Initial Environmental Examination

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

Dungarpur Water Supply and Sewerage Works

Prepared by Rajasthan Urban Infrastructure Development Project, Government of Rajasthan for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 31 March 2022)

Currency unit – Indian rupee (₹)
₹1.00 = $ 0.01
$1.00 = ₹ 75.91

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
FSSM	–	Faecal Sludge and Septage Management
IEE	–	Initial Environmental Examination
IFC	–	International Finance Corporation
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
STP	–	Sewage Treatment Plant
TEER	–	Treated Effluent Elevated Reservoir
TESR	–	Treated Effluent Storage Reservoir

ULB	–	Urban Local Body
WHO	–	World Health Organization
WTP	–	Water Treatment Plant

WEIGHTS AND MEASURES

m^3	–	cubic meter
dB	–	decibels
^oC	–	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 meter
MLD	–	million liters per day
km^2	–	square kilometer

NOTE

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

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APPENDICES

Appendix C1 – C25 – common appendices, attached separately, provide statutory standards, guidelines, reporting templates etc. are applicable to all subproject IEEs.

List of Common Appendices

Appendix C-25: Management of Work Plan during Festivals and Melas

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 also 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.

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

- **Water supply.** (i) Intake well and pump house 3.2 MLD at Vijay Chakra Sagar (Dimiya) Dam (ii) Raw water pump house-01 no (iii) clear Water Pump House (5 nos.) (iv) Raw Water Reservoir (550 KL) (v) Clear Water Reservoir (2 nos., 550 KL & 600 KL) (vi) Raw water rising main of 5.74 km and clear water rising main of 14.95 km (vii) Distribution networks of 153.39 km (viii) House service connection-12067 nos. (ix) Refurbishment of pump house (7 nos.), RWR (235 KL), WTPs- 2 nos. (4.54 MLD and 3.25 MLD), CWRs (2nos.), OHSRs (8nos.), GLSRs (4 nos.), (x) Rehabilitation of 2 TWs and 2 open wells, (xi) Construction of CRMC (2 nos.) and MCC (1no.).
- **Sewerage.** (i) Laying of 51.48 km sewer (ii) Construction of 3 nos. Sewage pumping stations (SPS) of capacities of 3MLD, 3MLD and 0.25 MLD (iii) Construction of 4.0 MLD Sewage Treatment Plant (STP) near Do River on Udaipur road along with 380 KL capacity TESR & 760 KL of TEER (iv) Rising main of 7.3 km (v) 6460 nos. of House Sever Connections inside the property boundary (vi) FSSM work including procurement of desludging tank of 4000 lit capacity..

Screening and Categorization. assessment of potential impacts. Dungarpur 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. Per Government of India environmental impact assessment (EIA) Notification, 2006, subproject do not require environmental clearance.

Description of the Environment. Subproject components are in Dungarpur 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 located in existing road right of way (RoW) and government-owned lands. The proposed STP, SPS and CWRs will be constructed on vacant government land. There are no trees on the site and is surrounded mostly by agricultural areas. The nearest built-up structures are to STP site are 3 cattle sheds

about 150 m and nearest habitation is 200 m away from the proposed STP site. The selected STP site is in government owned site in on riverbank of Do River. The selected site is also had sufficient area for future expansion of the STP, area available 28173 sqm against 3600 sqm required. The treated waste will be reused by nearby farmers and overflow from STP will be discharged in Do River. Kheria Magra and Gumanpua Protected Forest at 3 km & 2.6 km respectively far from proposed STP site. The nearest wildlife sanctuary is Sita Mata Sanctuary located 86 km from project town. The nearest ASI protected monument in Dungarpur district are Deo Somnath temples about 35 km and Jain Temple Inscription in Baroda village about 16 km from Dungarpur town.

Potential Environmental Impacts and Mitigation measures. In this draft IEE, negative impacts were identified in relation to location, design, construction and operation of the improved infrastructure. 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 archaeological resources envisaged. Temporary measures suggested to avoid any disturbance / damage to buildings during laying of water lines in nearby roads. Source of water for town is surface water from Edward Samand Dam (4.54 MLD), Vijay Chakra Sagar dam (3.20 MLD) and Somkamla Amba dam (4.361 MLD). Along these surface water sources additionally 4 existing ground water sources including 2 tube wells and 2 open wells, proposed for lean season when surface water source have less amount of water. The PHED has recorded yearly water level data of Edward Samand Dam, Vijay Chakra Sagar dam dams and as per water level data of past 12-year, the two dams was filled fully up to its storage capacity in all 12 years. New proposed Som Kamala Amba (SKA) Dam on Som River. The allotted water for Dungarpur is on 4.36 MLD (1.59 MCM) which is only 5.09 % of total drinking water available in dam.

Ground Water Source: At present there are 7 Nos Tube wells and 15 Nos Dug Wells / Open wells are supplies 3.0 MLD water to Dungarpur, out of these existing wells, 2 Nos Tube wells and 2 Nos Open wells are proposed to be deepening and desilting, with re commissioning work. Based on the design consideration, it was proposed to consider 1.5 MLD of water from ground water sources in case of emergency situations like repair and maintenance works in surface water sources and during lean seasons when water availability in surface water sources in less.

