employers are required to further protect workers by establishing regulated areas, controlling certain work practices and instituting engineering controls to reduce the airborne levels. The employer is required to ensure exposure is reduced by using administrative controls and provide for the wearing of personal protective equipment. Medical monitoring of workers is also required when legal limits and exposure times are exceeded.

2. Purpose of ACM Management Plan

7. 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.

3. Regulatory Frameworks for Asbestos Containing Materials

8. In India, there are several legislations that regulate the use and handling of asbestos as applicable, namely:

- The Supreme Court of India – Banned ACM use in January 21, 2011.
- 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."
- Environmental (Protection) Act (1986) - Environmental monitoring.

9. Different standards applicable to the project is given in **Table-1** below-

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 on the minimal waste generation. • Waste Collection: In the project circumstance, the waste is referred to the damaged powered asbestos which will be collected in the Permissible plastic bags to be

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

4. Inventory of ACMs in Bundi

10. Site visit of Bundi town was conducted on 02.05.2023 along with Supt. Engineer of CMSC-I, Contractor safety staff & engineers. During visit no asbestos containing materials were present/ found throughout all sites. Photographs of site visit at different work sites/ subproject component is given and enclosed as **Annexure-3**.

11. Further; for the assessment of presence of AC pipes in existing water supply networks, Office of the PIU, Bundi was requested to provide information for the same from PHED, Bundi vide letter no. RUIDP/ PIU/ BUN/ PH-IV/2022-23/37-40 Dated 17.05.2023. Details of existing

AC pressure pipeline has been provided by Executive Engineer, Public Health Engineering Department (PHED), District-Bundi, Rajasthan informed vide their letter no. 372-375 Dated 18-05-2023 that total 53 kms AC pipes are present/ operational of different diameters (ranging from 80-250mm dia.) in the existing water supply system in the town as per record (refer **Annexure-2**). Therefore this 53 km AC pipe line is the only matter of concern for Bundi, which need ACM management plan.

5. Provisions in the RSTDSP Project Regarding ACMs

12. Under RSTDSP projects, improvement in water supply system has been planned in the entire municipal areas of town. There is provision of replacement of entire AC pipes (irrespective of size, condition, diameter and age) and lay pipeline of HDPE/PVC/ uPVC as per contract specifications. Now, as the production and use of AC pipes is banned Pan-India, old/used AC pipes are of no use, therefore it is general practice that old AC pipes are not removed from the existing underground position and left in-situ and new proposed pipes are laid parallel to old AC pipes. Nevertheless, there are possibilities (like where there is not sufficient space to lay new pipes parallel to existing old AC pipes *e.g.* in narrow lanes and old city areas); that existing AC pipes are needed to be removed from their existing underground position to lay new pipe lines. In all such cases (though exceptional) mitigation measures will be required for handling, storage and disposal of ACMs in a safe manner to avoid health hazards to workers and nearby habitants. Following mitigation measures are suggested for the same.

6. ACM Removal procedures

13. 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 measures are to be adopted as given below:

- 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
- 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 4.0ft 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.

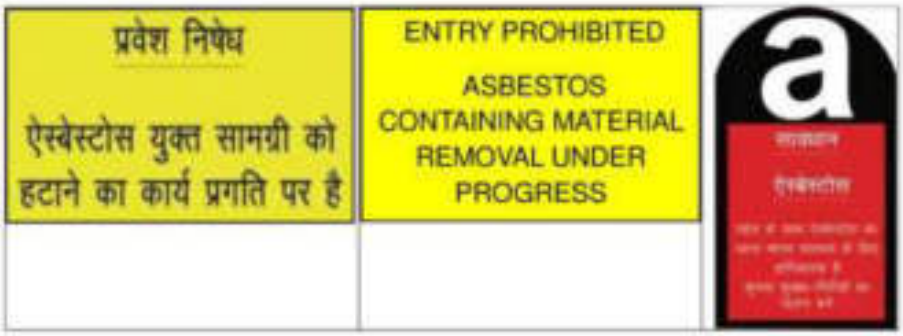


Figure 1: Asbestos warning signage during removal of ACM from site

7. Safe Practices in Handling ACM

14. Proper handling and PPE:

- Cover up and wear PPE (Personal Protection Equipment) including respirator or dust mask.
- Make sure the mask has two straps to hold it firmly in place. Don't use masks that only have one.
- Also wear a hard hat, gloves, disposable coveralls with a hood, and safety glasses or goggles to protect eyes.
- Do not eat, drink or smoke in the work area as you may inhale or eat dust. Wash your hands and face with soap and water before meal breaks and when finished work for the day.
- Do not use power tools Asbestos fibers can be released if power tools are used for anything other than the removal of screws.
- Do not water blast or scrub with a stiff broom or brush. It is illegal to water blast asbestos cement sheets. If the material has been accidentally water blasted or has suddenly deteriorated in some way, you should call a licensed asbestos removal DBO Operator
- Wet gently with water when removing asbestos cement pipes, use a pump spray to lightly dampen the pipes and keep the dust down. Remember: Not to water blast asbestos cement materials.
- Avoid drilling and cutting into asbestos products.
- Do not drill holes through and never cut instead remove the entire product and replace it with a non-asbestos product.
- Don't drop fiber pipes remove them carefully, lower them to the ground, don't drop them, to minimize breakage.

- Lay plastic sheeting under the work area to prevent any dust contaminating the ground. Use 200 micron thick plastic sheeting or bags or as permissible these must not be made from recycled materials or re-used for any other purpose.
- The work area has to be barricaded and there should be no un-authorized person allowed. Only Trained ACM expert should be allowed to handle the ACM along with EHS Expert.
- Close windows and doors and seal vents to stop dust getting into the house; ask neighbors' to do the same.
- Seal off other places where dust can get in.
- Remove soft furnishings like rugs, clothes, jute bags from the work area, and seal anything with plastics if it cannot be moved.
- All the AC broken pipes have to collected and stacked properly with 200 micron plastic wrapping with winning signage.
- Do not leave plastic sheet lying about where they may be further broken or crushed by people or traffic.
- Remove all ACM by the trained handler.
- Since we are amidst of dry climatic conditions due care must be taken to see that no waste broken pipes or fittings are left loose and outside the confined area and may be dampened as required.
- Mark and add signage.
- Due care has to be taken to collect the dampened waste in a permissible standard bags with proper warning signage's.

8. Storage of ACM Pipes

15. 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 (refer **Figure 2**).

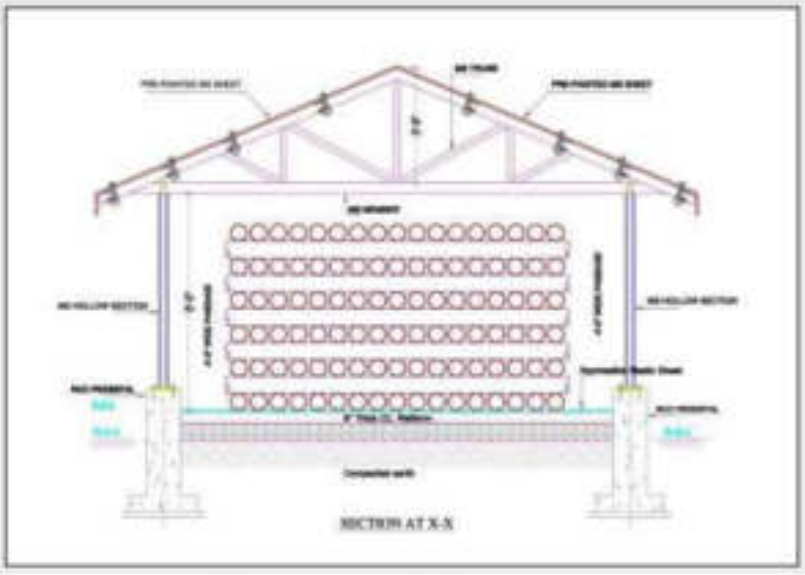


Figure 2: Schematic diagram showing ACM Pipes stacking

16. 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 (refer **Figures 3 & 4**).

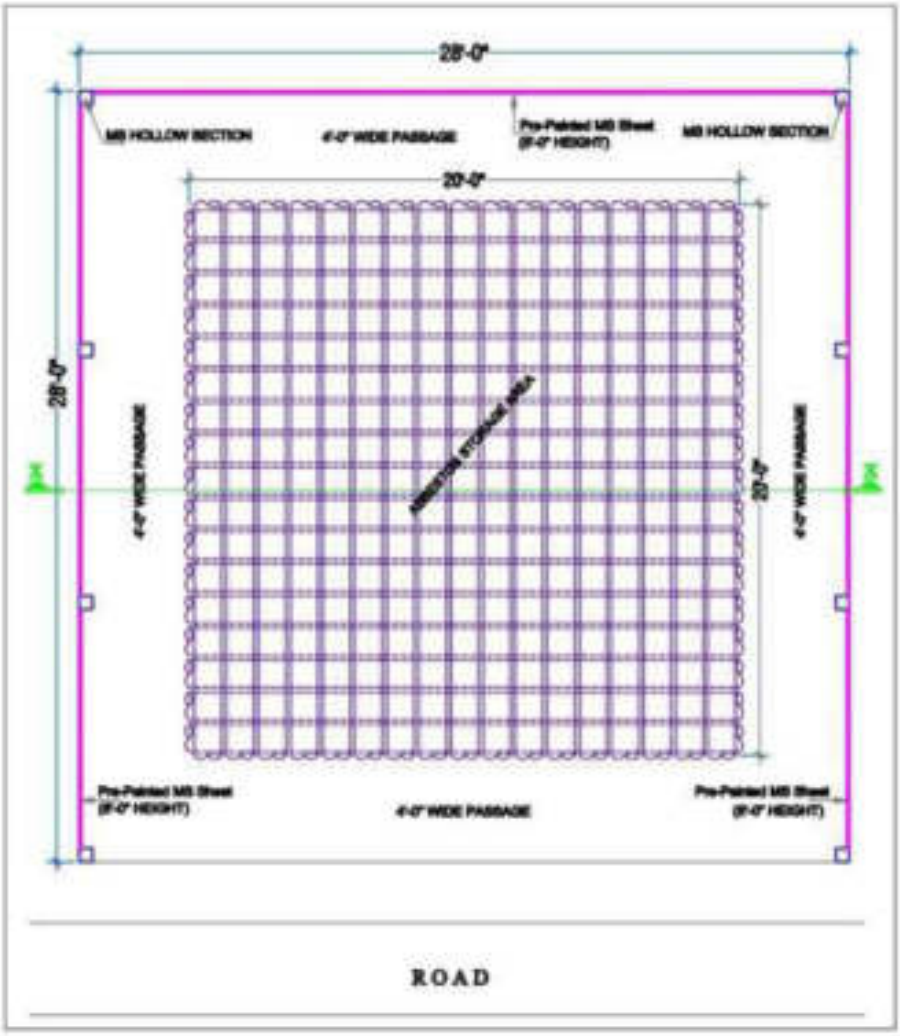


Figure 3: Schematic diagram showing ACM Pipes storage area

Figure 4: ACM: In-situ storage warning

9. Disposal of ACMs

17. The wastages packed have to be disposed off to Treatment, Storage or Disposal Facility (TSDF). Label/ display for TSDF disposal bags has to have clear display of the content in both English and local language as displayed under:

a. Waste Type:
b. Date of packing:
c. Qty/ Numbers:
d. Packed by:
e. Warning Signage:
f. Disposal

18. It will be responsibility of DBO contractor and PIU to send the ACMs to authorized agency for final disposal of ACMs. List of approved Treatment, Storage and Disposal Facilities (TSDF), who deal with ACMs in Rajasthan is given below-

Table 2: 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 Chorsha 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	Behror, Distt- Alwar	Only for Incineration

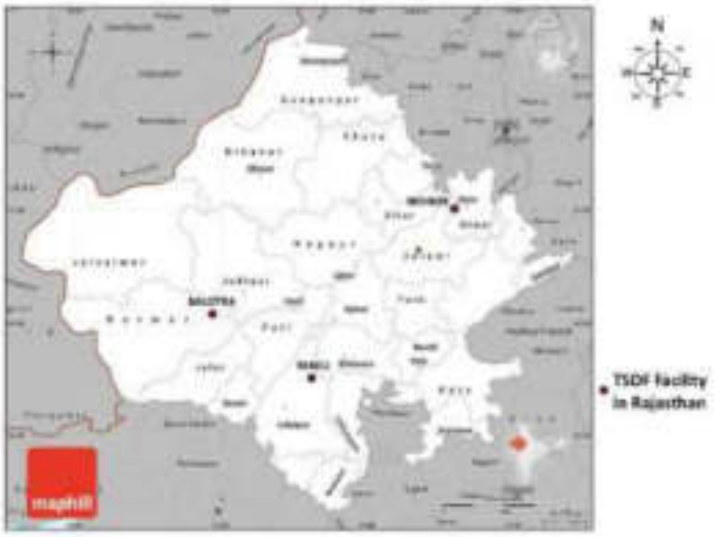


Figure 5: Map of the locations of approved TSDF in Rajasthan.

19. 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.

10. Standard Operating Procedures (SOPs) for Handling, Transportation and Disposal of ACMs

20. Two Standard Operating Procedures (SOPs) are prepared for safe handling, transportation and disposal of ACMs. These SOPs are to be followed by DBO contractor if ACMs is encountered at any site.

21. **Standard Operating Procedure-01-** are as follows-

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:
    - Hard helmet
    - Overall suit
    - Gloves
    - Mask to be strapped tight
    - Safety goggles

- Safety shoes
- Ear plugs

f. Avoid underground encountering of ACM
   - Ensure that an authorized person (HSE) is supervising the work
   - Barricade the area with signage
   - Damp ACM
   - Use safety gears
   - Dismantle ACM to be labeled, kept on plastic grounding and packed in permissible bags
   - Label the bags properly
   - 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:
   - Away from habitation
   - Avoid low lying areas
   - Away from water storage
   - To be enveloped with minimum of 8-feet height enclosure
   - Avoid high vertical stacks
   - Access controlled
   - Proper signage enclosure

h. Proper re-handling of ACM, labeling and packing

i. Control access and ensure proper monitoring of records, specifically:
   i. Environment
   ii. Health
   iii. Reporting to regulators

j. Dispose the ACM through qualified DBO Operators up to the Total Sanitary Disposal Facility (TSDF)

22. Outline of SOP-1 is given in below Figure-

Figure 6-Standard Operating Procedure Flow Sheet

23. **Standard Operating Procedure-02-** SOP-2 is formulated for Asbestos Fiber Monitoring, Analysis and Identification. SOP-2 is described as follows -

24. **Principle**- 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.

25. **Monitoring of Asbestos Fiber in Air-** 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.

The predominant average hourly wind direction in Bundi varies throughout the year. The wind is most often from the south west. Predominant wind blows from south west to north east direction.

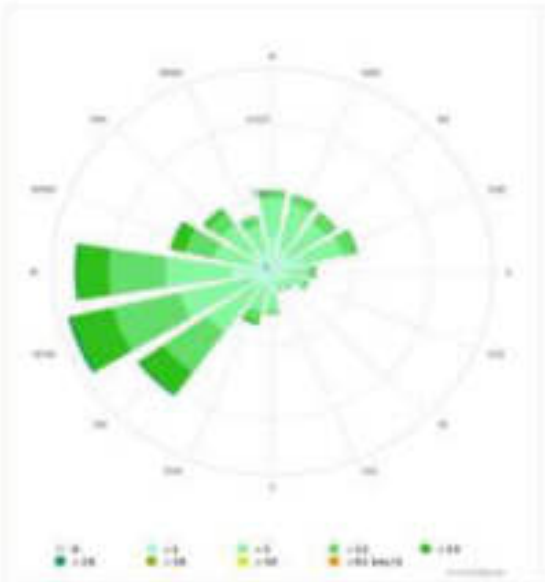


Figure 7: Predominant Wind Direction in Bundi, District-Bundi, Rajasthan

26. Two types of samples are to be taken, one within the workers breathing zone that is 300mm 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.

27. **Mounting Procedure-**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 15-25mm. 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, Labor lux 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 mm^2
a= graticule counting area in mm^2,
r= flow rate of air through filter in cm^3/min., and
t= single sample duration in minutes

28. 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 1000-500m 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.

29. Bureau of Indian Standards (BIS) Guidelines for Safe Use of Products containing Asbestos states that "Asbestos cement products (such as AC pipes) generally contain about 10-15% Asbestos fibers in a cement matrix that comprises the rest of the materials and are termed as locked in asbestos products as these products have the asbestos fibers bound in cement. The possibilities of air borne asbestos fiber will be in case of mishandling of encountered pipes with unsafe practice. During storing and installation; recommended work practices shall be followed to avoid harmful exposure". According to Hazardous and Other Wastes (Management

and Trans-boundary Movement) Rules, 2016, any waste with asbestos concentration limit of 10,000 mg/kg (*i.e.*1%), however this will apply only if the asbestos containing substances are in a friable, powdered or finely divided state. Under the Basel Convention[1], asbestos or asbestos waste in the form of dust and fibers is classified as hazardous waste.

11. Roles and Responsibilities with Estimated Cost for ACM Management

30. This contract under RSTDSP is Design, Build and Operate (DBO); therefore primary responsibility of ACM management is of DBO contractor. RUDSICO-EAP (formerly known as RUIDP); being principal employer has to ensure that ACM Management Plan is being implemented as per applicable rules and regulations. Roles and responsibilities of different entities and estimated cost of implementation of ACM Management Plan is given in below table-

Table 3: Roles and Responsibilities and Cost Estimates

PRE-CONSTRUCTION				
Activities	**Responsibilities**	**Associated Documents**	**Estimated Cost**	**Remark**
Design to encounter minimal ACM, and then Identification & Inventorization ACM - AC pipes & fittings	**RUDSICO-EAP & DBO CONTRACTOR**	Form-I (refer Annexure-1)	Rs.100/km	The onus of the minimal encounter of ACM is vested upon the RUDSICO-EAP and inventory will be with the DBO Operator and has to be annually verified by RUDSICO-EAP
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 (refer Annexure-1)	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.

[1] Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal, adopted in 1989

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 (refer Annexure-1)	Rs.40,000/ sample	The sampling zone should be 500m from the storage site and personal sampling has to be as per SOP-2.
Reporting in SEMR	**RUDSICO-EAP/ DBO CONTRACTOR**	None	Nil	As per ADB Format
Collection of Health records in compliance to the local laws.	**DBO CONTRACTOR/ RUDSICO-EAP/ PHED/ LSG**	Form-IV (refer Annexure-1)	Nil	For regular evaluation & identification of any abnormality.
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 (refer Annexure-1)	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- refer Annexure-1)	Nil	90 days from the start of work.
To facilitated a restricted confined storage space with access control with proper inventorization.		Form-II (refer Annexure-1)	Nil	Site Specific
In-situ storage of ACM.	**DBO CONTRACTOR**	Form-VI (refer Annexure-1)		The storage of existing and encountered ACM pipes (more than 4.0ft) will be stacked and to end at 90 deg. With vertical stacks, 6 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 (refer Annexure-1)	Nil	The copies of inventory generated and collected will have to be shared with Land Custodian (LC), RUDSICO-EAP and DBO 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 (refer Annexure-1)	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 AACM, 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	PHED/ LSG/ DBO CONTRACTOR	Form-II (refer Annexure-1)	Rs.3000/ Person	All the concerned employees deputed to handle or deal with ACM has to have Pre

ACM to be maintained.				medical history and periodic medical examination done

12. Emergency Response Plan (ERP) & Chance Find Protocol

31. 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-DBO 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 unauthorized personnel enter the area.
- The clean-up of any accidental release of higher risk materials, *e.g.*, asbestos cuttings, powered asbestos that may release the asbestos fibers, to be done by authorized person

32. Flow chart of ERP is shown in below Figure 8 -

Figure 8: Flow chart of ERP

33. 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.