Assessment confirms the source sustainability to provide drinking water, and no water sharing conflicts or downstream impacts envisaged. New STP of 4 MLD 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.

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 for 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 pipeline deeper than 3.5 m and also 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 (ii) proper planning and scheduling of water line and sewer 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.

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 with about 54 persons in month of March and April 2022. A City Level Committee (CLC) was held and CLC has appreciated and approved the subproject. The IEE will be made available at public locations; this draft IEE will be disclosed to a wider audience via the ADB and RUDSICO websites. Consultation process will continue during project implementation. A grievance redress mechanism (GRM) will be established to redress public grievances.

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 Dungarpur will be the major beneficiaries.

The subproject is primarily designed to improve environmental quality and living conditions of Dungarpur 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 existing WTP and 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 contractor. This IEE needs to be updated during the detailed design, reviewed and approved by ADB, and disclosed prior to start of construction.

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 also 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. **Dungarpur 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. 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.

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. This IEE will be updated during the detailed design to reflect changes and submitted to ADB for approval. 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:

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

II. DESCRIPTION OF PROJECT

A. Dungarpur Town

8. Location, Area and Connectivity*:* Dungarpur Town is a municipal council situated in the southern part of Rajasthan state of India. It is the administrative headquarters of Dungarpur District. The district is roughly triangular in shape. In East and North its borders on Banswara and

Udaipur District respectively while it adjoins the State of Gujarat in South & West. The Mahi River runs along the western edge of the district, forming the boundary with Banswara district. The Som River, a tributary of the Mahi, runs along the northern edge of the district, largely forming the boundary with Udaipur district. The rail line between Udaipur and Ahmadabad in Gujarat runs through the town, shortest distance to the National Highway 8 from Dungarpur town is 20 km. Dungarpur is located in the southern part of Rajasthan between 23° 20' and 24° 01' North latitude and 73° 21' and 74° 01' east longitude. In East and North it has common borders with Banswara and Udaipur districts respectively, while it adjoins the State of Gujarat in South and West. The most of the part of the district is hilly. The avg. elevation is 225 m (738 ft) above MSL. The municipal area of the town is about 13.20 Sq. Km.

B. Existing Conditions

1. Water Supply

35. At present an intermittent water supply system is running in the town. The present production of clear water is 6.4 MLD but in fact due to system losses only 3.840 MLD of treated water is being reached to the consumers giving a service level of supply is only ~70 LPCD against the desired service of 135 LPCD. Thus, there is 35- 40% NRW in the system. The frequency of supply is once in a day for the average duration of 1.00-1.5 hours. The total present water supply 6.4 MLD includes 2.4 MLD from Edward Samand dam, 1.0 MLD from Vijay Chakra dam, 1.0 MLD from tube wells and remaining 2.0 MLD from open wells. Detail discussions on existing water supply system in Dungarpur town is given in **Appendix 3**.

36. **Source**: At present water supply of the town is dependent on two local surface water Reservoirs viz Edward Samand and Vijay Chakra Sagar (Dimiya) dam, in addition to these, some sub surface sources (7 tube wells and 15 nos. open well) have also been connected with the system, but due to rocky terrain the yield of these ground water sources is very less and as the water table is regularly depleting fast therefore these would not sustain for longer. Vijay Chakra Sagar (Dimiya) dam was constructed in 60th decade in constituency of Maharawal Laxmansingh for the full fill the requirement of drinking water of Dungarpur.

2. Water Treatment Plants

37. There are two rapid gravity water treatment plants of capacity of 4.54 MLD and 3.25 MLD with the existing system. Thus, there is a total capacity of WTP is 7.79 MLD.

38. **Raw Water Conveyance.** The raw water from Edward Samand is carried out to raw water Sump at Bori H/Ws (WTP) by means of DI pipeline (by gravity flow) from there raw water is being pumped to WTP (3.25 MLD) at the same H/Ws for treatment. Balance 1.29 MLD me raw water is also carried out to Udaivilas H/Ws where another WTP (4.54 MLD) exists. Similarly, 3.25 raw water from Vijay Chakra Sagar (Dimiya) is carried out to Udaivilas H/Ws (WTP-3.25+1.29= 4.54 MLD) by means of DI pipeline through inter mediate pumping at Taraghati pumping station. The details of these raw water conveyance pipelines are given below in Table 1.

Table 1: Details of raw Water conveyance in Dungarpur

S.N.	Source	To	Details of raw water pipeline			Utility for this project
			Material	Dia in mm	Length In Mtr.	
1	Edward Samand	RW Sump at Bori H/Ws (WTP)	DI K-7	(a) 400 (b) 350	1490 7510	Useful, shall be utilised for this project
2	RW Sump at Bori H/Ws	Udaivilas H/Ws (WTP)	DI K-9	200	5950	Useful, shall be utilised for this project
3	Vijay Chakra Sagar (Dimiya)	Udaivilas H/Ws (WTP) Via Intermediate pumping station at Taraghati	DI K-9	200	9500	Replacement by 250 mm dia to accommodate flow and change of alignment along road.
		Total			22,960	

3. Details of head works and CWRs

39. There was Five Head works in the system with the six CWRs & pump houses but at present only four Head works are in use in the system, as one Head Works has now been closed due to ruined & unusable condition of CWR and pump house.

4. Existing service reservoirs

40. At present from water supply distribution point of view, the entire town has been divided into 20 zones. In these zones 23 Service Reservoirs (13 ESRs and 10 GLSRs) of various capacities are available in the respective zone areas; from this clear water is being supplied to the consumers.

41. For completed details and existing conditions of various existing water supply components are given in Audit report of existing water supply system in Dungarpur town in **Appendix 3** in this IEE.

42. **Area Coverage:** Presently about 70-80% area of municipality limit is covered under the drinking water supply scheme by ULB. Remaining area which is newly developed and newly added to the municipality area is remain unconnected with piped scheme and will be considered under this proposal.

5. Sewerage

43. Dungarpur Municipal Council does not have any sewerage system. Presently the wastewater from kitchens & bathrooms is discharged into storm water drains culminating finally to the Nallah or on ground, which pollutes the environment and contaminates the ground water. Most of the residential, commercial buildings and educational institutions have on-site septic tanks and soak pits. The effluents from the septic tanks directly drain into the open drains. In the absence of safe disposal system of sewage, the people of town are exposed to unhealthy and unhygienic environment. Therefore, public representatives are also demanding for the facilities of sewerage system on priority basis.

6. Sewage Flows for Different Horizon Years

44. 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 Dungarpur, it is proposed to supply the water at the rate of 135 LPCD. The expected flow of sewage be 108 LPCD, 5% provision is added over this to account for ground water infiltration and any other unaccounted for nondomestic addition. Estimated Sewage Generation for Dungarpur town (under RUIDP Phase-IV) is given below:

Population (number)			**Sewage Generation (MLD)**		
2025	**2040**	**2055**	**2025**	**2040**	**2055**
32256	34041	35288	3.66	3.86	4.00

45. Zone wise coverage (under RUIDP Phase-IV coverage) including ward wise projected population and zone wise coverage are given **Table 2.**

Table 2: Zone wise coverage (under RUIDP Phase-IV coverage)

Zone No.	**Zone Population (Total Town)**			**Zone Population (RUIDP Phase-IV)**			**Zone Population (FSM Area)**			**Zone Wise % Coverage ofTown**		
	2025	2040	2055	2025	2040	2055	2025	2040	2055	Total Area	RUIDP Phase-IV	FSM Area
1	21293	21891	22310	21293	21891	22310				100%	100%	
2	12012	13601	14711	9273	10267	10962	2739	3334	3749	100%	77%	23%
3	1766	1958	2093	1438	1594	1704	328	364	389	100%	81%	19%
4	9704	10918	11766				9704	10918	11766	100%		100%
5	1336	1567	1728				1336	1567	1728	100%		100%
6	2199	3093	3717				2199	3093	3717	100%		100%
7	3141	3781	4228	253	288	312	2887	3493	3915	100%	8%	92%
8	1517	1996	2330				1517	1996	2330	100%		100%
9	2663	3396	3908				2663	3396	3908	100%		100%
Total:	**55630**	**62200**	**66790**	**32256**	**34041**	**35288**	**23374**	**28159**	**31502**			

C. Proposed Water Supply and Sewerage Infrastructure in Dungarpur under RSTDSP

1. Water demand

46. Total projected clear water demand for various design years is given in Table 3 and ward wise population. The total ULB Population in 2025 is 55630 and base water demand is 7.51 MLD.

Table 3: Total Clear Water Demand for design years

Sl No	**Description**	**WATER DEMAND IN MLD**		
		Year 2025	**Year 2040**	**Year 2055**
1	Total ULB Population	55630	62200	66790
2	Base demand @ 135 LPCD in MLD	7.51	8.40	9.02
3	Other demand, as for floating population, boarding schools reserve police line etc	0.674	0.674	0.674
4	Total basic clear water Demand in MLD	8.18	9.07	9.69
5	Clear Water Demand including distribution Network Losses @ 10% in MLD (at distribution point)	8.34	9.33	10.02

Sl No	Description	WATER DEMAND IN MLD		
		Year 2025	Year 2040	Year 2055
6	Clear Water Demand including further rising lines Losses @ 2 % on demand at s.no.5 in MLD (at CWR)	9.28	10.28	10.99
7	Total clear water demand in MLD	9.28	10.28	10.99

D. Proposed Source for Subproject

47. **Proposed Water Sources:** There are 3 nos. surface water sources, proposed for water demand in this sub-project, and 4 nos. ground water sources including 2 nos. tube wells and 2 nos. open wells, proposed for emergency. Surface water source include Edward Samand Dam (availability of water 4.54 MLD), Vijay Chakra Sagar dam (availability of water 3.25 MLD) and Somkamla Amba dam (availability of water 4.361 MLD). Details on the need for refurbishment of existing components are given in **Appendix 3.** All four sources are already existing, and no new source will be developed for the project.