Summary of Asbestos Management Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Remark
Clearing, transfer and disposal of ACM pipes	Possibilities of air borne asbestos if handled unsafely, cut, drilled or broken into pieces that may cause: ❑ Inflammation of the lungs ❑ Mesothelioma ❑ Peritoneal mesothelioma ❑ Pleural plaques ❑ Asbestosis ❑ Bronchogenic Carcinoma ❑ Second hand-exposure	Implement the AMP strictly that includes identification of hazards, the use of proper safety gear and disposal methods.	DBO Contractor /RUDSICO-EAP	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 4.0ft length not damaged.
Work in narrow streets	Possibilities of air borne asbestos if handled unsafely cut, drilled or broken into pieces that may cause: ❑ Inflammation of the lungs ❑ Mesothelioma ❑ Peritoneal mesothelioma ❑ Pleural plaques ❑ Asbestosis ❑ Bronchogenic Carcinoma ❑ Second hand-exposure	Conduct awareness program on safety during the construction work. Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day. Provide barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches. Identify risk of intervention with existing AC pipes. If there is significant risk, implement the AMP strictly that includes identification of hazards, the use of proper safety gear and disposal methods.	DBO Contractor/ RUDSICO-EAP	All provision of safe working with proper signage has to be undertaken prior to work initiation, during the work and after the work.

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Remark
Interventions in existing AC pipelines	Possibilities of air borne asbestos if handled unsafely cut, drilled or broken into pieces that may cause: ❑ Inflammation of the lungs ❑ Mesothelioma ❑ 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/ RUDSICO-EAP	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/ RUDSICO-EAP	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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Annexure 1: Formats of ACM Management

FORM I – ASBETOS INVENTORY, INSPECTION AND ACTION FORM

Format: RUDSICO-EAP/ 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: RUDSICO-EAP/ INSP. MATRIX/ LOCATION/ NAME OF DBO CONTRECTOR/ 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 DBO Operator (HSE-Officer), the records of this document has to be maintained for a pre-decided life. Details of training imparted have to be file with appropriate evidence like photographs, feedback form, videos etc. There has to be a proper documentation of the records kept with highest level of transparence to retrieve, trace and track the records as necessary. The records maintained by the DBO 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: RUDSICO-EAP/AQMR/ LOCATION/NAME OF DBO CONTRACTOR/HSE 003/YEAR			
Vendor details Approvals			
S.No.	Location	Agency	Results & Permissible Norms
Conclusion/ Remark HSE Signatory			

FORM-IV-MEDICAL HISTORY

Format: RUDSICO-EAP/MH/ LOCATION/NAME OF DBO CONTRACTOR/HSE 004/YEAR							
Employee code:							
Employer Details:							
PPE Used:							
Insurance/ESI							
S.No	Name	Age/ Sex/ DBO	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]

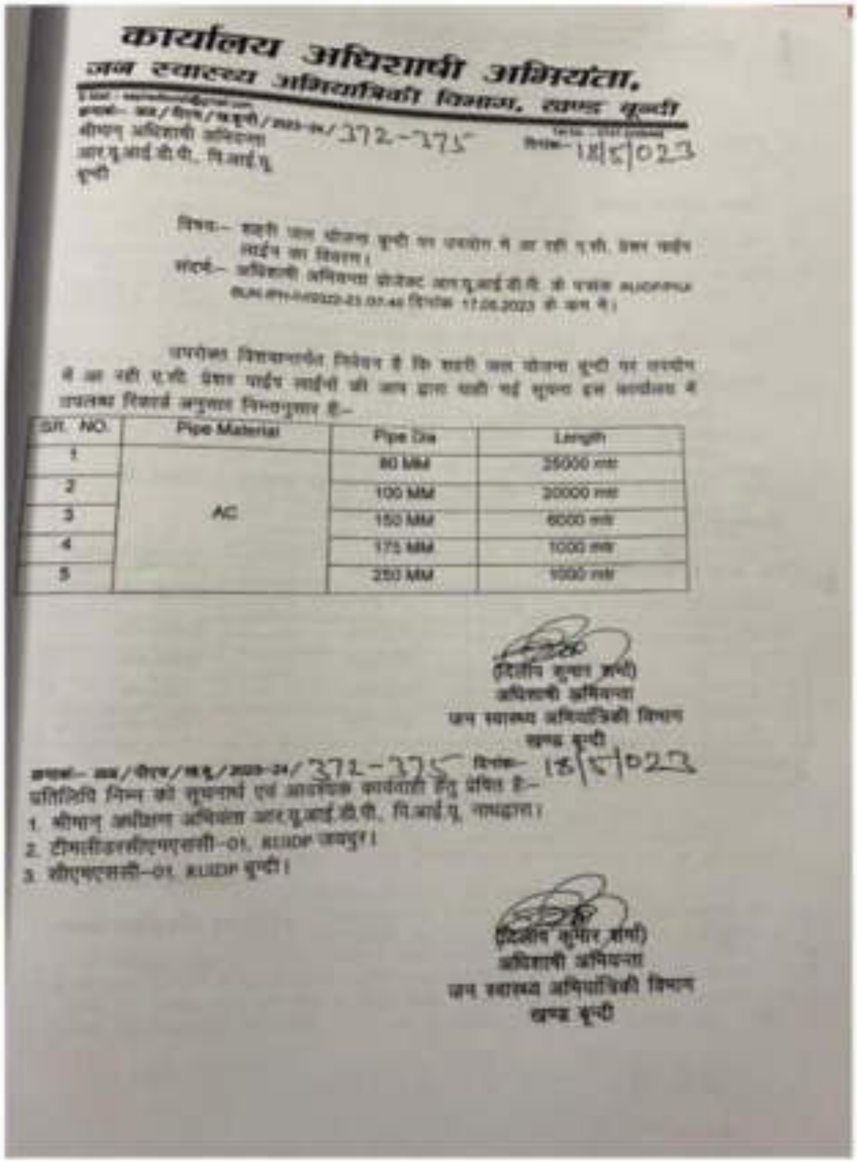
MANIFEST FOR HAZARDOUS AND OTHER WASTE

1.	Sender's name and mailing address (including Phone No. and e-mail)		
2.	Sender's authorization 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 Authorization	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 / Year
15.	Transporter acknowledgement of receipt of Wastes		
	Name and stamp:	Signature:	Month / Day / Year
16.	Receiver's certification for receipt of hazardous and other waste		
	Name and stamp:	Signature:	Month / Day / Year

FORM –VI: IN-SITU STORAGE OF ACM

S.No	Activity	Number of Stacks	Area occupied	Details of ACM Pipes	Day/ month/ year of storage
Site History					
For existing Stacks, details of re-handling of pipes in number or volume to be mentioned under supervision of Authorized Experts.					
Details of Location of re-handled ACM storage, new area should be • Minimum 10-15 ft away from campus habitation. • 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 Authorized 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					

Annexure 2: Details of AC pipes in Existing Water Supply Networks in Bundi



कार्यालय अधिशाषी अभियंता,
जन स्वास्थ्य अभियांत्रिकी विभाग, खण्ड बून्दी

372-375 18/5/023

SR. NO.	Pipe Material	Pipe Dia	Length
1	AC	80 MM	25000 mtr
2		100 MM	20000 mtr
3		150 MM	6000 mtr
4		175 MM	1000 mtr
5		250 MM	1000 mtr

372-375 18/5/023

Annexure 3: Site Visit Photographs of Bundi Town

Visit at PIU Office RUIDP, Bundi and meet with Ex. En, Supt. Engineers, Safety Officer of Contractor & brief about visit and need of AMP

Pump House at Vikas Nagar PHED H/w

Proposed site of OHSR at Vikas Nagar PHED H/w

Existing OHSR at Housing Board

OHSR site at Vikas nagar PHED campus

Proposed CWR site at Nainwa Road H/w

Visit at CWR site Nainwa Road with contractor safety officer and CMSC-I engineers

Existing CWR at Nainwa Road PHED campus

Proposed site of WS distribution network at Zone-10 Sadar market

Proposed WS distribution network site at Zone-9 near Nawal Sagar

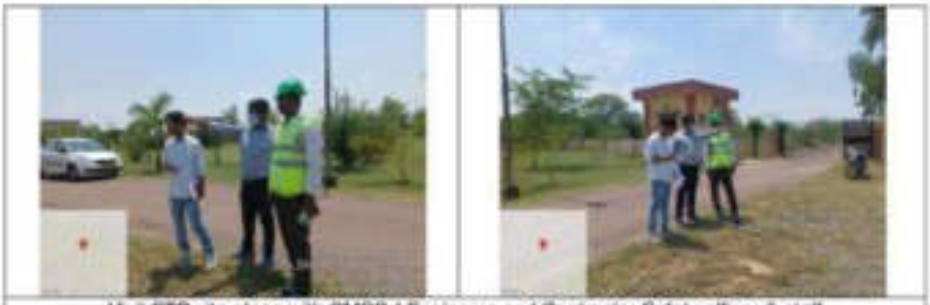
Proposed site of WS distribution network at Zone-8

Mangli H/w

Pump house at Mangli H/w

Existing STP at Ramganj Balaji

Proposed site of STP within existing STP campus



Visit STP site along with CMSC-I Engineers and Contractor Safety officer & staff

Conclusion:

Visited the Bundi town dated on 02/05/2023 and meet with the Official of PIU, Executive Engineer & Supt. Engineer & other Staff of CMSC-I and Contractor. Detail discussion with executive engineer regarding Asbestos Management Plan and purpose of visit. During discussion detail deliberation such as issues of Asbestos pipes occurring during excavation of WS in Bundi Town. During construction/ excavation activities, pipes need to be properly removed and disposed as per approved Asbestos Management Plan if occurred.

As per discussion with Supt. Engineer CMSC-I, existing WS line laying at the depth of approx. 1.0m plus pipe dia at different places or approx. 1.0-1.4m depth. New line of WS is being laying at the depth of approx.1.0m to 1.4m. New line will be laid in opposite direction of existing line where space is available. It may vary place to place, location of pipeline in reference to sides of road. Moreover sometimes in narrow street new line will be laid along the existing WS line at approx.1.0-1.5ft distance. So that there is lesser chance to encountered AC pipes during excavation. However, cannot deny the possibility to encounter AC pipes in broken stage sometimes during crossing the line but there will be low risk. In case of occur; all the procedure will be follows as per AMP. All existing line of water supply will not be disturbed and will left in the ground in their original condition.

During discussion with Executive Engineer, RUIDP-PIU, Bundi and Supt. Engineer of CMSC-I, detail deliberation such as issues of Asbestos pipes if occur during excavation of WS works in Bundi Town. In the event of encounter of any Asbestos Containing Materials (ACMs) during project activity, SOPs shall be followed till the final disposal at nearest TSDF site as given in Asbestos Management Plan.

Pre-dominant wind direction needs to be considered in planning of storage of ACM at designated place if occurred in near future. No habitation should be located near in downwind direction of ACM storage or its immediate vicinity.

During discussion with Ex.En. - RUIDP PIU, works of laying of water supply distribution network is not started in Bundi Town. Visited with support engineer of CMSC-I and contractor Safety officer and other staff at different project sites.

During site visit no asbestos containing materials (ACMs) were present at different sites in Bundi Town. In case of any occurrence of ACM's during excavation in near future, different sites

such as CWR campus of PHED, WS distribution network areas have visited but adequate space is available at STP site, Ramganj Balaji. However, in view of space there is no issue to temporary stack of ACM's if occurred in near future in existing STP campus, as no habitation/schools/ temple is exist near/in vicinity of the site. During visit found that PHED Vikas Nagar and Nainwa Road Campus is located within populated area and is not suitable to temporary store the ACM's at this location if encountered during work.

Existing STP site at Ramganj Balaji have sufficient space to temporary store the ACM if occurred in near future and quite remote from habitation, any water body or sensitive receptors.

In line of better management of ACM's if occurred during works, a training cum orientation programme was also conducted dated on 02nd May 2023 in due consent with Executive Engineer of RUIDP-PIU along with CMSC-I Staff and Contractor safety personnel & staff, social outreach team etc. During training, welcomed all the concerned person and brief about the Asbestos Management Plan and their needs while executing the works. During training, brief about the need and management of ACM's during works also discuss the ACMs removal, handling and temporary stacking and disposal procedure. During removal all the rules and regulation will need to be strictly adhered as per Asbestos Management Plan (AMP).

Photographs of training/ orientation programme conducted as follows:

Photographs during Training/ Orientation on Asbestos Management at PIU Office, Bundi

Attendance Sheet

TRAINING ON ASBESTOS MANAGEMENT

Project Town: Bundi

Venue: PIU office, Bundi

Date: 02/05/2023

S.No.	Name of Person	Gender	Designation	Contact No.	Signature
1	[illegible]	male	B.C. Engg.	[illegible]	[illegible]
2.	[illegible]	-"-	Site Engg	[illegible]	[illegible]
3.	[illegible]	-"-	Site Engg	[illegible]	[illegible]
4.	[illegible]	-"-	Site Sup.	[illegible]	[illegible]
5.	[illegible]	Female	SDT	[illegible]	[illegible]
6	[illegible] Kumar	male	[illegible]	[illegible]	[illegible]
7	[illegible]	male	Support Engg [illegible]	[illegible]	[illegible]
8	[illegible]	Male	Support Engg [illegible]	[illegible]	[illegible]
9	[illegible]	Female	[illegible]	[illegible]	[illegible]

Executive Engineer
RUIDP, PIU - Bundi

Asbestos Expert
PMCBC

Common Appendices C1 – C25 attached separately.

Appendix C-1: Drinking Water Standards
Appendix C-2: Ambient Air Quality Standards
Appendix C - 3: Emission limits for New DG sets up to 800 KW
Appendix C- 4: Stack Height Requirement of DG set
Appendix C-5: Vehicle Exhaust Emission Norms
Appendix C-6: Ambient Noise Quality Standards
Appendix C-7: Noise Limits for DG Set
Appendix C-8: Effluent Discharge Standards for Sewage Treatment Plant
Appendix C-9: Pages from Rajasthan State Sewerage and Waste Water Policy for reuse of treated effluent and sludge
Appendix C-10: Guidelines for Reuse of Treated Effluent and Sludge from STP for Beneficial Purposes
Appendix C-11: Guidelines for compensatory tree plantation in RUIDP works
Appendix C-12: Salient Features of Laws applicable to Construction Works including Labor Laws
Appendix C-13: Sample Outline Spoil Management Plan
Appendix C-14: Sample Outline Traffic Management Plan
Appendix C- 15: Sample Six Monthly Reporting Format
Appendix C-16: Sample Environmental Site Inspection Report
Appendix C-17: Sample Grievance Registration Form
Appendix C-18: Management Plan for Night works at Project Sites
Appendix C-19: Guidelines for Safety during Monsoon/Heavy rainfall
Appendix C-20: Sample ACM Management Plan
Appendix C-21: Guidelines for Workers Camps
Appendix C-22: Guidelines for Safety in Chlorine Usage
Appendix C-23: Guidelines for Prevention and Control of COVID-19
Appendix C-24: RUDSICO-EAP Guidelines for implementation of Prevention and Control Measures for COVID-19
Appendix C-25 Management of Work Plan during festivals and fairs (melas)

Initial Environmental Examination

PUBLIC

Document Stage: Updated Draft
Project Number: 42267-034
January 2024

India: Rajasthan Secondary Towns Development Sector Project – Additional Financing (PART B)

Bundi Water Supply and Wastewater Works

Common Appendices

Prepared by Rajasthan Urban Drinking Water Sewerage and Infrastructure Corporation Limited-External Aided Project (RUDSICO-EAP) for the Asian Development Bank (ADB). This is an updated version of the draft originally posted in February 2023 available on https://www.adb.org/projects/documents/ind-42267-034-iee-0

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Appendix C-1: Drinking Water Standards

Group	National Standards for Drinking Water[a]			WHO Guidelines for Drinking-Water Quality, 4th 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			

Note-

[a] Bureau of India Standard 10500: 2012.

[b] Health-based guideline values.

[c] Per ADB SPS, the government shall achieve whichever of the 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.

Appendix C-2: Ambient Air Quality Standards

Parameter	Location [a]	India Ambient Air Quality Standard [b] ($\mu g/m^3$)	WHO global air quality guidelines 2021 ($\mu g/m^3$)	Applicable Per ADB SPS[e] ($\mu g/m^3$)
PM_{10}	Industrial Residential, Rural and Other Areas	60 (Annual) 100 (24-hr)	15 (Annual) 45 (24-hr)	15 (Annual) 45 (24-hr)
	Sensitive Area	60 (Annual) 100 (24-hr)	15 (Annual) 45 (24-hr)	15 (Annual) 45 (24-hr)
PM_{25}	Industrial Residential, Rural and Other Areas	40 (Annual) 60 (24-hr)	5 (Annual) 15 (24-hr)	5 (Annual) 15 (24-hr)
	Sensitive Area	40 (Annual) 60 (24-hr)	5 (Annual) 15 (24-hr)	5 (Annual) 15 (24-hr)
SO_2	Industrial Residential, Rural and Other Areas	50 (Annual) 80 (24-hr)	40 (24-hr) 500 (10-min)	40 (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)	10 (Annual) 200 (1-hr)	10 (Annual) 80 (24-hr) 200 (1-hr)
	Sensitive Area	30 (Annual) 80 (24-hr)	10 (Annual) 200 (1-hr)	10 (Annual) 80 (24-hr) 200 (1-hr)
CO	Industrial Residential, Rural and Other Areas	2,000 (8-hr) 4,000 (1-hr)	4000 (24 hour)	2,000 (8-hr) 4,000 (1-hr) 100,000 (15-min)
	Sensitive Area	2,000 (8-hr) 4,000 (1-hr)		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) 1.0 (24-hr)
	Sensitive Area	0.5 (Annual) 1.0 (24-hr)		0.5 (Annual) 1.0 (24-hr)
Ammonia (NH_3)	Industrial Residential,	100 (Annual) 400 (24-hr)		100 (Annual) 400 (24-hr)

Parameter	Location [a]	India Ambient Air Quality Standard [b] (µg/m^3)	WHO global air quality guidelines 2021 (µg/m^3)	Applicable Per ADB SPS[e] (µg/m^3)
	Rural and Other Areas			
	Sensitive Area	100 (Annual) 400 (24-hr)		100 (Annual) 400 (24-hr)
Benzene (C_6H_6)	Industrial Residential, Rural and Other Areas	5 (Annual)		5 (Annual)
	Sensitive Area	5 (Annual)		5 (Annual)
Benzo(o)pyrene (BaP) particulate phase only	Industrial Residential, Rural and Other Areas	0.001 (Annual)		0.001 (Annual)
	Sensitive Area	0.001 (Annual)		0.001 (Annual)
Arsenic (As)	Industrial Residential, Rural and Other Areas	0.006 (Annual)		0.006 (Annual)
	Sensitive Area	0.006 (Annual)		0.006 (Annual)
Nickel (Ni)	Industrial Residential, Rural and Other Areas	0.02 (Annual)		0.02 (Annual)
	Sensitive Area	0.02 (Annual)		0.02 (Annual)

Note-

[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 C-3: Emission limits for New DG sets up to 800 KW
(As per Environment (Protection) (Third Amendment) Rules, 2013)

TABLE

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

Note:

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

   Explanation.- The term 'COP year' means the period from 1st April to 31st March.
6. Stack height (in metres), for genset shall be governed as per Central Pollution Control Board (CPCB) guidelines.