1. Proposed sources for water supply for Dungarpur

Table 4: Drinking water sources and water demand

Source	Existing water Demand	Proposed water demand	Change in usage
Edward Samand	4.54 MLD	4.732 MLD	4.23% Increase
Vijay Chakra Sagar	3.25 MLD	3.103 MLD	4.52% Decrease
Som Kamla Amba	Nil	4.361 MLD	New source
Ground water	3. 0 MLD	1.5 MLD	50 % decrease

Table 5: Water availability in sources

Source	Total yearly storage capacity	Abstraction of water	Percentage of Abstraction	Government Allocation is available or PHED dam
Edward Samand	137 mcft = 3.879 MCM (137/35.317)	Daily - 4.54 MLD – Yearly - 1657.1 million Litre/Year) = 1.66 MCM (yearly)	=1.66/3.879*100% =42.79%	4.54 MLD
Vijay Chakra Sagar	44.87mcft = 1.27 MCM (44.87/35.317)	3.25 MLD –Daily (1186.2 Million Litre/Year) 1.1862 MCM (yearly)	=1.1862/1.27*100% =93.40%	3.25 MLD (required water demand is 3.1 MLD)
Som Kamla Amba	160 MCM total storage capacity and 8.01 MCM is	4.361 MLD - 1591.76 Million Liter/Year)	=8.01/ 1.59 *100%	4.361 MLD

Source	Total yearly storage capacity	Abstraction of water	Percentage of Abstraction	Government Allocation is available or PHED dam
	reserved for drinking water	1.59 MCM /year	= 5.09 % of total drinking water available.	

48. Edward Sagar Dam (Durgapur reservoirs): Situated on Do River, a seasonal river is a drinking water reservoir owned by PHED, GOR. Water of this reservoir is reserved only for drinking water for Dungarpur. Capacity of this dam is 137 MCFT (3.879 MCM) live storage. The PHED has allocated 4.54 MLD (1.66 MCM) water for Dungarpur water supply subproject, which is about only 42.79 % of total storage capacity of dam.

49. Total storage capacity of Edward Samand Dam is 137 MCFT but only 61 MCFT water quantity can be abstracted from this dam on gravity basis. About 11 feet of water storage is maintained as dead storage and only 61 MCFT water quantity will be used for this subproject. The intake and WTP are already exiting on this dam. Water quantity is allocated for use is based on water abstractions from this dam on gravity basis and capacity of existing WTP. 11 feet water storage is maintained as dead storage.

50. The water from dam is not used for irrigation or any other activity. The PHED has recorded yearly water level data of dam and as per water level data of past 12-year, the dam was filled fully up to its storage capacity in all 12 years.

51. **Vijay Chakra Sagar Dam**: Situated on Moran River, tributary to mahi river near Dimiya village, Dungarpur is a drinking water reservoir owned by WRD, GOR water of this reservoir is reserved only for drinking water supply for Dungarpur. Capacity of this dam is 44.87 MCFT including dead storage and 40 MCFT (1.27 MCM) is live storage. The PHED has allocated 3.1 MLD (1.18 MCM) water for Dungarpur water supply subproject (but currently only 1 MLD has been abstracted), which is about 93.40% of total water available in dam. The existing water abstraction of water from dam is 3.25 MLD and proposed capacity is 3.1 MLD. The water from dam is not used for irrigation or any other activity. The PHED has recorded yearly water level data of dam and as per water level data of past 12-year, the dam was filled fully up to its storage capacity in all 12 years.

52. As per the subproject design, the abstraction from Vijay Chakra Sagar Dam will remain same and it will provide 3.1 MLD or 25.44 % of total design demand of 12.196 MLD (2040). There is also a proposal by PHED Dungarpur to increase this dam height by 1 m to increase water availability in future, however since it is only in proposal stage, the increase in water storage of dam is not considered in the subproject design.

53. **New proposed Som Kamala Amba (SKA) Dam on Som River**: This dam is located on Sam river in Ashpur Tehsil of Dungarpur District, to provide the Irrigation cum drinking water facilities. The dam supplies 8.1 MCM drinking water and irrigation supply to 26998.6 ha of Gross Command Area (GCA) and 19155.42 ha of Culturable Command Area (CCA).

54. Capacity of dam at FTL of 213.5 m is 172.75 MCM and live storage capacity 160 MCM MCM out of which 8.1 MCM is reserved for drinking water. The allotted water for Dungarpur is on 4.36 MLD (1.59 MCM) which is only 5.09 % of total drinking water available in dam.

55. To meet out the shortfall demand of the town Dungarpur, the state Government has sanctioned a public importance project namely Drinking Water Supply Project for 151 Villages and 1 town of District Dungarpur (Dungarpur town itself) based on Som Kamla Amba Dam under Jal Jivan Mission. Presently the project is under execution, transmission main from the Som Kamla Amba Dam to Dungarpur town has been laid and construction work of intake well and water treatment plant is under progress. As per PHED officials project will be commissioned up to December 2022.

56. **Ground Water Source:** At present there are 7 Nos tube wells, and 15 Nos Dug Wells / Open wells are supplies 3.0 MLD water to Dungarpur, out of these existing wells, 2 Nos Tube wells and 2 Nos Open wells are proposed to be deepening and desilting, with re commissioning work. Based on the design consideration, it was proposed to consider 1.5 MLD of water from ground water sources in case of emergency situations like repair and maintenance works in surface water sources and during lean seasons when water availability in surface water sources in less.