Appendix C-4: Stack Height Requirement of DG set

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+0.2x ÖKVA
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 C-5: Vehicle Exhaust Emission Norms

1. **Passenger Cars**

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

2. **Heavy Diesel Vehicles**

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

Source: Central Pollution Control Board

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

Appendix C-6: Ambient Noise Quality Standards

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

Note-

[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 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 C-7: Noise Limits for DG Set

(Noise Limit for Generator Sets run with Diesel were notified by Environment (Protection) second Amendment Rules vide GSR 371(E), dated 17th May 2002 at serial no.94 and its amendments vide GSR No 520(E) dated 1st July 2003; GSR 448(E), dated 12th July 2004; GSR 315(E) dated 16th May 2005; GSR 464(E) dated 7th August 2006; GSR 566(E) dated 29th August 2007 and GSR 752(E) dated 24th October 2008; G.S.R. 215 (E), dated 15th March, 2011 under the Environment (Protection) Act, 1986)

Noise Limit for Generator Sets run with Diesel

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

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

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

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

2. Noise limit for DG sets not covered by paragraph 1.

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

2.1 Noise from DG set shall be controlled by providing an acoustic enclosure or by treating the room acoustically, at the users end.

2.2 The acoustic enclosure or acoustic treatment of the room shall be designed for minimum 25 dB (A) insertion loss or for meeting the ambient noise standards, whichever is on the higher side (if the actual ambient noise is on the higher side, it may not be possible to check the performance of the acoustic enclosure/acoustic treatment. Under such circumstances the performance may be checked for noise reduction upto actual ambient noise level, preferably, in the night time). The measurement for Insertion Loss may be done at different points at 0.5 m from the acoustic enclosure/ room, then averaged.

2.3 The DG set shall be provided with proper exhaust muffler with insertion loss of minimum 25 dB (A).

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

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

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

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

3.1 Applicability

01. These rules apply to DG sets upto 1000 KVA rated output, manufactured or imported in India, on or after 1st January, 2005.

02. These rules shall not apply to –

a) DG sets manufactured or imported for the purpose of exports outside India; and

b) DG sets intended for the purpose of sample and not for sale in India.

3.2 Requirement of Certification

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

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

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

Appendix C-8: Effluent Discharge Standards for Sewage Treatment Plant

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

Note: These parameters are being followed under RSTDSP works

Appendix C-9: Pages from Rajasthan State Sewerage and Waste Water Policy for reuse of treated effluent and sludge

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.

7. Treated effluent shall be priced and sold to end users at a price covering at least the operation and maintenance costs of delivery.

8. It is the intention of the Government, through private sector participation, to transfer management of infrastructure and services from the public to the private sector, in order to improve performance and upgrade the level of service.

9. The role of the private sector will expand with management contracts, concessions and other forms of private sector participation in wastewater management.

10. The concepts of BOO/BOT shall be entertained, and the impact of such concepts on the consumers shall be continually addressed and negative impacts mitigated.

11. The private sector role in reuse of treated effluent shall be encouraged and expanded.

12. As per urban reforms (under various schemes by MOUD) 100% cost of O&M of sewerage system shall be recovered from consumer. The costs will depend on the system/technology adopted for collection of sewerage and treatment and the administration costs. It is important that the full cost of the service is assessed for each urban area instead of adopting a typical cost assessment. The full cost shall cover the following:

(i) Institutional aspect of the sanitation service e.g. the management information systems, accountancy and finance management, billing and collection, customer services, etc. and oversight activities.

(ii) Operating, maintaining (on a planned maintenance basis), repairing replacing and extending sanitation service physical infrastructure.

(iii) Keeping updated infrastructure and customer data on a GIS base.

(iv) Managers, staff, vehicles, equipment and consumables associated with the above.

(v) Consumable like chemicals etc.

(vi) Power charges.

(vii) Spare Parts.

(viii) Any other O&M contract amount

5.6. Source of Funds for Sewerage Project

(A) In general, implementation of reuse facility requires substantial capital expenses. In addition to capital cost associated with reclaimed water facility, there are also additional operation, maintenance, and replacement and administrative costs. Hence responsible agencies may consider following sources of 'Funds for Construction of Sewerage Project':

Appendix C-10: 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 aliments 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 helminthiases 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 flors 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 superflous 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 fied 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 fist 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 C-11: Guidelines for compensatory tree plantation in RUIDP works

RUIDP
Office of RUDSICO, External Aided Project (RUIDP)
Rajasthan Urban Drinking Water Sewerage and Infrastructure Corporation Ltd (RUDSICO)
{Erstwhile Rajasthan Urban Infrastructure Finance and Development Corporation Ltd}
Head Quarter Address:- Old Working Women Hostel, Behind Nehru Palace, Tonk Road Jaipur
Branch Address: - AVS Building, Jawahar Circle, JLN Marg, Jaipur - 302017
Ph. – 141 2721966 Fax No. 141 2721919,
E-mail:- mailruidp@gmail.com, mail.ruidp@rajasthan.gov.in **Website: -** www.ruidp.rajasthan.gov.in

No. F3 (201)(57)/RUIDP/PMU/Ph-III/CMS/ 586

Date: 13.04.2018

Sub: Construction Management System: Circular – 10
Ref: Guidelines for Compensatory Tree Plantation in RUIDP works.

RUIDP being a responsible organization in the sector of Urban Infrastructure understands the need & responsibility towards protection and conservation of Environment. It is mandatory in all RUIDP projects to avoid tree cutting during construction activities, however, in some unavoidable cases tree cutting may be allowed subjected to following conditions : -

1. Submission of detailed proposal by contractor indicating number of trees required to be cut with justification and details of efforts made to avoid/minimize tree cutting.
2. Tree cutting should be allowed by PIU/Employer Representative only after permission from concerned authorities (Administration/ Tahsildar/ Forest Department as the case may be).
3. Compensatory plantations should be ensured/ done by contractor in sufficient number of trees so that final survived trees should meet criteria of 1:3 (three trees should be planted for every one tree cut). This ratio is a minimum requirement; additional plantation by contractor should be encouraged. The ratio shall also be got approved by concerned permitting authority.
4. Compensatory plantations can be done in any of project sites (if space available) or any other place in the town after due permission from land owner/concerned department and PIU.
5. Tree species selected for compensatory plantations should be native (local) species and list of such species should be obtained/ verified from Forest Department of concerned town prior to submission of proposal for tree cutting.
6. Trees proposed to be planted should be at least of 3 mtrs height and in healthy condition.
7. It shall be responsibility of contractor to ensure the survival of planted trees upto 5/10 years i.e. for entire O&M period.
8. After completion of Contract period and before handing over project for O&M, all the trees should be counted by PIU through consultants and handed over to Municipality/asset owner/concerned department through PIU.

9. Compensatory plantation is an additional obligation (deemed to be accepted by all parties) and should not be considered as replacement/substitution of any pre-existing contractual obligation/ conditions. Compensatory plantation obligations will be additional to Pre defended mandatory plantations for sites in contract.
10. Payments for this Compensatory plantation shall be done from provisional sum of contract and rates shall be taken from RUIDP SOR for the available items and market rate analysis for other items.

This circular shall be strictly abided by all the members of PIU, PMDSC, PSC & Contractor.

(Dr. Preetam B Yashvant)
Project Director

No. F3 (201)(57)/RUIDP/PMU/Ph-III/CMS/ 597-91 Date: 13.04.2018

Copy to following for information and necessary action:

1. PA to PD/Addl. PD/ FA/ CE/ ACE/SE-I/SE-II/SE-III/ POs/APOs, PMU, RUIDP, Jaipur
2. SE, PIU, Pali/Tonk/Sriganaganagar/Jhunjhunu/Bhilwara/Hanumangarh/Kota
3. EE, PIU, Sawai Madhopur/ Bikaner/ Udaipur/ Jhalawar/ Mt. Abu/Banswara
4. Team Leader/ Project Coordinator/CM/ Dy. CM/ACM, PMDSC/ PSC, Jaipur, Pali/ Tonk/ Sriganaganagar/ Jhunjhunu/ Bhilwara/ Hanumangarh/ Kota/ Sawai Madhopur/ Bikaner/ Udaipur/ Jhalawar/ Mt. Abu/Banswara
5. ACP, RUIDP, Jaipur to send by e-mail and put up the Guidelines on the website.

Addl. Chief Engineer

Appendix C-12: Salient Features of Laws applicable to Construction Works including Labor Laws

(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 (as amended up to 2017) - 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 burry 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. Following are the major requirements under this Act, applicable to this project-

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 equipments and appoint competent person to drive or operate such vehicles and equipments
- 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 equipments
- Provide safety net, safety sheet, safety belts while working at height (more than1.6 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

(xviii) **The Occupational Safety, Health and Working Conditions Code, 2020**: The Occupational Safety, Health And Working Conditions Code, 2020 is a code to consolidate and amend the laws regulating the Occupational safety and health and working conditions of the persons employed in an establishment and for matters connected therewith or incidental thereto. This Code simplifies, amalgamates and rationalises the provisions of the different enactments with certain important changes which, inter alia, are as under:—

- To impart flexibility in adapting technological changes and dynamic factors, in the matters relating to health, safety, welfare and working conditions of workers;
- To apply the provisions of the proposed Code for all establishments having ten or more workers, other than the establishments relating to mines and docks;
- To provide the concept of “one registration” for all establishments having ten or more employees. However, for the applicability of all other provisions of the Code in respect of factories, except registration, the threshold has been fixed twenty workers in a factory (with power) and forty workers (without power);

- To include the journalist working in electronic media such as in e-paper establishment or in radio or in other media in the definition of “working journalists”;
- To provide for issuing of appointment letter mandatorily by the employer of an establishment to promote formalisation in employment;
- To provide free of cost annual health check-ups for employees above the specified age in all or certain class of establishments by which it would be possible to detect diseases at an early stage for effective and proper treatment of the employees;
- To make the provisions relating to Inter-State Migrant Workers applicable on the establishment in which ten or more migrant workers are employed or were employed on any day of the preceding twelve months and also provide that a Inter-State Migrant may register himself asan Inter-State Migrant Worker on the portal on the basis of self-declaration and Aadhaar;
- An Inter-State Migrant Worker has been provided with the portability to avail benefits in the destination State in respect of ration and availing benefits of building and other construction worker cess;
- To constitute the National Occupational Safety and Health Advisory Board to give recommendations to the Central Government on policy matters, relating to occupational safety, health and working conditions of workers;
- To constitute the State Occupational Safety and Health Advisory Board at the State level to advice the State Government on such matters arising out of the administration of the proposed Code;
- To make a provision for the constitution of Safety Committee by the appropriate Government in any establishment or class of establishments;
- To employ women in all establishments for all types of work. They can also work at night, that is, beyond 7 PM and before 6 AM subject to the conditions relating to safety, holiday, working hours and their consent;
- To make provision of “common license” for factory, contract labour and beedi and cigar establishments and to introduce the concept of a single all India license for a period of five years to engage the contract labour;
- To enable the courts to give a portion of monetary penalties up to fifty per cent. to the worker who is a victim of accident or to the legal heirs of such victim in the case of his death;
- To provide overriding powers to the Central Government to regulate general safety and health of persons residing in whole or part of India in the event of declaration of epidemic or pandemic or disaster;
- To make provision for Social Security Fund for the welfare of unorganised workers; and
- To make provision for adjudging the penalties imposed under the Code.

Appendix C-13: 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 C-14: 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:

- the safety of pedestrians, bicyclists, and motorists travelling through the construction zone;
- protection of work crews from hazards associated with moving traffic;
- mitigation of the adverse impact on road capacity and delays to the road users;
- maintenance of access to adjoining properties; and
- 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.

- Make traffic safety and temporary traffic control an integral and high-priority element of project from planning through design, construction, and maintenance.
- Inhibit traffic movement as little as possible.
- Provide clear and positive guidance to drivers, bicyclists, and pedestrians as they approach and travel through the temporary traffic control zone.
- Inspect traffic control elements routinely, both day and night, and make modifications when necessary.
- Pay increased attention to roadside safety in the vicinity of temporary traffic control zones.
- Train all persons that select, place, and maintain temporary traffic control devices.
- Keep the public well informed.
- Make appropriate accommodation for 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

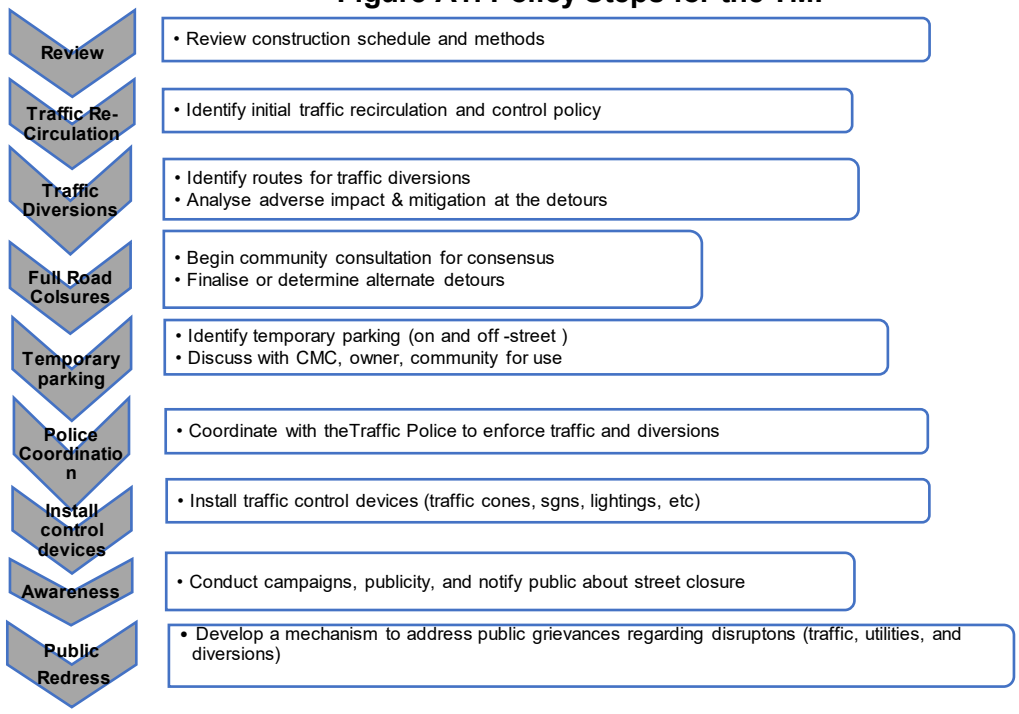
4. Apart from the capacity analysis, a final decision to close a particular street and divert the traffic should involve the following steps:

- approval from the ULB/Public Works Department (PWD) to use the local streets as detours;
- 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;
- determining of the maximum number of days allowed for road closure, and incorporation of such provisions into the contract documents;
- determining if additional traffic control or temporary improvements are needed along the detour route;
- considering how access will be provided to the worksite;
- contacting emergency service, school officials, and transit authorities to determine if there are impacts to their operations; and
- 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:

- traffic control devices in place at the work zones (signs, traffic cones, barriers, etc.);
- defensive driving behaviour along the work zones; and
- 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:

- explain why the brochure was prepared, along with a brief description of the project;
- advise the public to expect the unexpected;
- educate the public about the various traffic control devices and safety measures adopted at the work zones;
- educate the public about the safe road user behaviour to emulate at the work zones;
- 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
- 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. Flagggers/ 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

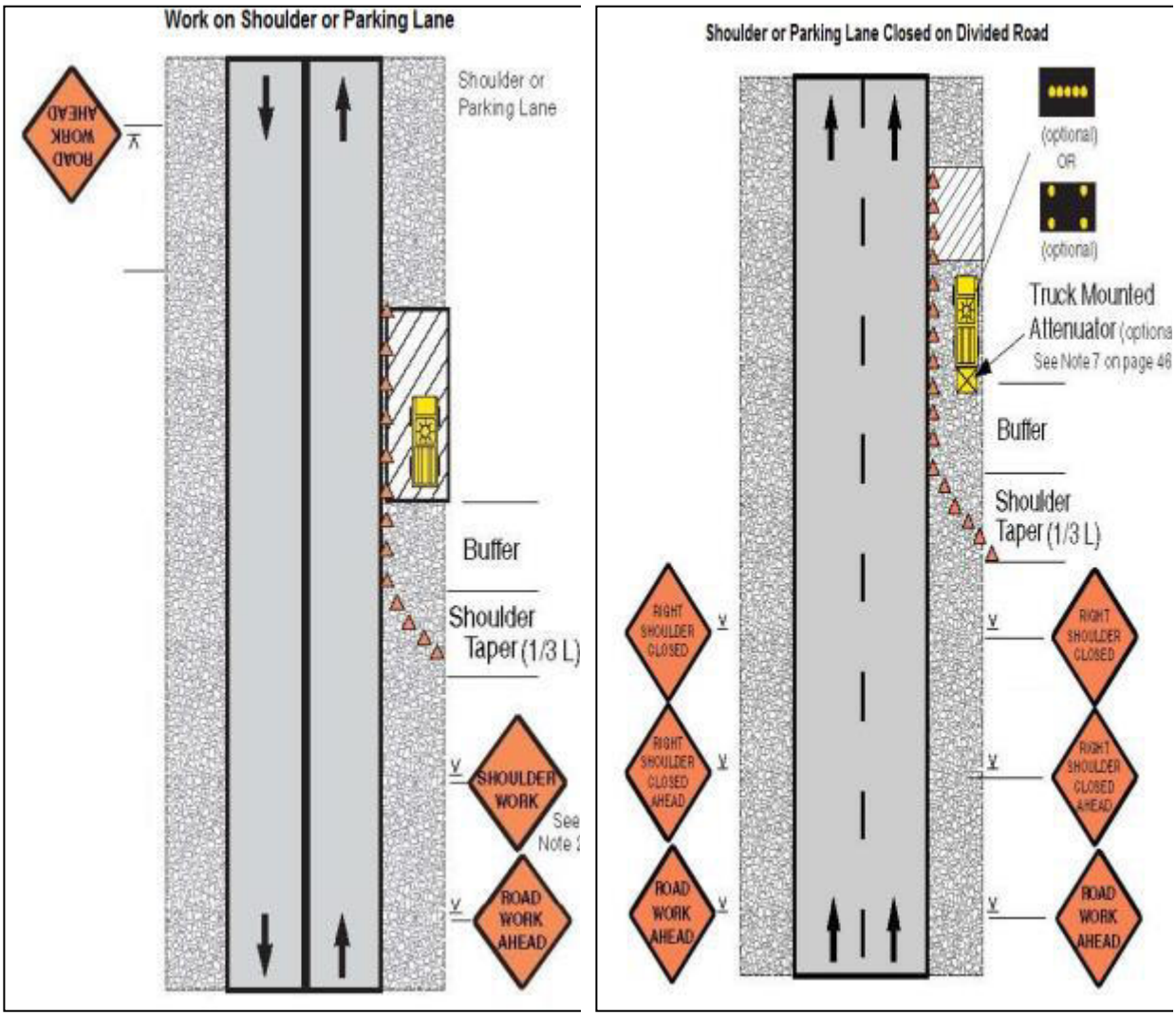


Figure A4 & A5: Work in Travel Lane & Lane closure on road with low volume

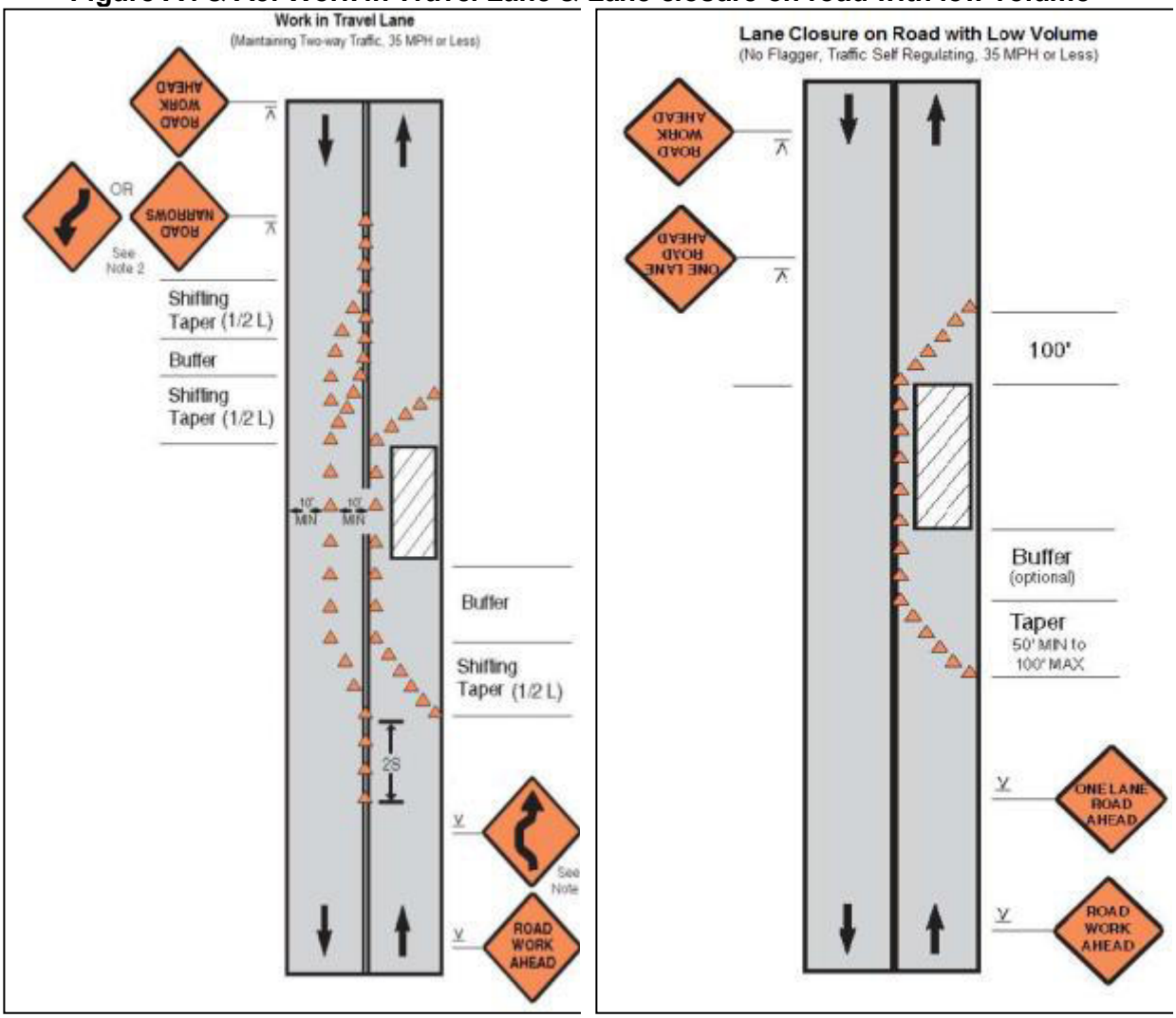


Figure A6 & A7: Lane closure on a two-line road with low volume (with yield sign) & Lane closure on a two-line road with low volume (one flagger operation)

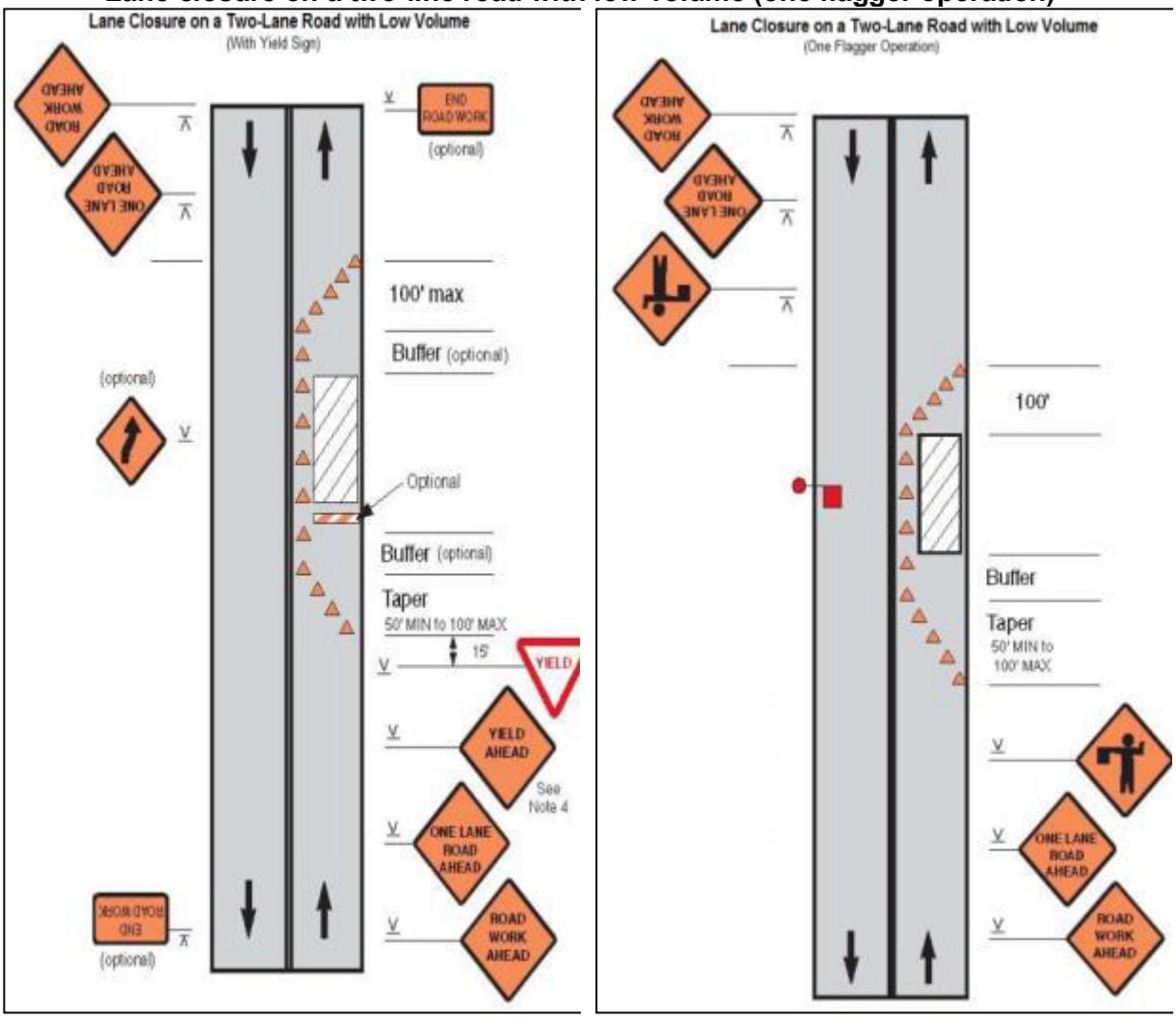


Figure A8 & A9: Lane Closure on a Two-Lane Road (Two Flagger Operation) & Lane Closure on a Four-Lane Undivided Road

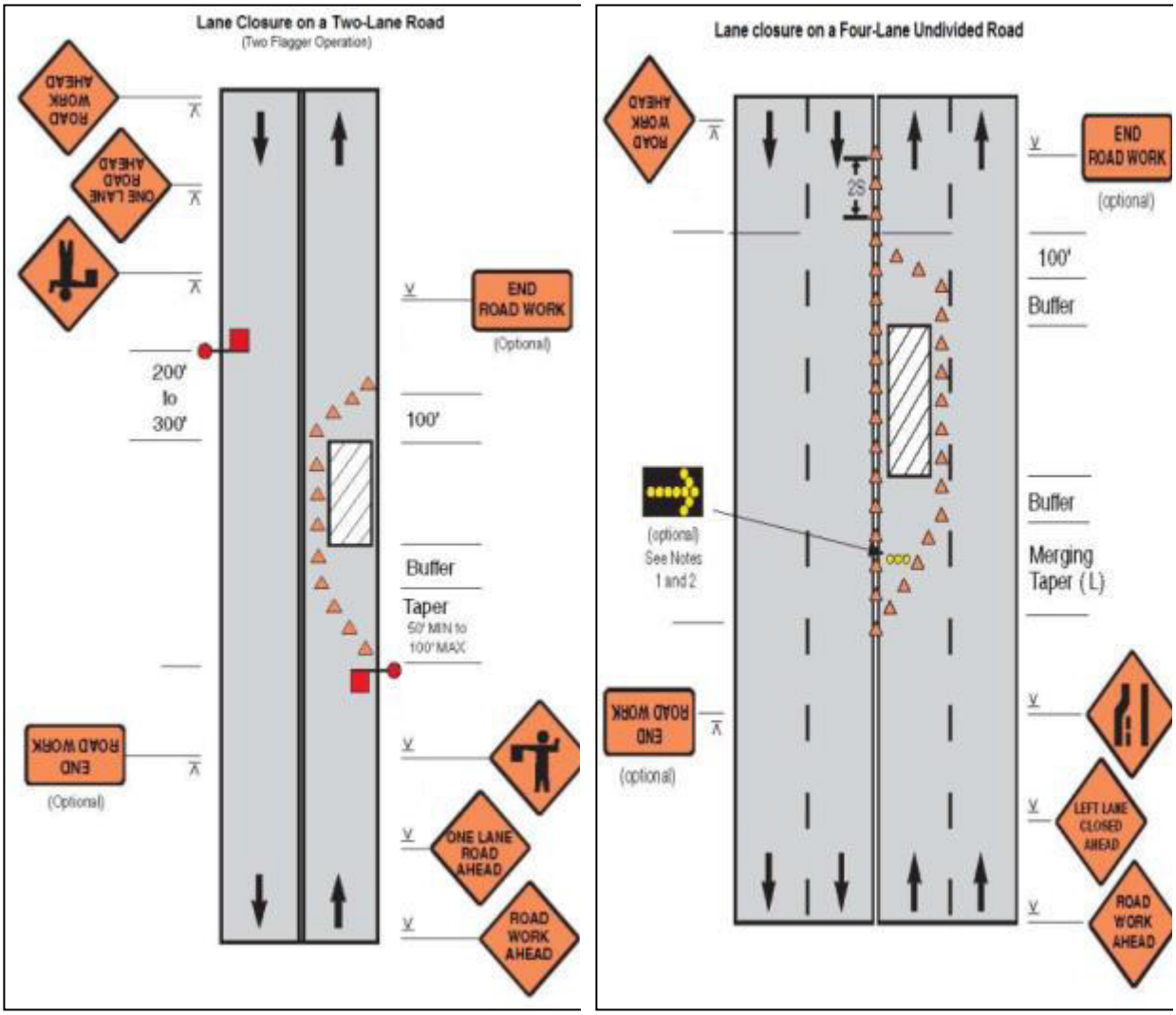
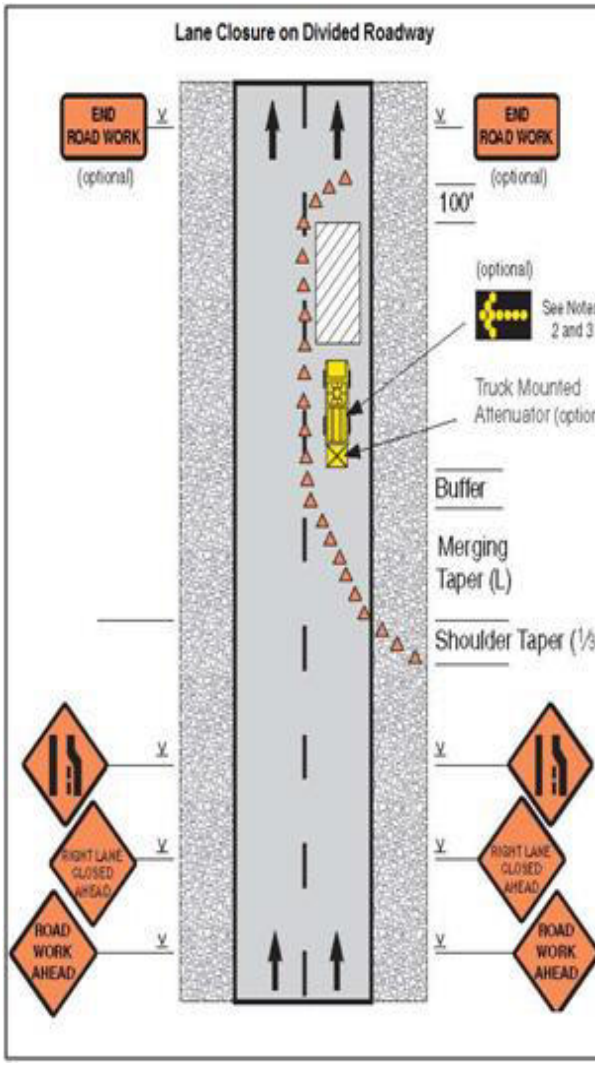


Figure A10 & A11: Lane Closure On Divided Roadway & Half Road Closure On Multi-Lane Roadway



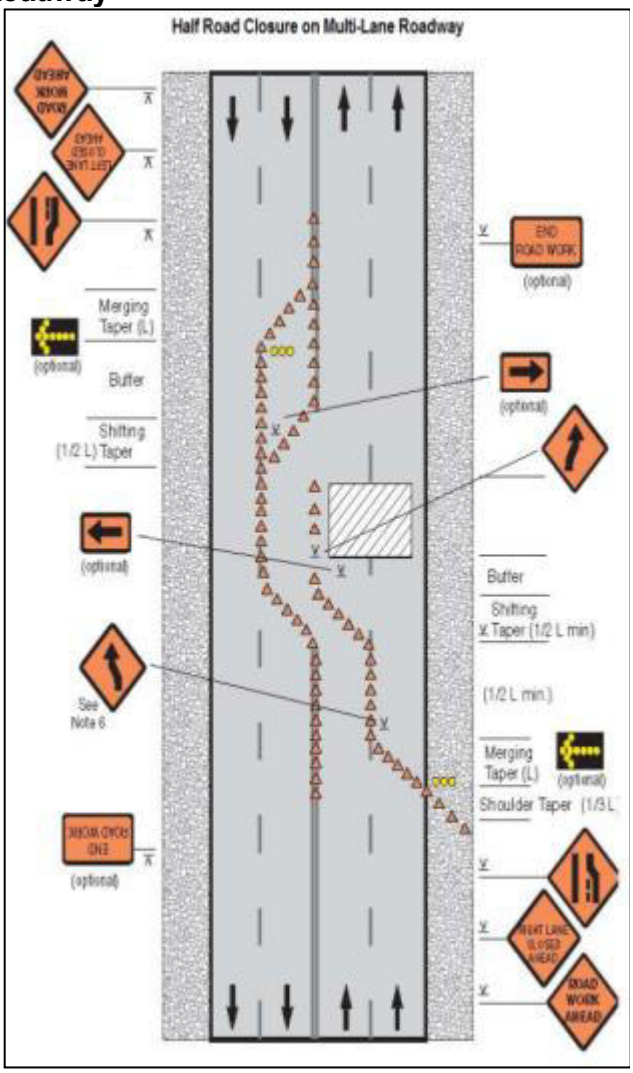
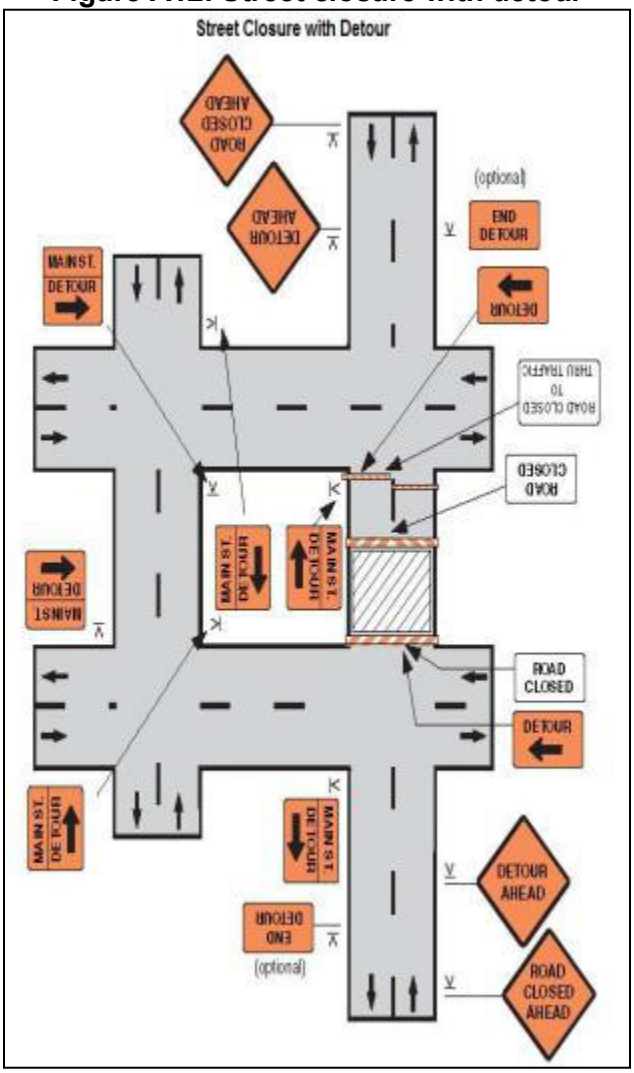


Figure A12: Street closure with detour



Appendix C-15: Sample Six Monthly Reporting Format

1. Introduction

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

No.	b-Project Name	Status of Sub-Project				List of Works	Progress of Works
		Design	Pre-Construction	Construction	Operational Phase		
		☐	☐	☐	☐		
		☐	☐	☐	☐		
		☐	☐	☐	☐		

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

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

3. Compliance status with environmental loan covenants

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

4. Compliance status with the environmental management and monitoring plan

5. Provide the monitoring results as per the parameters outlined in the EMP. Append supporting documents where applicable, including Environmental Site Inspection Reports.
6. There should be reporting on the following items which can be incorporated in the checklist of routine Environmental Site Inspection Report followed with a summary in the semi-annual report send to ADB. Visual assessment and review of relevant site documentation during routine site inspection needs to note and record the following:

- What are the dust suppression techniques followed for site and if any dust was noted to escape the site boundaries;
- If muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads;
- adequacy of type of erosion and sediment control measures installed on site, condition of erosion and sediment control measures including if these were intact following heavy rain;
- Are their designated areas for concrete works, and refuelling;
- Are their spill kits on site and if there are site procedure for handling emergencies;
- Is there any chemical stored on site and what is the storage condition?
- Is there any dewatering activities if yes, where is the water being discharged;
- How are the stockpiles being managed;
- How is solid and liquid waste being handled on site;
- Review of the complaint management system;
- Checking if there are any activities being under taken out of working hours and how that is being managed.