57. **Proposed works under Water Supply are**- (i) Intake well and pump house 3.2 MLD at Vijay Chakra Sagar (Dimiya) Dam (ii) Raw water pump house-01 no (iii) clear Water Pump House (5 nos.) (iv) Raw Water Reservoir (550 KL) (v) Clear Water Reservoir (2 nos., 550 KL & 600 KL) (vi) Raw water rising main of 9.19 km and clear water rising main of 13.74 km (vii) Distribution networks of 153.39 km (viii) House service connection- 12067 nos. (ix) Refurbishment of pump house (7 nos.), RWR (235 KL), WTPs- 2 nos. (4.54 MLD and 3.25 MLD), CWRs (3nos.), OHSRs (8nos.), GLSRs (4 nos.), (x) Rehabilitation of 2 TWs and 2 open wells, (xi) Construction of CRMS (2 nos.) and MCC (1no.).

2. Availability of clear water from proposed sources

58. As total production from Edward Samand dam is 4.54 MLD. 4.54 MLD raw water will be collected to Bori RWR by gravity. From Bori RWR 3.25 MLD water pumped to Bori WTP of capacity 3.25 MLD and balance 1.29 MLD raw water is transferred to Udai villas WTP (of capacity 4.54 MLD). Production from Dimiya Dam will be 3.1 MLD, therefore total water proposed to be treated at Udai villas WTP is 3.25 MLD + 1.29 MLD = 4.54 MLD. Presently the existing intake well for pumping raw water from Dimiya dam is in back water of dam, during the summer season water is to be brought near existing pump house by the centrifugal submersible pumps. As to get the maximum benefit in pumping the raw water during severe drought conditions a new intake well is proposed near the spillway section of the Vijay Chakra Sagar Dam (Dimiya dam).

59. PHED ensured vide letter No EE/ DPR/2021-22/ 1596 dated 12-08-2021 for allocation of clear water from proposed sources (Letter is attached as **appendix 5** in IEE)

3. Associated projects:

60. **New Water Source** Som Kamla Amba Dam on Som River is proposed as new sustainable source for the subproject by PHED. Som Kamla Amba dam is located on Som River in the Dungarpur district. The construction of this dam was started in 1992 and completed in 2000 for irrigation and drinking purposes. At the Somkamla Amba Dam, a new WTP, Intake and Rising Main upto CWR in new colony (Dungarpur) are proposed under PHED Jal Jivan Mission project which will completed by 2024 through PHED Dungarpur. Supporting details given by Chief Engineer PHED Jaipur through the letter **No. CE(SP)/PHED/Dungarpur/DPR/2018-19/2630-2431 dated 26.07.2018. Letter and Summary of DPR are given in Appendix 4. In this project** At initial phase WTP of 21.29 MLD is proposed for demand of 2036 upgradable upto 29.01 MLD

for future demand.

61. **Sewerage works.** Under RSTDSP, it is proposed to develop a sewerage system in Dungarpur Town to collect, treat, and dispose/reuse the domestic wastewater safely. The objectives of the proposed sewerage works are:

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

62. **Proposed works under Sewerage are-** (i) Laying of 51.48 km sewer (ii) Construction of 3 nos. Sewage pumping stations (SPS) of capacities of 3MLD, 3MLD and 0.25 MLD (iii) Construction of 4.0 MLD Sewage Treatment Plant (STP) near Do River on Udaipur road Provide 12440 nos. (iv) Rising main of 7.3 km (v) 6460 nos. of House Sever Connections inside the property boundary (vi) FSSM work including procurement of desludging tank of 4000 lit capacity.

63. **Sewage treatment Plant**. It is proposed to develop sequential batch reactor (SBR) based sewage treatment facility that will treat the incoming sewage to stringent discharge standards specified in this IEE and included in the bid documents. SBR is a cyclic activated sludge treatment process and provides highest treatment efficiency possible in a single step biological process. One STP of 4.0 MLD Capacity along with 380 KL capacity TESR & 760 KL of TEER, is proposed as part of the project in Dungarpur Town to meet the sewage generation. The proposed location of STP and its associated components is in north-west direction of Dungarpur town. Land ownership of the proposed STP and treated effluent discharge point is under Nagar Parishad of Dungarpur town. The nearest habitation of the proposed STP site is Bhilwata colony at 300 m distance. There is no direct impact on human being lived in surrounding areas from STP and its treated effluent discharge. Land for proposed STP and treated effluent discharge is under ownership of Municipal Cooperation of Dungarpur

64. **Disposal of Treated Wastewater:** After Treatment of wastewater at proposed 4 MLD STP, is proposed to dispose by gravity nearby river located about 50 metre away from STP site into the Do River the disposal site is just outside the STP premises. Do River is the tributary river of Som River. Do River is associated with Dungarpur city through the natural drain in which local city drainage and outfall of Gap Sagar and Sabela Lake is discharged. Do river is seasonal river therefore impact of treated effluent discharge into this river is negligible. Proposed STP location and final discharge point of treated effluent are shown in Google Map and Toposheet Map in **Figure 1 and 2**.