Summary Monitoring Table

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Status of Compliance	Responsibility of mitigation	Responsibility of monitoring	Cost and Source of Funds	Remarks
Design Phase						
Pre-Construction Phase						
Construction Phase						
Operational Phase						

Overall Compliance with CEMP/ EMP

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

5. Approach and methodology for environmental monitoring of the project

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

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

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

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

Air Quality Results

Site No.	Date of Testing	Site Location	eters (Government Standards)			
			PM_{10} µg/m3	$PM_{2.5}$ µg/m3	SO2 µg/m3	NO2 µg/m3

Water Quality Results

Site No.	Date of Sampling	Site Location	Parameters(Government Standards)					
			pH	Conductivity µS/cm	BODmg/L	TSSmg/L	TNmg/L	TPmg/L

Noise Quality Results

Site No.	Date of Testing	Site Location	LAeq (dBA) (Government Standard)	
			DayTime	NightTime

7. Summary of key issues and remedial actions

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

8. Appendixes

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

Appendix C-16: 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	

	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	
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

_____

_____ _____

Name
Position

Name
Position

Appendix C-17: 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 C-18: Management Plan for Night works at Project Sites

Following requirements should be fulfilled for construction works at night hours-

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

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

    - Illumination should be as follows-

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

    - As far as possible ready mix concrete from batching plant to be used, otherwise the concrete should be prepared away from residential areas and brought to the site
    - All the noise activity like hammering, cutting, crushing, running of heavy equipments should be done in day time and avoided in night time

- Workers engaged in night works should have adequate rest/sleep in day time before start of night works
- Worker engaged for night works should have previous experience of night works and should be physically fit for such works including clear vision in night
- All the necessary provisions of traffic aids such as traffic signals, road signage, barricades, cautions boards, traffic diversion boards etc. should be available with fluorescent/retro-reflective arrangements
- Workers should be trained before start of night works about risks and hazards of night works and their mitigation measures and should be provided all the protective aids (PPEs) including fluorescent/retro-reflective vests
- Horns should not be permitted by equipment's and vehicles
- Workers should not shout and create noise
- First aid and emergency vehicles should be available at site
- Emergency preparedness plan should be operative during night works
- Old persons and pregnant women and women having small kids should not work in night time
- All the vehicles and equipment's being used at night works should have adequate type of silencers/enclosures/mufflers to reduce noise
- All the vehicles should be checked for working head lamps, tail lamps, inner lights etc. before start of night works

7. PIU/CMSC 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 videographic records as well as register the observations
8. Night works should be stopped early in the morning at least one hour before start of pedestrian/traffic movement
9. After completion of night works all the site should be cleaned and maintained obstruction free for day time movement of vehicles and pedestrians
10. Drivers and workers should be alert and responsive during night works
11. All the wages to workers working in night hours should be as per the applicable labour acts
12. Avoid any nuisance which may create problems to nearby habitants and work peacefully during night hours
13. Night works should not be conducted near hospitals and during peak seasons such as peak tourist season, students' exam times etc.

Appendix C-19: 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 passers-by and road users during the impending Monsoon.

Normal and heavy rainfall event affect our ongoing works, It should be our conscientious effort to ensure that such events do not prove to be problematic to people and structures in town. During monsoon PIU/PMCBC should ensure that any further excavation work is taken up only after ensuring that the earlier work is in safe stage. It is desired that DCM/ACM & Ex En PIU should inspect all sites during rains and take proactive actions.

Some of the precautions and mitigation measures to be taken are discussed below-

1. The execution of works having deep excavation in smaller lanes and congested areas should be completed well before monsoon. The works of deep excavation during monsoon should not be preferably taken up or extensive care should be taken for execution of such works.
2. The settlement in refilled trenches of sewerage and water supply lines may occur during monsoon. PMCBC 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 PMCBC 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.

Note-

SE–PIU and ACM-PMCBC 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 C-20: Sample ACM Management Plan

BACKGROUND OF ASBESTOS

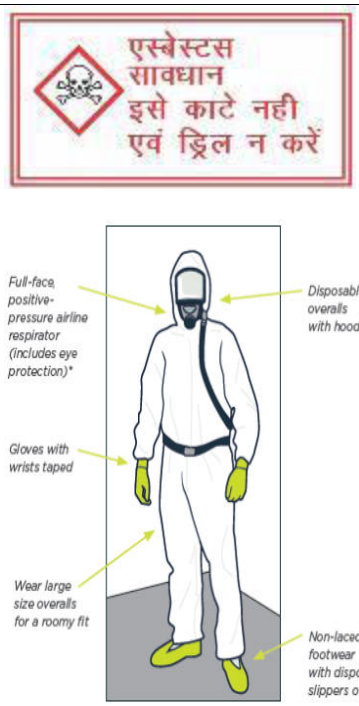
1. The purpose of this Asbestos Management Plan (AMP) is to identify, use appropriate methodology and scientifically handling /disposal of the Asbestos Containing Materials (ACM) in order to comply with the applicable National legislation and International standards in sync with norms of ADB's SPS 2009. 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 /orreduce the generation of airborne dust during handling, storing, transportation and final disposal of final disposal of asbestos and asbestos containing products. • The crux is waste avoidance: the practice inculcated should focus the on minimal waste generation. • Waste Collection: In the project circumstance, the waste is referred to the damaged powered asbestos which will be collected in the Permissible plastic bags to be disposed off to the nearest TSDF facilities.
IS 12081: Pictorial Warning to be implemented on equipment containing Asbestos Contaminated Products.	The objective of the caution is to make the person handling to take all pre-cautionary measures and make them aware of all the possible risk.

	
IS 11451: Safety and Health Requirements related to Occupational Exposure to Asbestos contaminated Products.	In the project the norms pertaining to limiting number of hours working with ACM will be 8.0 hrs/48 hrs a week and the medical examination has to be periodic, the environmental monitoring has to be done as per the protocol. The safety at work place shall be enforced.
IS 11768: Waste Disposal Procedure for Asbestos Containing Products.	The protocol pertaining to disposal of the waste is emphasized, the collection of ACM powered will be in permissible plastic bags, which will be twisted tight at the neck so that the wear and tear due to abrasion will be minimum and the transportation of the asbestos waste has to be done by the authorized vendor to the approved landfill site that in the project case id TSDF.
Sampling of asbestos fiber (as per BIS-11450) has to be done regularly using personal sampler and determined using phase contrast microscope.	The Sampling and analysis protocol is emphasized. Details are given as above.

4. 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 ASSESMENT:

5. 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.

6. 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.

7. 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.

8. The assessment of the ACM disposal will be vested with the DBO 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

9. 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-DBO 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

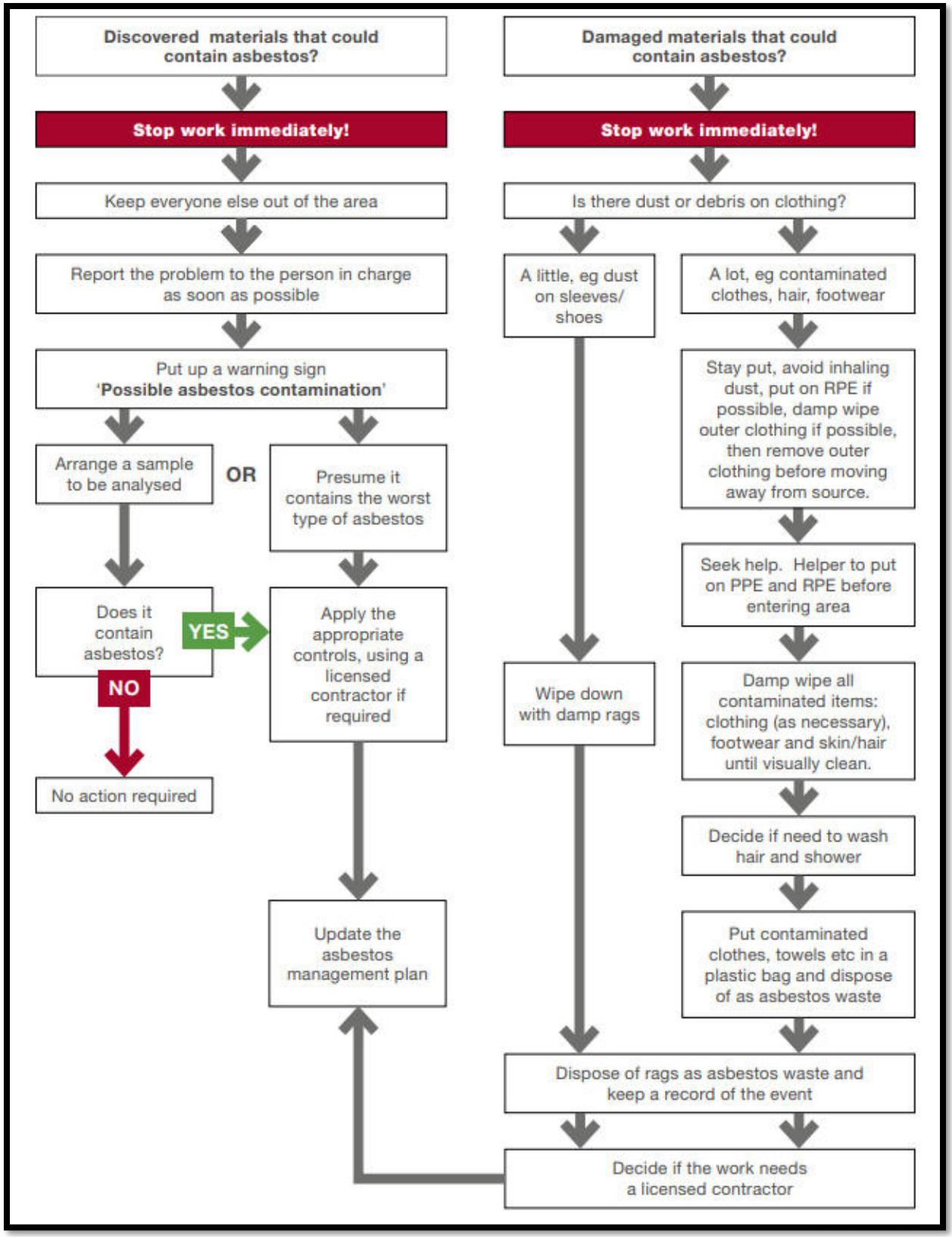


Fig.No.1-Showing Flow chart of ERP

Table 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 DBO 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/RUIDP/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 DBO 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 HAZARDOUR 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

10. 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

11. 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

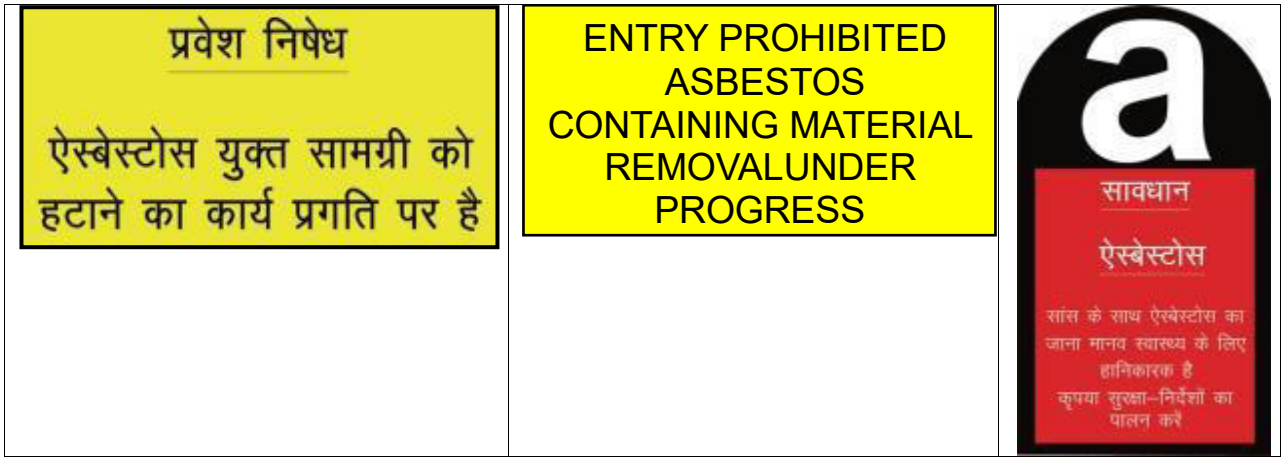


Fig. 2 Asbestos warning signage

- Undertaken Asbestos fibre 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

12. 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 DBO 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 permissible 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 winning 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.

13. Due care has to be taken to collect the dampened waste in a permissible standard bags with proper warning signage's.

14. 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. 3- ACM: In-situ storage warning

15. The AMP procedures-**Standard Operating Procedure-01-** are as follows and are summarized as above

j. Objectives – to keep the work zone safe and secured.
k. Requirements – identify all the requirements needed for handling AC in the specific site and project
l. Conduct and ensure awareness and vocational training to ACM handlers
m. Conduct a comprehensive identification and risk assessment of ACMs
n. 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
o. Avoid underground encountering of ACM
   i. Ensure that an authorized person (HSE) are supervising the work
   ii. Barricade the area with signage
   iii. Damp ACM
   iv. Use safety gears
   v. Dismantle ACM to be labeled, kept on plastic grounding and packed in permissible bags
   vi. Label the bags properly
   vii. Ensure shipping to proper disposal sites
p. Site selection – the disposal site should be ready to handle ACM and protect the nearby people as well The site selection criteria are as follows:
   i. Away from habitation
   ii. Avoid low lying areas
   iii. Away from water storage
   iv. To be enveloped with minimum of 8-feet height enclosure
   v. Avoid high vertical stacks
   vi. Access controlled
   vii. Proper signage enclosure
q. Proper re-handling of AMC, labeling and packing

r. Control access and ensure proper monitoring of records, specifically:
i.Environment
ii.Health
iii.Reporting to regulators
s. Dispose the ACM through qualified DBO Operators up to the Total Sanitary Disposal Facility (TSDF)

Table 3: 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

16. Label/display for TSDF disposal bags has to have clear display of the content in both English and local language as displayed under:

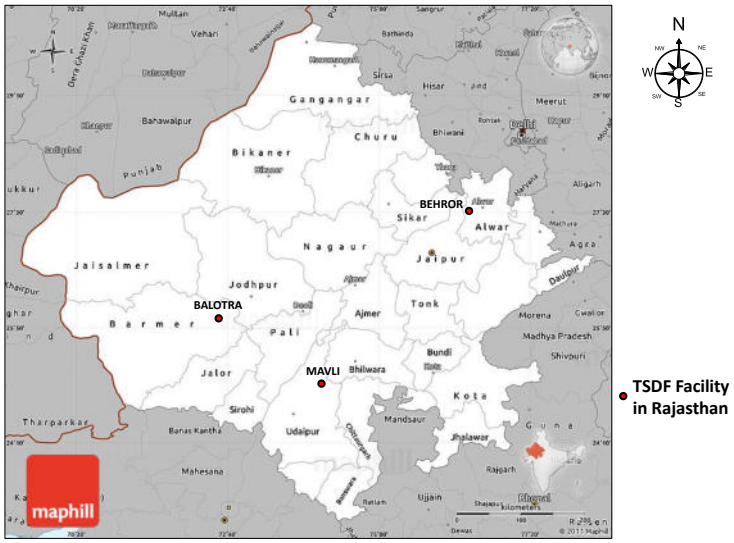


Fig 4: Map of the locations of approved TSDF in Rajasthan.

IN-SITU STORAGE ACM PIPES AREA

17. 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.

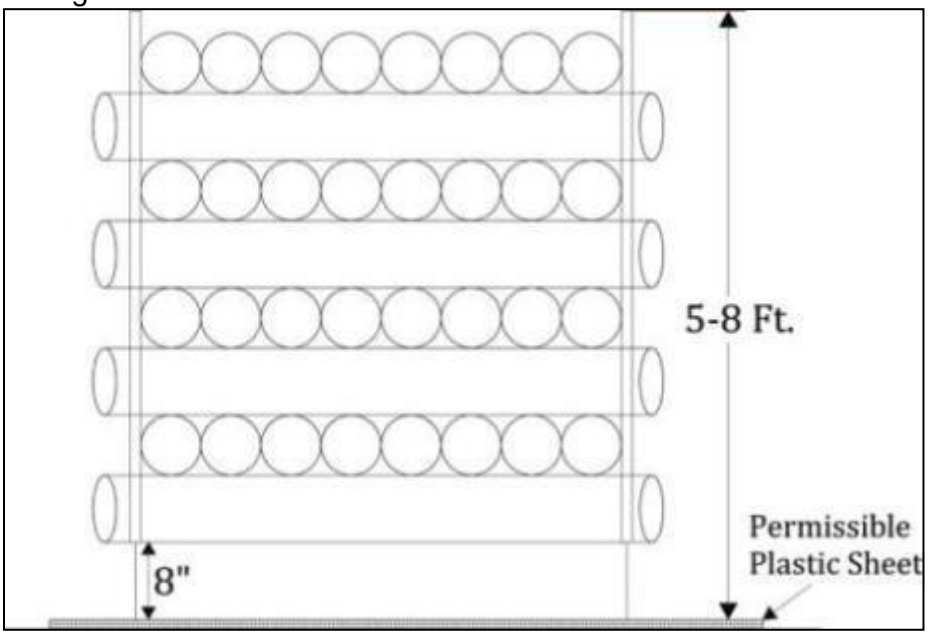


Fig. 5: Schematic diagram showing ACM Pipes stacking

18. 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.