65. The disposal of treated water will be at downstream of Khandeshwar Mahadev temple. The temple has its own tube well for it own water use. Temple is not using any water from river. STP is proposed at a sufficient distance from the temple thus there is no negative impact is envisaged on temple.

66. **Faecal Sludge and Septage Management**. It is proposed to provide FSSM system in areas where the population density is low (less than 100 persons per hectare) and will not generate sewage in adequate quantity to convey by sewer network. FSSM will provide low-cost sanitation in areas where sewer network is not an immediate requirement/not feasible at present, will make septage collection, treatment and effluent management environment- friendly. Total 40 nos. Wards in Dungarpur are taken in the sewerage project. Out of 40 wards,12 wards are considered under FSSM. These wards having the low density, unfavourable topographical conditions and other wards which will be covered under upcoming schemes as per available funding in future.

Table 6: ward wise population and habitation details at Dungarpur town

Ward No.	Total Area	Habitation Area*	Other than Habitation Area	Census Population	Projected Population		
	Ha.			2011	2025	2040	2055
10 Year O & M							
1	137.93	61.47	76.46	1246	2482	3507	4223
2	18.98	11.01	7.97	889	1199	1457	1636
3	58.11	18.46	39.65	915	1420	1840	2132
4	127.04	40.08	86.96	1670	2271	2770	3118
5	245.89	47.64	198.25	1107	2185	3079	3704
Total					9557	12653	14813
3 Year O&M / Till laying of sewer network under other scheme or 10 Year which is minimum							
17	5.53	3.10	2.43	1117	1117	1117	1117
18	3.03	1.91	1.12	1284	1284	1284	1284
19	21.30	4.97	16.33	1289	1386	1466	1522
23	43.73	8.75	34.98	909	1150	1350	1490
26	98.51	9.11	89.40	1058	1274	1452	1577
31	44.15	8.08	36.07	1142	1319	1466	1569
40	19.83	9.41	10.42	1018	1250	1442	1576
Total					**8779**	**9577**	**10135**

67. Under the FSSM, faecal 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.

Figure 1: Location of STP and discharge point

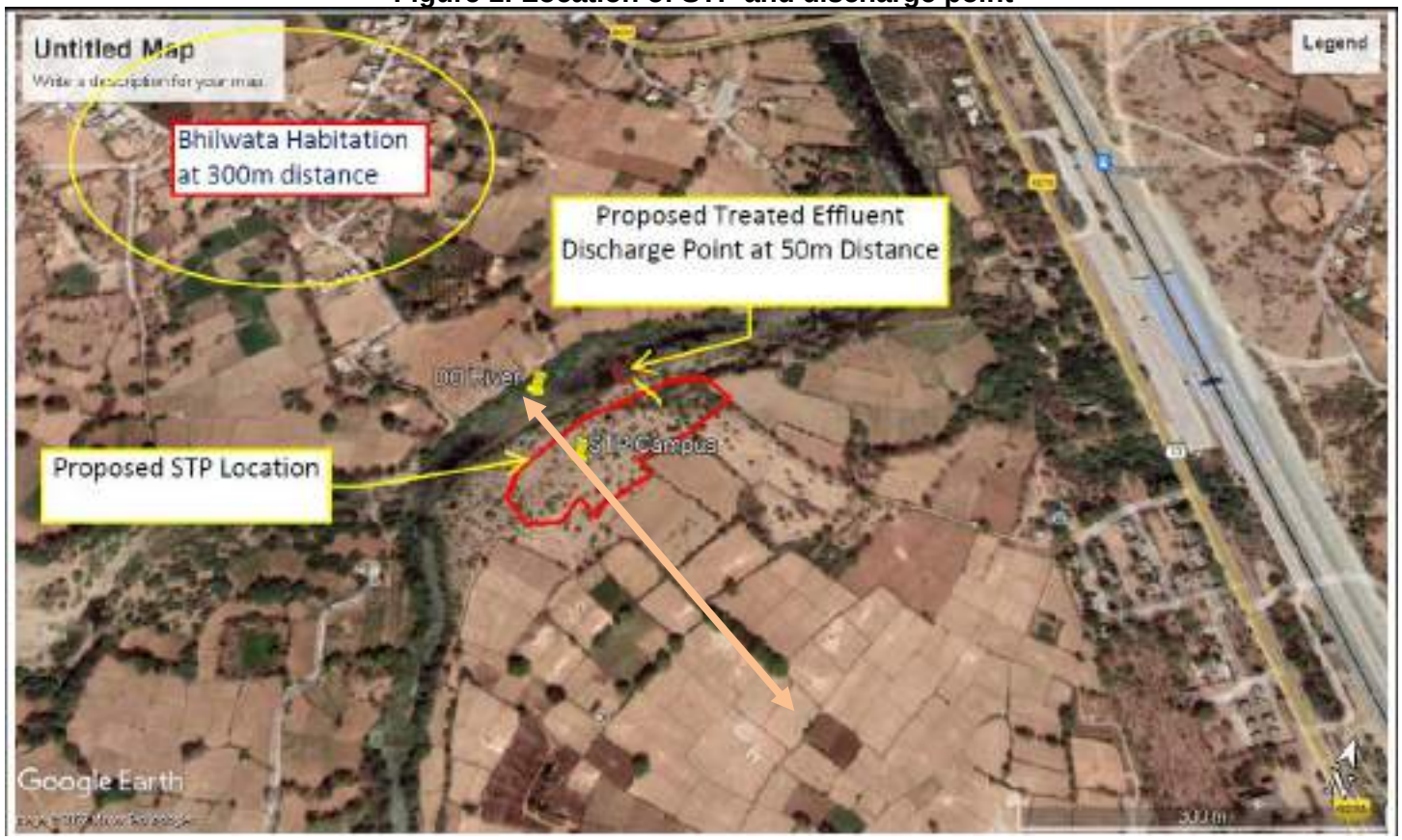
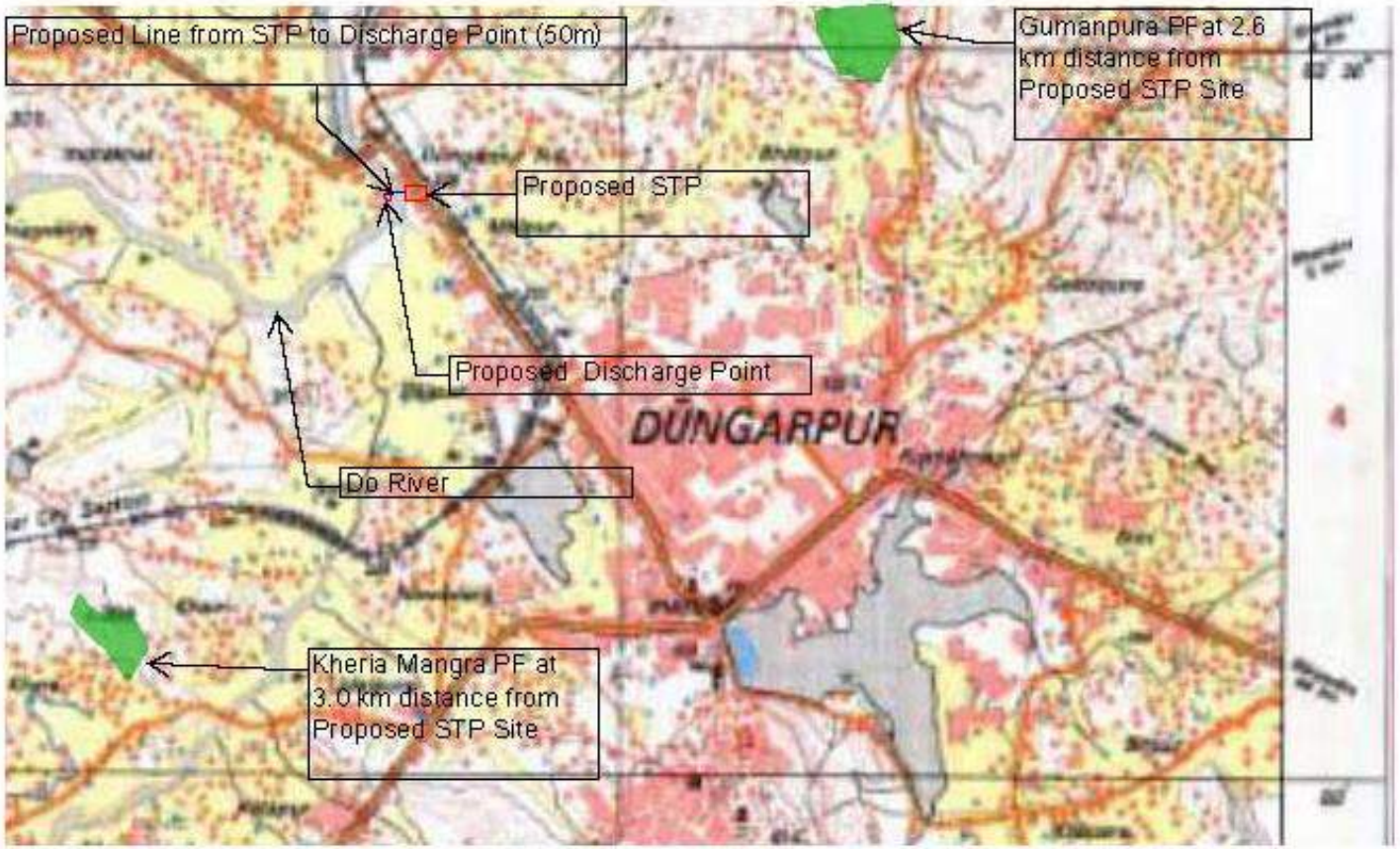


Figure 2: Location of STP and discharge point on Toposheet



68. **Table 7** shows the nature and size of the various civil works components of this water supply and sewerage subproject in Dungarpur Town. Google Coordinates of proposed work sites are given in **Table 8**. Locations of project sites in google map are shown in **Figures 3 to 9**, conceptual layout plans and alignments are shown in **Figures 10 to 11**.