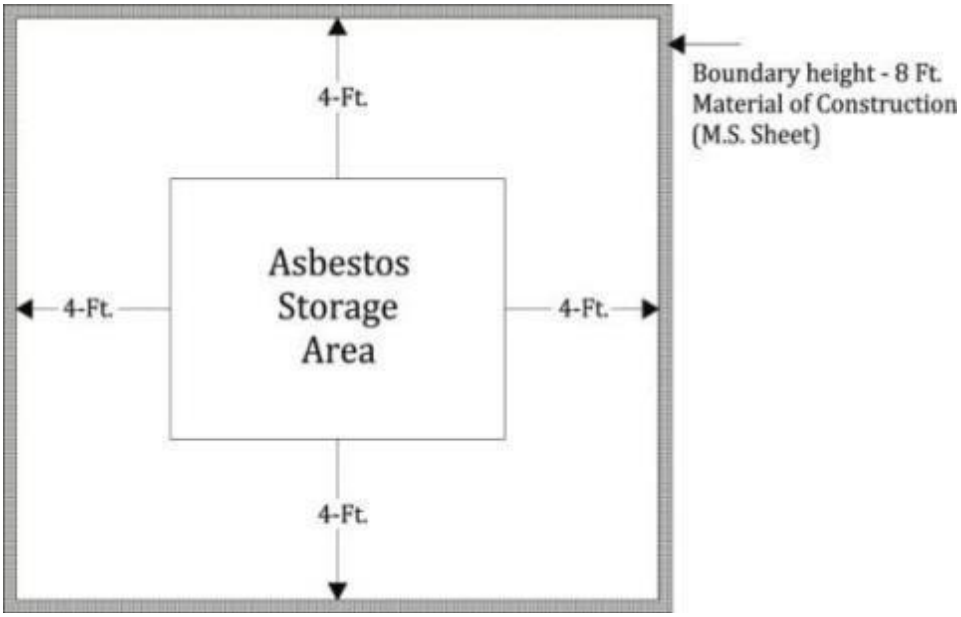


Fig. 6: Schematic diagram showing ACM Pipes storage area

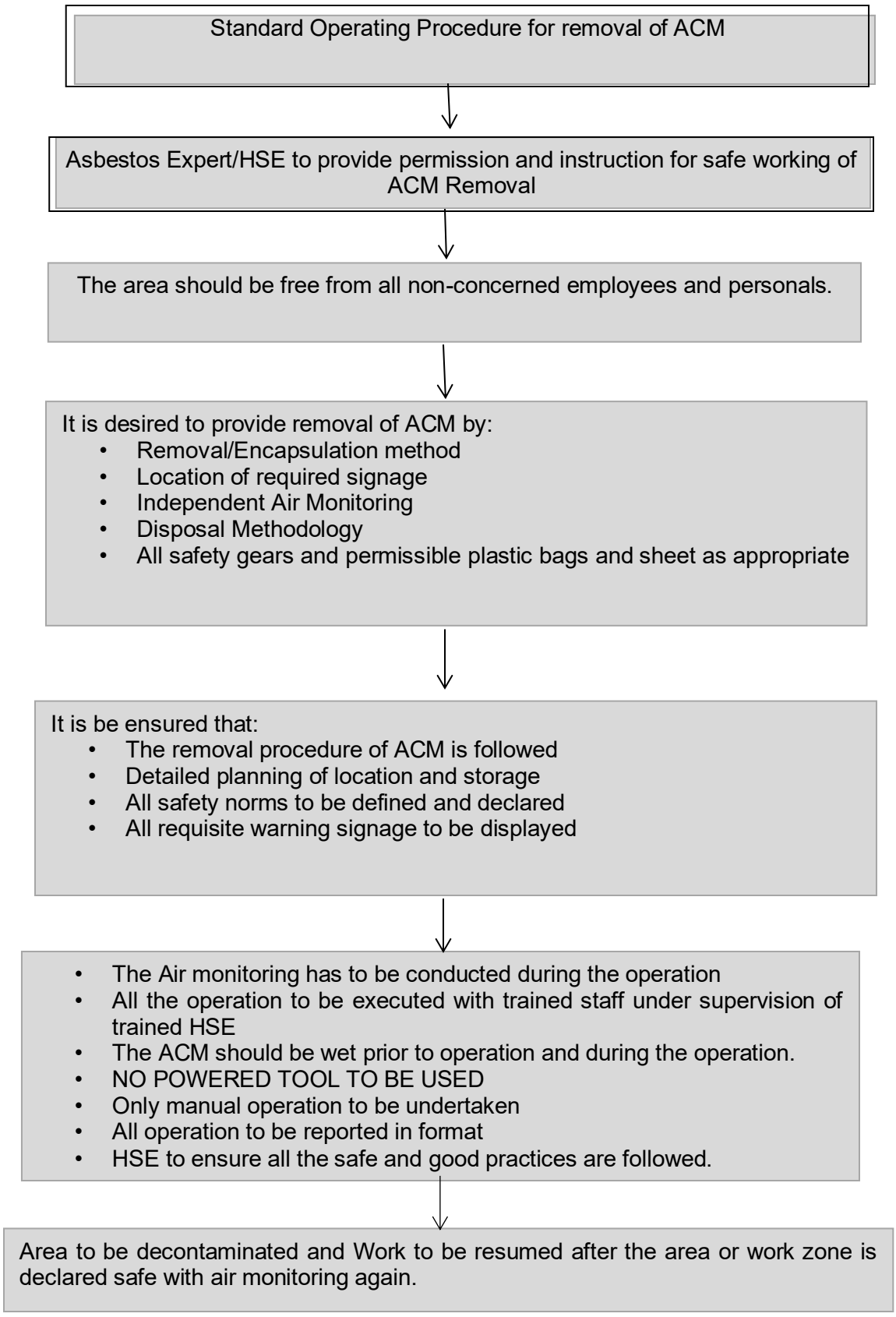


Fig. 6 -Standard Operating Procedure Flow Sheet

19. 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.

20. 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.

21. 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 4- 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 habituation, the pipes used for fencing, tree guard needs to be re-handled & stored in the nearest isolated storage site and the damaged pipes/broken pipes have to be disposed off to the TSDF with all pre-cautionary measures. **NOTE:** Only powered/ grounded ACM will have to be disposed off to TSDF.	Manpower engaged: Trained labor, Supervisor, HSE Experts/Asbestos Expert	The re-handling cost will be part of the laying program. The disposal cost is Rs.1500/MT plus freight as per actual
	Removal of encountered AC Pipes	• The damaged / broken AC Pipes have to be cautiously handled with prior moistening and packed in plastic bags (permissible plastic bags) and sent for re-use in road making or to TSDF with all signage and precautionary measures as suggested above.	Manpower engaged: Trained labor, Supervisor, HSE Experts/Asbestos Expert	As stated above
	Storage	• The existing storage stacks have to be shielded with 8.0 ft height and above ground (min1.0 ft) The Pipes shall be stored in stacks with stoppers provided at the bottom layer to keep the pipe stack stable. The stack, particularly of smaller diameter pipes, shall be in pyramid shape. Pipes shall not be stacked more than 1.5 m high. Each stack shall have pipes of the same type and size only. Removal of pipes shall start from the top layer and by pulling from one end, if required, with all safety precautions. A pipe shall not be stored inside another pipe. The pipes	Manpower engaged: Trained labor, Supervisor, HSE Experts/Asbestos Expert	As on daily wages

		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/Nm3. Per the OSHA standards for asbestos, exposure monitoring and medical surveillance of workers is required when the Workers are or will be exposed to airborne concentrations of fibers of asbestos at or above OSHA's exposure limits for a combined total of 30 or more days per year; Workers perform work that disturbs asbestos-containing material (ACM) or presumed asbestos-containing material (PACM) for a combined total of 30 or more days per year. Minimum 3 locations (@120deg from each location) at min 500 m from the isolated storage of ACM and one sampling near the encountered site. The frequency of monitoring should be bi-annually.	Approved/accredited laboratory	As stated above.

	PPE's	Hard helmet, double strapped mask, safety tapes, boots(non laced), 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 shouldbe 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 CONTRECTOR/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 DBO 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 transparencies to retrieve, trace and track the records as necessary. The records maintained by the DBO 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& Permissible Norms
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/DBO	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. ofContainers	•		……..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 Year
15.	Transporter acknowledgement of receipt of Wastes			
	Name and	Signature:		Mont Day Year

	stamp:			h						
1		Receiver’s certification for receipt of hazardous and other waste								
6.	Name and stamp:	Signature:		Month		Day			Year	

FORM –VI: IN-SITU STORAGE OF ACM

S. No	Activity	Number of Stacks	Area occupied	Details of ACM Pipes		Day/month/year Of storage
Site History						
For existing Stacks, details of re-handling of pipes in number or volume to be mentioned under supervision of Authorized Experts.						
Details of Location of re-handled ACM storage, new area should be • Minimum 10-15 ft away from campus 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 mm^2

a= graticule counting area in mm^2,

r= flow rate of air through filter in cm^3/min., and

t= single sample duration in minutes

5. To rule out the probability of the air borne asbestos in the existing scenario at the said site as well as other similar sites at the different work zones, it is necessary to have the asbestos fiber monitoring and sampling counts to be recorded at regular intervals. The environmental air sampling stations will have to be minimum three at 120 degree angle, within 1000-500 m from the ACM. The sampling frequency has to be in all three stages-Pre-Construction, Construction and Post Construction, while the personal sampling has to be done as stated above.

6. Bureau of Indian Standards (BIS) Guidelines for Safe Use of Products containing Asbestos states that "Asbestos cement products (such as AC pipes) generally contain about 10-

15% asbestos fibers in a cement matrix that comprises the rest of the materials and are termed as locked in asbestos products as these products have the asbestos fibers bound in cement. The possibilities of air borne asbestos fiber will be in case of mishandling of encountered pipes with unsafe practice. During storing and installation; recommended work practices shall be followed to avoid harmful exposure". According to Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016, any waste with asbestos concentration limit of 10,000 mg/kg (i.e. 1%), however this will apply only if the asbestos containing substances are in a friable, powdered or finely divided state. Under the Basel Convention[1], asbestos or asbestos waste in the form of dust and fibers is classified as hazardous waste. The applicable legislation under the present scenario are:

[1] Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal, adopted in 1989

Summary of Asbestos Management Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Remark
Clearing, transfer and disposal of ACM pipes	Possibilities of air borne asbestos if handled unsafely, cut, drilled or broken into pieces that may cause: ❑ Inflammation of the lungs ❑ Mesothelioma ❑ Peritoneial mesotherlioma ❑ 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 ❑ Peritoneial mesotherlioma ❑ Pleural plaques ❑ Asbestosis ❑ Bronchogenic Carcinoma Second hand-exposure	Conduct awareness program on safety during the construction work Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day Provide barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches Identify risk of intervention with existing AC pipes. If there is significant risk, implement the AMP strictly that includes identification of hazards, the use of proper safety gear and disposal methods.	DBO Contractor/RUIDP	All provision of safe working with proper signage has to be undertaken prior to work initiation, during the work and after the work.
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	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

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Remark
	❑ Peritoneial mesotherlioma ❑ Pleural plaques ❑ Asbestosis ❑ Bronchogenic Carcinoma Second hand-exposure			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 C-21: Guidelines for Workers Camps

(Based on IFC benchmark standards for workers accommodation)

Guidelines for Workers' Accommodation

1. Availability of sufficient number of clean rooms for the workers with adequate facilities of ventilation, Drinking water, Electricity/fan/light (natural and artificial lighting) etc. in each room.
2. Camps should not be subjected to periodic flooding nor located within 200 feet of swamps, pools, sink holes or other surface collections of water. All sites should be graded, ditches and rendered free from depressions in which water may become a nuisance.
3. Accessibility to an adequate and convenient supply of potable water to the workers. Depending upon the climate, weather conditions and accommodation standards, 80 to 180 litres per persons per day water should be available and drinking water should meet the national/WHO drinking water standards.
4. Camp site should be adequately drained to avoid the accumulation of stagnant water.
5. All tanks used for the storage of drinking water should be constructed and covered as to prevent water stored therein from becoming polluted or contaminated.
6. All sites should be adequate in size to prevent overcrowding of necessary structures.
7. Camps should have Crèche facility for children with necessary arrangements.
8. The grounds and open areas surrounding the shelters should be maintained in a clean and sanitary condition free from rubbish, debris, waste papers, garbage or other refuse.
9. Beds, cots, or bunks, and suitable storage facilities such as wall lockers for clothing and personal articles should be provided in every room used for sleeping purposes.
10. A separate bed for each worker should be provided. Double deck bunks are not advisable for the safety and hygiene reasons and their use should be minimized. If they are used there must be enough clear space between the lower and upper bunk of the bed. Standard range is 0.7 to 1.10 meters. Triple deck bunks are prohibited.
11. All heating, cooking, and water heating equipment should be installed in accordance with State and local ordinances, codes, and regulations governing such installations. If a camp is used during cold weather, adequate heating equipment should be provided.
12. If food is provided, it should cater for different cultural needs. Kitchens should be provided with facilities to maintain adequate personal hygiene including a sufficient number of washbasins designated for cleaning hands with clean running water and materials for hygiene drying.
13. All kitchen floors, ceiling and wall surface adjacent to or above food preparation and cooking areas should be built using durable, non-absorbent, easily cleanable, non-toxic materials.
14. No person with any communicable disease shall be employed or permitted to work in the preparation, cooking, serving, or other handling of food, foodstuffs, or materials used therein, in any kitchen or dining room operated in connection with a camp or regularly used by persons living in a camp.
15. There should be recreation facilities for the camp workers i.e. TV/sports/newspaper/magazine etc.
16. There should be facility of mosquitoes prevention and control i.e. use of mosquito net/coil/electric repellent/pesticide etc.
17. Sanitary and toilet facilities should be constructed of the materials that are easily cleanable. Standard range of the toilets varies from 1 unit for 6 persons to 15 persons. For urinals, standards are 1 unit for 15 persons.
18. There is no need to provide separate urinals in any place where less than 50 workers are employed or where the latrines are connected to water borne sewage system.
19. Sanitary and toilet facilities should be designed to provide workers with adequate privacy including ceiling to floor partitions and lockable doors.

20. Separate toilet and bathing facilities should be available for Men and women. These facilities shall be distinctly marked "for men" and "for women" by signs printed in English and in the native language of the persons using the facilities, and/or marked with easily understood pictures or symbols.
21. Workers' gender, religious, cultural and social backgrounds should be respected. In particular, workers should be provided with the possibility of celebrating religious holidays and observances.
22. No pets, birds or livestock should be kept or fed unless approved by management or camp operator.
23. There should be proper arrangement of colour coded dustbins i.e. Green for wet/biodegradable wastes, blue for dry/non-biodegradable waste and red for safe disposal of domestic hazardous waste i.e. sanitary napkins and diapers.
24. There should be adequate facility for waste water management (i.e. septic tanks/soak pits) and for disposal of Municipal solid waste (i.e. composting).
25. The person in charge of managing the accommodations has a specific duty to report to the health authorities the outbreak of any contagious diseases, food poisoning and any other important casualties.
26. Guidance on the detrimental effects of the abuse of alcohol and drugs and other potentially harmful substances and the risk, concerns related to HIV/AIDS and other health risk related activities should be provided to the workers through group/individual orientations and should also be displayed at camps as visual boards.
27. Workers should have easy access to medical facilities and medical staff where possible female doctors/nurses should be available for female workers. Regular health check up should be done for the workers. First-AID Kit/Health care facilities should be available in the camps. There should be proper demarcation/display of First Aid facility and First Aider.
28. A specific fire safety plan should be prepared including training of fire wardens, periodic testing and monitoring of fire safety equipments.
29. All key contacts, emergency contact number, including nearby hospital should be posted in a prominent place and in all languages present e.g., at camp gate and throughout the camp.

Appendix C-22: Guidelines for Safety in Chlorine Usage
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)

1.1Storage Area

- Obtain storage license from controller of explosives under Gas Cylinder Rules 2004 if the quantity of Cl2 containers to be stored is more than 5 Nos.
- 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.
- 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.
- Do not store container directly under the sun.
- Weather cock should be installed near the storage to determine wind direction.
- The storage building should be of non-combustible construction with at least two exits opening outside.
- Neutralization system should be provided.
- Continuous monitoring of chlorine leak detection equipment with alarm should be installed in the storage area.
- The area should be free and remote from elevators, gangways or ventilating system to avoid dangerous concentration of Chlorine during leak.
- Two portable foam type fire extinguishers should be provided in the premises.
- Corrosive substances shall not be stored nearby which react violently with each other.
- Unauthorized person should not be allowed to enter into the storage area.
- The floor level of storage shed should be preferably 30 cms (at least one foot) higher from the ground level to avoid water logging.
- Ensure that all containers are properly fitted with safety caps or hooks.

1.2. Cylinder & Drum Containers

- Store chlorine cylinders upright and secure them so that they do not fall.
- 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.
- Keep enough space between containers so as to have accessibility in case of emergency.
- 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.
- Do not store explosives, acids, turpentine, ether, anhydrous ammonia, finely divided metals or other flammable material in the vicinity of Chlorine.
- Do not store containers in wet and muddy areas.
- Store filled and empty containers separately.
- Protective covers for valves are secured even when the containers are empty, except during use in the system.
- Never use containers as a roller to move other equipment.
- Never tamper with fusible plugs of tonners.
- Check leakages every day by means of ammonia torch. However, it should not be touched to brass components like valves of container for safety.
- Never carry out any welding work on the chlorine system as combustion of steel takes place at 2510C in presence of chlorine.

- 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

- Use containers in the order of their receipt, as valve packing can get hardened during prolonged storage and cause gas leaks.
- Do not use oil or lubricant on any valve of the containers.
- Badly fitting connections should not be forced and correct tool should always be used for opening and closing valves. They should never be hammered.
- The area should be well ventilated with frequent air changes.
- Transport the cylinders to the process area by using crane, hoist or railings etc.
- 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.
- 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.
- Connect the containers to the system by using approved accessories.
- 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.
- Never use rubber tubes, PVC tubes etc. for making connections.
- Use the right spanner for operating the valve. Always keep the spanner on the valve spindle. Never use ill fitting spanner.
- After making the flexible connection, check for the leakage by means of ammonia torch but it should not come in contact with a valve.
- Keep minimum distance between the container valve and header valve so that during change-over of the container, minimum amount of gas leaks.
- The material of construction of the adopter should be same as that of valve outlet threads. o. The valve should not be used as a regulator for controlling the chlorine. During regulation due to high velocity of Chlorine, the valve gets damaged which in turn can cause difficulty in closing.
- The tools and other equipment used for operating the container should be clean and free of grease, dust or grit.
- Wear breathing apparatus while making the change-over of the container from the process header.
- Do not heat the container to withdraw more gas at faster rate.
- Use pressure gauge and flow measuring device to control the flow and to know the quantity of gas left in the container.
- Use an inverted U type barometric leg or vacuum breaking arrangement for connecting the container to the process piping.
- Withdrawal of the gas should be stopped when the gas pressure inside the container is between 0.1 to 0.5 kg/cm2 approximately.
- 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.
- Gas containers should be handled by trained persons only.

1.4. Disconnecting Containers from Process System

- Use breathing apparatus before disconnecting the container.
- First close the container valve fully. After removal of chlorine the process valve should be closed.
- 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.

- 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

- The handling of containers should be done under the supervision of trained and competent person.
- It should be done carefully with a crane, hoist or slanted ramp. Do not use magnet or sharp object for lifting the containers.
- Small cylinders should not be lifted by means of valve caps as these are not designed to carry the weight.
- The containers should not be allowed to strike against each other or against any hard object.
- Vehicles should be braked and isolated against any movement.
- 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.
- The containers should never be dropped directly to the ground or on the tyre from the vehicle.
- There should be no sharp projection in the vehicle.
- Containers must have valve caps and plugs fitted properly.
- Check containers for leakage before loading/unloading.

1.6. Transportation of Container

- The name of the chemical along with diamond pictorial sign denoting the dangerous goods should be marked on the vehicle.
- The name of the transporter, his address and telephone number should be clearly written on the vehicle.
- 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
- The driver should not transport any leaking cylinder.
- The cylinder should not project outside the vehicle.
- The transporter must ensure that every vehicle driver must carry “Trem Card” (Transport Emergency Card) and ‘Instructions in writing booklet’ and follow them.
- Every driver must carry safety appliances with him, viz; Emergency kit, breathing apparatus etc.
- The vehicles must be driven carefully, especially in crowded localities and on bumpy roads. Do not apply sudden brakes.
- Check for the leakage from time to time.
- 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.

- Leakage may occur through the valve. There are basically four types of valve leaks.
  - Valve packing
  - Valve seat
  - Defective inlet thread
  - Broken valve thread

- 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.
- Leakage may occur through fusible plug.
  - If the leakage is through the threads of fusible plug, yoke, hood and cap nut arrangement is used to control the leak.
  - If fusible metal itself in the plug is leaking, yoke and stud arrangement is used to control the leak.

2. 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 Centre
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. firefighting, 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. Incase 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:

- Take a shallow breath and keep eyes opened to a minimum.
- Evacuate the area.

- Investigate the leak with proper gas mask and other appropriate Personal protection.
- The investigator must be watched by a rescuer to rescue him in emergency.
- If liquid leak occurs, turn the containers so as to leak only gas.
- In case of major leakage, all persons including neighbours should be warned.
- 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.
- Under no circumstances should water or other liquid be directed towards leaking containers, because water makes the leak worse due to corrosive effect.
- The spillage should be controlled for evaporation by spraying chilled water having temperature below 9.4oC. With this water crystalline hydrates are formed which will temporarily avoid evaporation. Then try to neutralize the spillage by caustic soda or soda ash or hydrated lime solution carefully. If fluroprotein foam is available, use for preventing the evaporation of liquid chlorine.
- Use emergency kit for controlling the leak.
- 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.
- 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.
- Only specially trained and equipped workers should deal with emergency arising due to major leakage.
- If major leak takes place, alert the public nearby by sounding the siren.
- Any minor leakage must be attended immediately or it will become worse.
- 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:

- Breathing apparatus.
- Emergency kit.
- Leak detectors.
- Neutralisation tank.
- Siren system.
- Display of boards in local language for public cautioning, first aid and list of different authorities with phone numbers.
- Communication system.
- Tagging system for equipment’s.
- First aid including tablets and cough mixtures.
- Exhaust fans.
- Testing of pressure vessels, chlorine lines etc. every year as per factory act.
- Training & mock drill.
- Safety showers.
- Eye fountain.

- Personal protective equipment.
- Protecting hoods for ton-containers.
- Fire extinguishers.
- Wind cock.

Appendix C-23: Guidelines for Prevention and Control of COVID-19
WHO Interim Guidance on Water, Sanitation, Hygiene and Waste Management for the COVID19 virus

World Health Organization

unicef

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 days[9] at 23°C to 2 weeks[10] 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 $\geq$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 precautions[18] and use PPE to prevent exposure, including long-sleeved gowns, gloves, boots, masks, and goggles or a face shield. If diapers are used, they should be disposed of as infectious waste as they would be in all situations. Workers should be properly trained in how to put on, use, and remove PPE so that these protective barriers are not breached.[25] If PPE is not available or the supply is limited, hand hygiene should be regularly practiced, and workers should keep at least 1 m distance from any suspected or confirmed cases.

If a bedpan is used, after disposing of excreta from it, the bedpan should be cleaned with a neutral detergent and water, disinfected with a 0.5% chlorine solution, and then rinsed with clean water; the rinse water should be disposed of in a drain or a toilet or latrine. Other effective disinfectants include commercially available quaternary ammonium compounds, such as cetylpyridinium chloride, used according to manufacturer's instructions, and peracetic or peroxyacetic acid at concentrations of 500–2000 mg/L.[26]

Chlorine is ineffective for disinfecting media containing large amounts of solid and dissolved organic matter. Therefore, there is limited benefit to adding chlorine solution to fresh excreta and it is possible that this may introduce risks associated with splashing.

4. Emptying latrines and holding tanks, and transporting excreta off-site.

There is no reason to empty latrines and holding tanks of excreta from suspected or confirmed COVID-19 cases unless they are at capacity. In general, the best practices for safely managing excreta should be followed. Latrines or holding tanks should be designed to meet patient demand, considering potential sudden increases in cases, and there should be a regular schedule for emptying them based on the wastewater volumes generated. PPE (long-sleeved gown, gloves, boots, masks, and goggles or a face shield) should be worn at all times when handling or transporting excreta offsite, and great care should be taken to avoid splashing. For crews, this includes pumping out tanks or unloading pumper trucks. After handling the waste and once there is no risk of further exposure, individuals should safely remove their PPE and perform hand hygiene before entering the transport vehicle. Soiled PPE should be put in a sealed bag for later safe laundering (see Cleaning practices). Where there is no off-site treatment, in-situ treatment can be done using lime. Such treatment involves using a 10% lime slurry added at 1-part lime slurry per 10 parts of waste.

5. Cleaning practices

Recommended cleaning and disinfection procedures for health care facilities should be followed consistently and correctly.[19] Laundry should be done and surfaces in all environments in which COVID-19 patients receive care (treatment units, community care centres) should be cleaned at least once a day and when a patient is discharged.[27] Many disinfectants are active against enveloped viruses, such as the COVID-19 virus, including commonly used hospital disinfectants. Currently, WHO recommends using:

- 70% ethyl alcohol to disinfect small areas between uses, such as reusable dedicated equipment (for example, thermometers);
- sodium hypochlorite at 0.5% (equivalent to 5000 ppm) for disinfecting surfaces.

All individuals dealing with soiled bedding, towels, and clothes from patients with COVID-19 infection should wear appropriate PPE before touching soiled items, including heavy duty gloves, a mask, eye protection (goggles or a face shield), a long-sleeved gown, an apron if the gown is not fluid resistant, and boots or closed shoes. They should perform hand hygiene after exposure to blood or body fluids and after removing PPE. Soiled linen should be placed in clearly labelled, leak-proof bags or containers, after carefully removing any solid excrement and putting it in a covered bucket to be disposed of in a toilet or latrine. Machine washing with warm water at 60–90°C (140–194°F) with laundry detergent is recommended. The laundry can then be dried according to routine procedures. If machine washing is not possible, linens can be soaked in hot water and soap in a large drum using a stick to stir and being careful to avoid splashing. The drum should then be emptied, and the linens soaked in 0.05% chlorine for approximately 30 minutes. Finally, the laundry should be rinsed with clean water and the linens allowed to dry fully in sunlight.

If excreta are on surfaces (such as linens or the floor), the excreta should be carefully removed with towels and immediately safely disposed of in a toilet or latrine. If the towels are single use, they should be treated as infectious waste; if they are reusable, they should be treated as soiled linens. The area should then be cleaned and disinfected (with, for example, 0.5% free chlorine solution), following published guidance on cleaning and disinfection procedures for spilled body fluids.[27]

6. Safely disposing of greywater or water from washing PPE, surfaces and floors.

Current WHO recommendations are to clean utility gloves or heavy duty, reusable plastic aprons with soap and water and then decontaminate them with 0.5% sodium hypochlorite solution after each use. Single-use gloves (nitrile or latex) and gowns should be discarded after each use and not reused; hand hygiene should be performed after PPE is removed. If greywater includes disinfectant used in prior cleaning, it does not need to be chlorinated or treated again. However, it is important that such water is disposed of in drains connected to a septic system or sewer or in a soakaway pit. If greywater is disposed of in a soakaway pit, the pit should be fenced off within the health facility grounds to prevent tampering and to avoid possible exposure in the case of overflow.

7. Safe management of health care waste

Best practices for safely managing health care waste should be followed, including assigning responsibility and sufficient human and material resources to dispose of such waste safely. There is no evidence that direct, unprotected human contact during the handling of health care waste has resulted in the transmission of the COVID-19 virus. All health care waste produced during the care of COVID 19 patients should be collected safely in designated containers and bags, treated, and then safely disposed of or treated, or both, preferably on-site. If waste is moved off-site, it is critical to understand where and how it will be treated and destroyed. All who handle health care waste should wear appropriate PPE (boots, apron, long-sleeved gown, thick gloves, mask, and goggles or a face shield) and perform hand hygiene after removing it. For more information refer to the WHO guidance, Safe management of wastes from health-care activities.[28]

Considerations for WASH practices in homes and communities.

Upholding best WASH practices in the home and community is also important for preventing the spread of COVID-19 and when caring for patients at home. Regular and correct hand hygiene is of particular importance.

1. Hand hygiene

Hand hygiene in non–health care settings is one of the most important measures that can prevent COVID 19 infection. In homes, schools and crowded public spaces – such as markets, places of worship, and train or bus stations – regular handwashing should occur before preparing food, before and after eating, after using the toilet or changing a child's diaper, and after touching animals. Functioning handwashing facilities with water and soap should be available within 5 m of toilets.

2. Treatment and handling requirements for excreta.

Best WASH practices, particularly handwashing with soap and clean water, should be strictly applied and maintained because these provide an important additional barrier to COVID-19 transmission and to the transmission of infectious diseases in general.[17] Consideration should be given to safely managing human excreta throughout the entire sanitation chain, starting with ensuring access to regularly cleaned, accessible, and functioning toilets or latrines and to the safe containment, conveyance, treatment, and eventual disposal of sewage.

When there are suspected or confirmed cases of COVID-19 in the home setting, immediate action must be taken to protect caregivers and other family members from the risk of contact with respiratory secretions and excreta that may contain the COVID-19 virus. Frequently touched surfaces throughout the patient's care area should be cleaned regularly, such as beside tables, bed frames and other bedroom furniture. Bathrooms should be cleaned and disinfected at least once a day. Regular household soap or detergent should be used for cleaning first and then, after rinsing, regular household disinfectant containing 0.5% sodium hypochlorite (that is, equivalent to 5000 ppm or 1-part household bleach with 5% sodium hypochlorite to 9 parts water) should be applied. PPE should be worn while cleaning, including mask, goggles, a fluid-resistant apron, and gloves,[29] and hand hygiene with an alcohol-based hand rub or soap and water should be performed after removing PPE.

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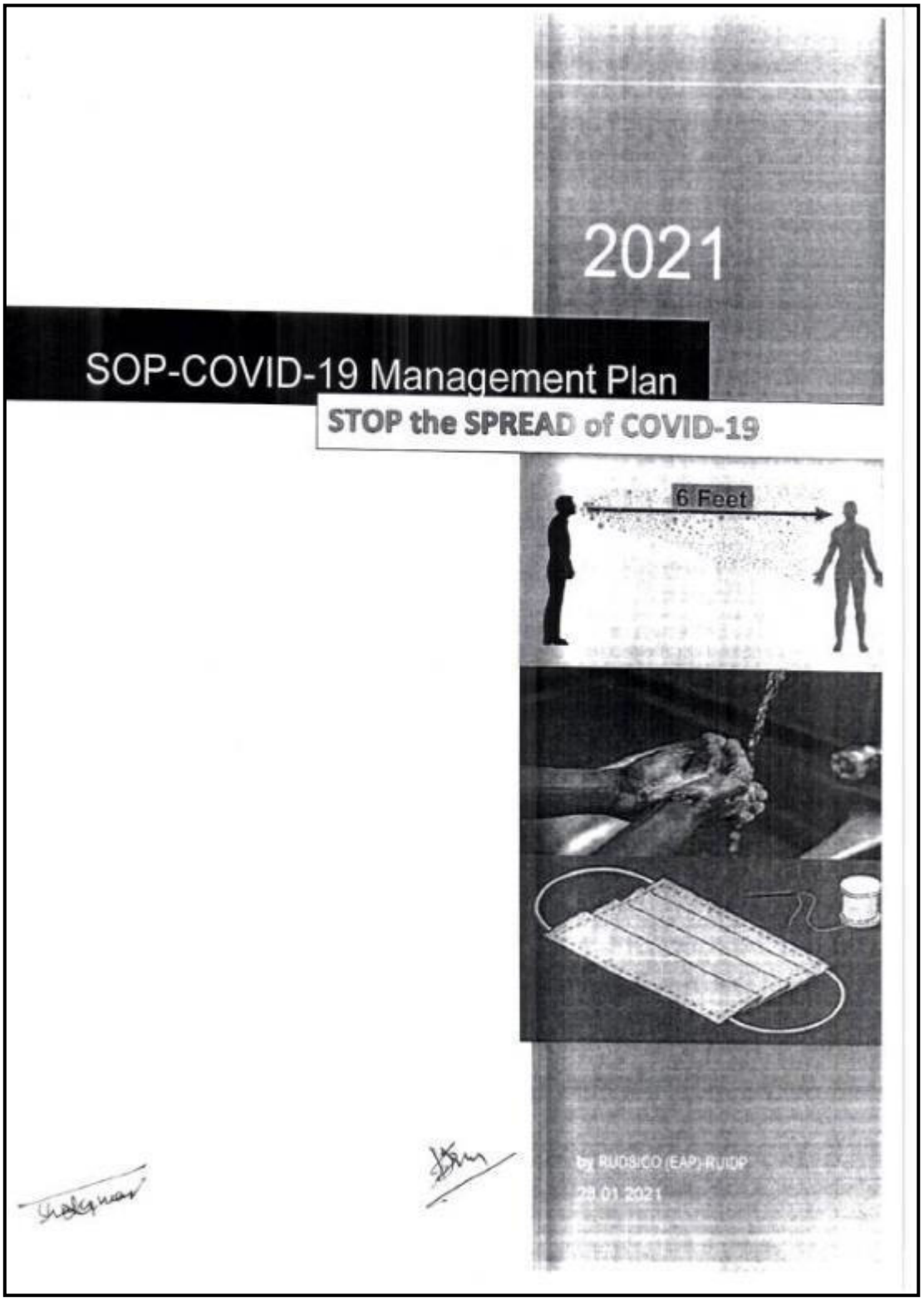
WHO continues to monitor the situation closely for any changes that may affect this interim guidance. Should any factors change, WHO will issue a further update. Otherwise, this interim guidance document will expire 2 years after the date of publication.

WHO reference number: WHO/2019-nCoV/IPC_WASH/2020.2

Appendix C-24: RUDSICO-EAP Guidelines for implementation of Prevention and Control Measures for COVID-19



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Safe Operating Procedure (SOP) and COVID-19 Management Plan for Construction Works during COVID-19 Situation

I. INTRODUCTION

- Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus.
- Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people, and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness.
- The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes, so it's important that you also practice respiratory etiquette (for example, by coughing into a flexed elbow) and maintain social distancing
- At this time, there are no specific vaccines or treatments for COVID-19. However, there are many ongoing clinical trials evaluating potential treatments

II. PURPOSE

- This document[1] is intended to supplement formal EH&S policies, procedures and plans that the contractor has in place for its employees and staff working in RSTDSP projects. Hence, this document is not intended to replace any formalized procedures currently in place for the Contractor. Where this guideline does not meet or exceed the standards put forth by the Contractor, the Contractor shall abide by the most stringent procedure available.
- In addition to prevailing EH&S Plan in all projects, Safe Operating Procedures specific to COVID-19 are prepared by working contractors and being followed in all work sites.
- Existing EH&S Officer of contractor to be given additional responsibility of COVID-19 Officer[2] to implement and monitor the COVID-19 SOPs. The EH&S officer cum COVID-19 Officer[2] at the Contractor's worksite (appointed by Contractor and agreed by PIU) will submit a written weekly report to the Client's Representative (PIU Head). The EH&S Officer cum COVID-19 Officer shall certify that the Contractor and all subcontractors are in full compliance with these guidelines.
- The EH&S Officer cum COVID-19 officer should monitor all sites on daily basis.
- Any issue of non-compliance with these guidelines shall be a basis for the suspension of work. The Contractor will be required to submit a corrective action plan (on the next day or immediately as per the nature of issue) detailing each issue of non-conformance and a plan to rectify the issue(s). The Contractor will not be allowed to resume work until the plan is approved by the Client (PIU). Any additional issues of non-conformance may be subject to action against the Contractor's as health & safety/safeguard clauses of the contract.
- Construction sites operating during the Covid-19 pandemic need to ensure they are

[1] This document may be made available in the local language, and the salient features would be displayed through signages at the appropriate locations throughout work sites and stretches by the Contractor for wider dissemination and awareness

[2] The existing safeguards officer OR health & safety officer OR supervisor of the contractor can be designated as COVID-19 officer by undergoing the training available at
(a) https://www.who.int/emergencies/diseases/novel-coronavirus-2019/training/online-training
(b) https://openwho.org/courses/eprotect-acute-respiratory-infections
(c) https://openwho.org/courses/COVID-19-IPC-EN

protecting their workforce and minimizing the risk of spread of infection.

- This guidance is intended to introduce consistent measures on sites of all sizes in line with the Government's recommendations on social distancing.
- These are exceptional circumstances and the contractor and PIU must remain abreast of and comply with the latest Government advice on COVID-19 at all times.
- The health and safety requirements of any construction activity must also not be compromised at this time. If an activity cannot be undertaken safely due to a lack of suitably qualified personnel being available or social distancing being implemented, it should not take place.
- It is to be noted that emergency services/medical services are also under great pressure and may not be in a position to respond as quickly as usual.
- Sites should remind the workforce at every opportunity of the Worksite Procedures which are aimed at protecting them, their colleagues, their families and the nearby population.

If a worksite is not consistently implementing the measures in this document, it may be required to shut down.

III. COVID-19 TYPICAL SYMPTOMS

- Fever
- Cough
- Shortness of Breath
- Sore Throat

IV. PRINCIPLES OF WORKER PROTECTION

- Consistently practice social distancing
- Cover coughs and sneezes
- Maintain hand hygiene
- Clean surfaces frequently

V. MAXIMUM PRECAUTION FOR PERSONS/LABOURERS REPORTING TO WORK

- IF SICK, STAY HOME!
- IF SICK DURING WORK, GO HOME!
- IF SOMEONE SICK, SEND THEM HOME!

VI. PPEs AND SANITIZATION ARRANGEMENTS

Contractor to provide face masks (of the type approved by Government for use to protect persons from COVID-19) to all persons working in or visiting the worksite. At each worksite hand sanitizers/soap shall be kept and workers will be required to regularly sanitize/wash hands with soap. If any object is to be used by several workers, all workers shall be provided hand gloves. Full sanitization of worksite and work objects shall be done every day before start of works. This along with procedures set out in this document is for maximum precaution to protect all persons/labourers at all times.

VII. HEALTH CHECK UP AND THERMAL SCANNING

All persons at the worksite should have their temperature screened by COVID-19 officer with Infrared Thermometer (handheld non-contact).

Health checkup of all workers and staff shall be done by a medical practitioner on weekly basis. If any suspected COVID-19 infected person is found, he shall immediately reported to local authority/govt. recognized COVID-19 hospital. Thermal scanning shall be done of each worker and staff before entering to site and office and if any person has more than normal

temperature, he shall not be allowed to enter site/office. Such person shall be sent back to home/work camp and regular daily monitoring of his temperature shall be done and if temperature remains high he shall be reported to local authority/govt. recognized COVID-19 hospital for further treatment/quarantine.

VIII. SELF ATTESTATION BY PERSONS/LABOUR PRIOR TO WORK

Prior to starting a work (on daily basis), each labour /worker will self-attest to the supervisor:

- no signs of COVID-19 symptoms within the past 24 hours.
- No contact with an individual diagnosed with COVID-19. (contact means living with a positive person, being within 6 ft of positive person OR sharing things of positive person)
- Not undergone quarantine or isolation (in case of any labourer /worker who has been quarantined or isolated previously, the engagement shall be only after obtaining the requisite clearance)

The engagement of workers falling in the high-risk category such as workers over the age of 55 years, with underlying medical conditions or health issues, etc. should be done only after obtaining the requisite clearance from trained and registered medical practitioners.

The self-attestation would be verified in collaboration with trained and registered medical practitioners deployed at site through discussions with laborers /workers and/or preliminary checks such as temperature checks, etc. prior to their engagement at site.

In addition, the Contractor shall mandatorily follow all medical test requirements for the workers prior to their engagement and/or mobilization at site as per the guidelines issued by the Central and State government agencies and WHO from time to time.

Persons/Labourers showing COVID-19 symptoms or not providing self-attestation shall be directed to leave the work site and report to the Govt. recognized hospital/quarantine centre immediately. Labour not to return to the work site until cleared by Govt. recognized hospital /quarantine centre.

IX. GENERAL PRECAUTIONS TO BE FOLLOWED AT PERMANENT SITES/OFFICES

- No handshake, Only Namaste
- Non-essential physical work that requires close contact between workers should not be carried out
- Work requiring physical contact should not be carried out
- Plan all other work to minimise contact between workers
- Wash hands often (every 1-2 hrs or frequently as possible) with soap for at least 20 seconds
- Use hand sanitizer
- No person should enter the work site other than the authorized persons mentioned by supervisor during start of work
- All must implement social distancing[3] by maintaining a minimum distance of 6-feet from others[3] at all times to eliminate the potential of cross contamination.
- Avoid face to face meetings – critical situations requiring in-person discussion must follow social distance i.e., 6 ft from others.
- Conduct all meetings via conference calls, if possible. Do not convene meetings of

[3] Social distancing may not be practical for undertaking certain specific activities within the workplace. It is therefore important to review the work method statements for these types of activities to assess impact and how to find safe ways of doing in line with best available guidance

more than 10 people. Recommend use of cell phones, texting, web meeting sites and conference calls for project discussion

- All individual work group meetings/ talks should follow social distancing
- At each job briefing /toolbox talk, employees are asked if they are experiencing any symptoms, and are sent home if they are
- Each worksite should have displayed laminated COVID-19 safety guidelines and handwashing instructions (seen Annexure for display pictographs)
- All restroom /toilet facilities should be cleaned (min twice a day), and handwashing facility must be provided with soap, hand sanitizer and paper towels
- All surfaces should be regularly cleaned, including mobiles, tabletops /surfaces, door handles, laptops, records, etc.
- All common areas and meeting areas are to be regularly cleaned (min twice a day) and disinfected at least twice a day
- All persons to maintain their own water bottle, and should not be shared.
- To avoid external contamination, it is recommended everyone bring food from home
- Maintain Social Distancing separation during breaks and lunch.
- Cover coughing or sneezing with a tissue, then throw the tissue in the trash and wash hands, if no tissue is available then cough /sneeze into your upper sleeves or elbow. Do not cough or sneeze into your hands.
- Clean your hands after coughing or sneezing thoroughly by using soap and water (minimum for 20 seconds). If soap and water are not available, please use a hand sanitizer. The Contractor shall ensure adequate quantities of sanitizer and soap are made available at all locations including site offices, meeting rooms, corridors, washrooms /toilets, etc. as appropriate.
- Avoid touching eyes, nose, and mouth with your hands
- To avoid sharing germs, please clean up after Yourself. DO NOT make others responsible for moving, unpacking and packing up your personal belongings
- If you or a family member is feeling ill, stay home![4]
- Work schedules are adjusted to provide time for proper cleaning and disinfecting as required.

X. TEMPORARY WORK-SITE (PIPE LAYING SITES) PREVENTION PRACTICES

- At the start of each shift, confirm with all employees that they are healthy and inform all workers of reusable and disposable PPE.
- Outside person(s) should be strictly prohibited at worksite
- All construction workers will be required to wear cut-resistant gloves or the equivalent.
- Use of eye protection (reusable safety goggles/face shields) is recommended. The supply of eye protection equipment to the workers is considered as a standard part of PPE during construction works.
- In work conditions where required **social distancing is impracticable** to achieve, such employees shall be supplied with standard face mask, gloves, and eye protection.
- All employees shall drive to work site in a single occupant vehicle. Staff shall not ride together in the same vehicle
- When entering a machine or vehicle which you are not sure you were the last person to enter, make sure that you wipe down the interior and door handles with disinfectant (with 1% sodium hypochlorite solution) prior to entry. Adequate quantity of the disinfectant shall be provided by the Contractor at all such site-specific locations.
- Workers should maintain separation of 6 feet from each other.
- Multi person activities will be limited where feasible (two persons lifting activities)
- Gathering places on the site such as sheds and/or break areas will be eliminated, and

instead small break areas will be used with seating limited to ensure social distancing.

- Contact the cleaning person of the worksite and ensure proper COVID-19 sanitation processes. Increase cleaning/disinfection visits to at least 2 times a day. Cleaning person(s) to be provided with gloves, gown and face mask for each cycle of cleaning. The Contractor shall make available adequate supply of PPE and chemicals while the threat of COVID-19 continues.
- Clean all high contact surfaces a minimum of twice a day in order to minimize the spread of germs in areas that people touch frequently. This includes but is not limited to desks, laptops and vehicles
- All employees to maintaining good health by getting adequate sleep; eating a balanced, healthy diet, avoid alcohol; and consume plenty of fluids.
- Continuation of works in construction project with workers available on site and no workers to be brought in from outside
- The site offices shall have adequate ventilation. The air conditioning or ventilation systems installed at the site offices would have high-efficiency air filters to reduce the risk of infection. The frequency of air changes may be increased for areas where close personal proximity cannot be fully prevented such as control rooms, elevators, waiting rooms, etc.
- The Contractor shall carry out contactless temperature checks for the workers prior to site entrance, during working hours and after site works to identify persons showing signs of being unwell with the COVID-19 symptoms

XI. WASHING FACILITY

- All worksites should have access to toilet and hand washing facility.
- Providing hand cleaning facilities at entrances and exits. This should be soap and water wherever possible or hand sanitizer if water is not available
- Washing facility with hot water, and soap at fire hydrants or other water sources to be used for frequent handwashing for all onsite employees
- All onsite workers must help to maintain and keep stations clean
- If a worker notices soap or towels are running low or out, immediately notify supervisors. Proactively supervisor should make sure shortage situation never occurs.
- Garbage bins will be placed next to the hand wash facility for discarding of used tissues/towels with regular removal and disposal facility (end of each day)

XII. CLEANING PROCEDURES

Increase cleaning/disinfection visits to at least 2 times a day. Cleaning person(s) to be provided with gloves, gown and face mask for each cycle of cleaning.

Each worksite should have enhanced cleaning and disinfection procedures that are posted and shared including sheds, gates, equipment, vehicles, etc. and shall be posted at all entry points to the sites, and throughout the project site. These include common areas and high touch points like

- Taps and washing facilities
- Toilet flush and seats
- Door handles and push plates
- Handrails on staircases and corridors
- Lift and hoist controls
- Machinery and equipment controls
- Food preparation and eating surfaces
- Telephone equipment / mobiles
- Keyboards, photocopiers and other office equipment

Re-usable PPEs[4] should be thoroughly cleaned after use and not shared between workers

XIII. LABOUR CAMP

Contractor shall follow a zero-tolerance policy on wearing of masks.

Masks (homemade can be thought of) to be provided to all the persons/labourers for use at the camp site as well as at the worksite. Increase cleaning/disinfection visits to at least 2 times a day. Cleaning person(s) to be provided with disposable gloves, gown and face mask for each cycle of cleaning.

Toilet Facility

- Restrict the number of people using toilet facility at any one time e.g. appoint one welfare attendant among the labours.
- Wash hands before and after using the facilities
- Enhance the cleaning regimes for toilet facilities particularly door handles, locks and the toilet flush
- Portable toilets should be avoided wherever possible, but where in use these should be cleaned and emptied more frequently
- Provide suitable and sufficient rubbish bins for hand towels with regular removal and disposal.

Eating/snacks Arrangements

- Provide permanent (till society is safe from COVID-19) on-camp/off-camp cook/helpers can be implemented. Make sure that the "Guidelines for food handling, preparation and distribution during COVID-19" and it regular updates are being followed.
- Whilst there is a requirement for construction camps to provide a means of heating food and making hot water, these are exceptional circumstances and where it is not possible to introduce a means of keeping equipment clean between use, etc. must be removed from use.
- Contractor to arrange all daily need items and grocery at site itself and no worker is allowed to go to shops for daily need items.
- Dedicated eating areas should be identified on camp to reduce food waste and contamination
- Break times should be staggered to reduce congestion and contact at all times
- Hand cleaning facilities or hand sanitizer should be available at the entrance of any room where people eat and should be used by workers when entering and leaving the area
- Workers should sit 2 metres apart from each other whilst eating and avoid all contact
- Where catering is provided on camp, it should provide pre-prepared and wrapped food only
    - Payments should be taken by contactless options wherever possible
    - Crockery, eating utensils, cups etc. should be avoided wherever possible
- Drinking water should be provided with enhanced cleaning measures of the tap mechanism introduced
- Tables should be cleaned between each use
- All rubbish should be put straight in the bin and not left for someone else to clear up; only covered pedal operated bins should be used and the bins should be cleared and cleaned regularly, with strict adherence to safety protocols for disposal and hygiene maintenance (including proper PPE's such as gloves, mask and apron worn by the

[4] Advisory on use of Homemade Protective Cover for Face & Mouth by GOI

waste handler/cleaner and disposal at a designated place);
- All areas used for eating must be thoroughly cleaned at the end of each break and shift, including chairs, door handles, etc.

Changing Facilities, Bathrooms, Showers and Drying Areas

- Introduce staggered start and finish times to reduce congestion and contact at all times
- Introduce enhanced cleaning of all facilities throughout the day and at the end of each day
- Consider increasing the number or size of facilities available on camp if possible
- Based on the size of each facility, determine how many people can use it at any one time to maintain a distance of two metres
- Provide suitable and sufficient garbage bins in these areas with regular removal and disposal.
- Visitor log should be strictly maintained that the labour camp.

COVID-19 officer will ensure compliance with prevention issues at the labour camp(s).

XIV. UPDATES ON COVID-19

The Contractor shall be in touch with the Department of Health & Family Welfare and Labour Department to identify any potential worksite exposures relating to COVID-19, including:

- Strictly follow the guidelines issued by Ministry of Health and Family Welfare
- Other workers, vendors, inspectors, or visitors to the worksite with close contact to the individual
- Labour Camps / Work areas such as designated workstations or rooms /sheds
- Work tools and equipment
- Common areas such as break rooms, tables and sanitary facilities

Also refer the following websites from time to time for regular updates.

https://www.mohfw.gov.in/

This document can be updated from time to time based on the advisories or directions of the Govt.

XV. TRAINING

- PIU to ensure all workers get training on above requirements before start of any construction activity
- During construction period frequent visual and verbal reminders to workers can improve compliance with hand hygiene practices and thus reduce rates of infection. Handwashing posters should also be displayed at work site and labour camps

XVI. EMERGENCY CONTACT

- Provide emergency contact number(s) at work site and labour camp for reporting COVID-19 symptoms

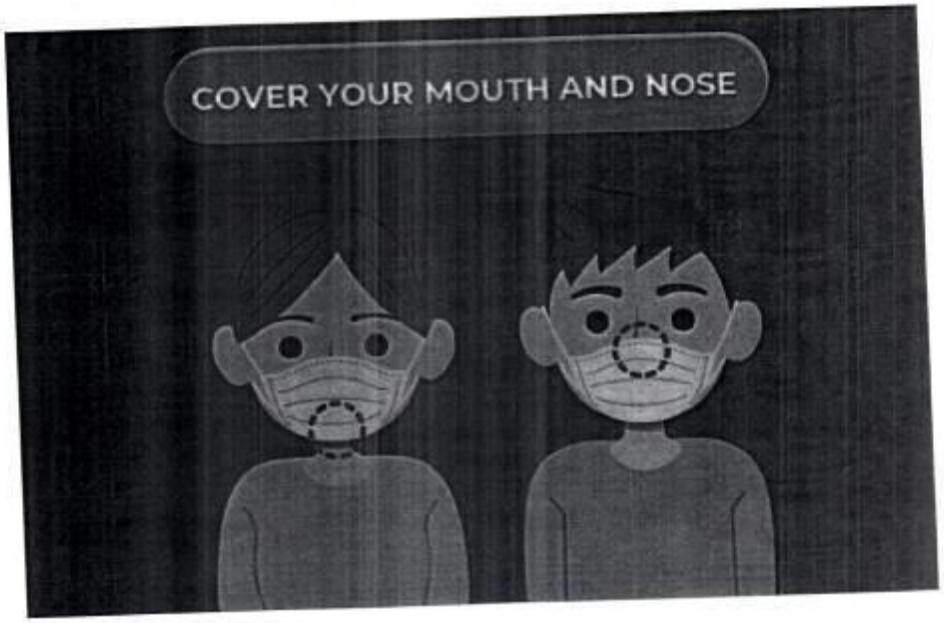
Ensure all staff and personal use the Aarogya Setu app, recommended by GOI for tracking COVID-19 patients.

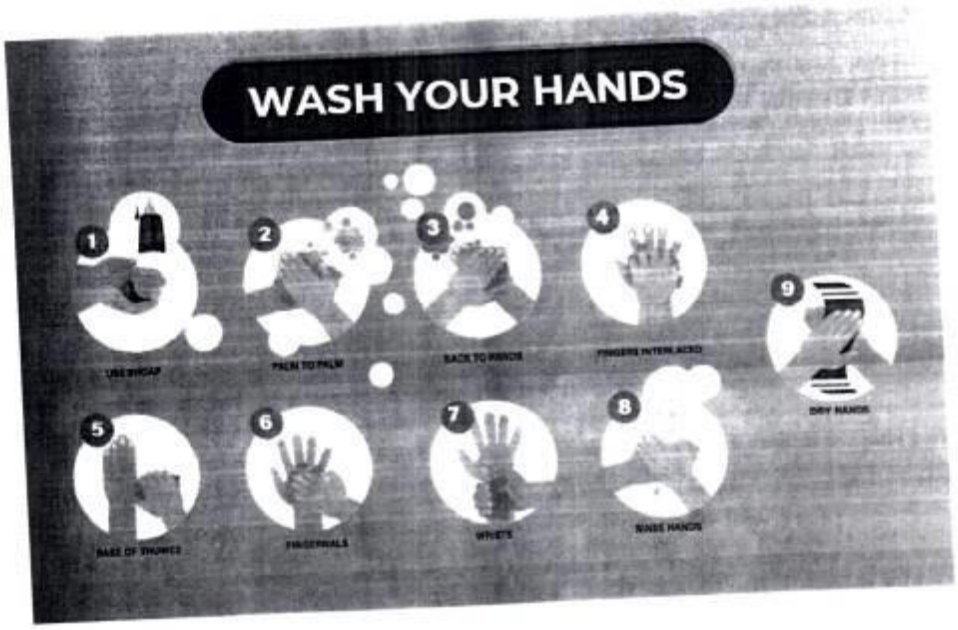
Team Leader
PMCBC, RSTDSP Jaipur

ESS, PMCBC

COVID-19 PRECAUTIONS

(To be displayed at sites)




WASH YOUR HANDS
1
2
3
4
9
5
6
7
8


AVOID TRAVELLING


CONSULT A
DOCTOR


#I STAY AT HOME
AND FIGHT CORONAVIRUS


DON'T TOUCH
YOUR FACE
DON'T
TOUCH
YOUR
FACE


NO SELF-TREATMENT

Appendix C-25: Management of Work Plan during Festivals and Melas

1.	**Planning Of Fair and Festival**	• The date and time should be fixed well in advance so that all requisite preparations can be made. It should be announced at least 60 days in advance. • Information shall be shared with local health authorities'/ health officers of all localities in which fair/festival is being organized. • Health officer shall inform higher officials concerned with the fair/festival
2.	**Notification of fairs and festivals**	• Notification (by govt. order or otherwise) should specify ➢ The area and duration of the fairs/ festivals ➢ The limits of the area where fairs/ festivals are to be organized should be well defined • Also, festival tax if any being levied by the govt. on vehicles, travellers, etc should be notified. The Govt. should also notify how much tax will be levied
3.	**EHS Arrangements**	• The site should be demarcated and preparation of the site be done. • Site should be cleaned and drained properly • Roads should be aligned properly • Water sprinkling should be done periodically to avoid dust nuisance. • Sufficient numbers of dustbin container should be placed (Wet & Dry) • Water sufficient in quality and quantity fit for drinking and cooking should be arranged. Also facilities for safe storage of water can be made. • To practically possible extent, accommodation to the pilgrims and visitors be made. • Adequate lighting arrangements be made. • Wholesome food should be made available at reasonable price and yet of necessary quantities. Foods prepared/ offered/ stored has to be properly supervised. • All the food preparation should be hygienic. • Refuse, rubbish, sewage should be collected, removed and disposed off safely. • Suitable latrines should be arranged and maintained • Infectious cases if any should be detected early and segregated. Preventive measures should be started. • Adequate medical staff, medical relief, hospital accommodation be provided. • Any other service deemed necessary can be arranged for. • Health officer be given adequate powers to seize private buildings, private water supply like wells, etc. Same should be informed to public to prevent protest. • There should be good approach to the road. • Sweepers in ratio of 1 per 1000 pilgrims be appointed. • Temporary hospital be set up for management of any infections. District health officer should stay at the site of fair and festival.
4.	**Promoting COVID appropriate Behaviour.**	• Avoiding physical contact is a responsible behaviour as it prevents the spread of COVID-19 disease and other viruses. • Physical distance Should be maintained minimum 6 feet • Avoid Touching Eyes, Nose and Mouth / Maintain respiratory hygiene / Wash hands frequently and thoroughly