Table 7: Details of Proposed Project components

<table>
<tr><th>Component</th><th>Function</th><th>Description</th><th>Location & Ownership</th></tr>
<tr><td colspan="4">Water Supply</td></tr>
<tr><td>Intake – cum – raw water pump house for year 2036</td><td>Water extraction from source</td><td>New

3.20 MLD capacity- with 2 pumps- 1W+1S (well type)</td><td>Location- Vijay Chakra Sagar (Dimiya) Dam south-east of Dungarpur Town
Ownership- WRD.</td></tr>
<tr><td>Tube Wells</td><td>Water extraction from ground</td><td>Rehabilitation: 02 nos. of existing tube wells and 2 nos of existing open well</td><td><table><tr><th>Location</th><th>Nos.</th></tr><tr><td>Patrakar colony TW</td><td>1</td></tr><tr><td>Darji wada TW</td><td>1</td></tr><tr><td>Rani Bao OW</td><td>1</td></tr><tr><td>Kela bao OW</td><td>1</td></tr><tr><td>Total</td><td>4 (2 TW & 2 OW)</td></tr></table></td></tr>
<tr><td>Raw Water Reservoir (RWR)</td><td>Storage tank of raw water before treatment</td><td>New
RWR- 550 KL</td><td>Locations: Bori HW Campus
Ownership: PHED</td></tr>
<tr><td>New Raw water pump house</td><td>Pumping the raw water</td><td>New
Raw water pump house including complete pumping system to feed H/Ws</td><td>Location- Existing Bori WTP Campus
Ownership- PHED</td></tr>
<tr><td>Raw water Rising mains</td><td>Pumping of water</td><td>New
- 9.19 km</td><td>Location: Within ROW
Ownership: Municipal Council</td></tr>
<tr><td>WTPs</td><td>Treatment of raw water</td><td>Refurbishment
Udaivilas - 4.54 MLD

and

Bori RGF (3.25MLD)</td><td>existing WTP campus Udaivilas

existing WTP campus Bori RGF (3.25MLD)</td></tr>
<tr><td>Pump houses</td><td></td><td>Refurbishment:

Existing 7 Pump houses,</td><td>Vijay Chakra Sagar (Dimiya) PH-1 for Raw water,
Udai vilas RGF (I), Bori RGF (I), Bori RGF (II), Nai Abadi CWR-PH-1, Main pump house at AEn PHED office, and Chandpole pump house</td></tr>
<tr><td>Clear Water Pump Houses with Chlorination system</td><td>Post chlorination / disinfection of water prior to supply</td><td>New 5 nos. of clear water pump houses with chlorination system</td><td>Locations:
Bori Campus
Chandpole Campus
Main PHED Campus
New Colony Campus
Udai Vilas Campus,
Ownership: PHED</td></tr>
</table>

7

<table>
<tr><th>Component</th><th>Function</th><th>Description</th><th>Location & Ownership</th></tr>
<tr><td>Clear water Rising mains</td><td>Pumping of water</td><td>New - 13.74 km</td><td>Location: Within ROW
Ownership: Municipal Council</td></tr>
<tr><td>CWRs</td><td>Storage and pumping of clear water for supply</td><td>New
2 nos of CWRs of capacities of 550 KL and 600 KL</td><td>Location:
• Chandpole (550 KL)
• New Colony (600 KL)
Ownership: PHED</td></tr>
<tr><td>OHSRs, CWRs,</td><td></td><td>Refurbishment:

Existing raw water storage (235 KL),

Existing 4.54 MLD (RGF) & 3.25 MLD (RGF) WTPs,

Existing 4 nos. CWRs of 325, 325, 263 and 272 KL capacity,

Existing SRs (8nos. ESRs & 4 nos. GLSRs)</td><td>Locations:
• Raw Water Storage: At Bori (Masonry)
CWRs:
<table>
<tr><th>Location of Head Works</th><th>Type of CWR</th><th>Capacity of existing CWR (kl)</th></tr>
<tr><td>Udaivilas</td><td>RCC CWR</td><td>325</td></tr>
<tr><td>Bori</td><td>RCC CWR</td><td>325</td></tr>
<tr><td>AEn Office</td><td>Masonry CWR</td><td>263</td></tr>
<tr><td>New colony / Nai Abadi</td><td>RCC CWR</td><td>272</td></tr>
</table>
OHSRs and GLSRs-
<table>
<tr><th>Location of OHSR/GLSR /VFD PUMPS</th><th>Capacity of OHSR(KL)</th><th>OHSR Staging</th></tr>
<tr><td>New Rajpura OHSR</td><td>150</td><td>18</td></tr>
<tr><td>Navadera OHSR</td><td>325</td><td>15</td></tr>
<tr><td>Meera Dungari GLSR</td><td>225</td><td>GLSR</td></tr>
<tr><td>Khantwara GLSR</td><td>225</td><td>GLSR</td></tr>
<tr><td>Ghati GLSR new</td><td>368</td><td>GLSR</td></tr>
<tr><td>Ghati (II) GLSR (</td><td>450</td><td>GLSR</td></tr>
<tr><td>Shastri Colony OHSR</td><td>100</td><td>15</td></tr>
<tr><td>Ptrakar Colony OHSR</td><td>140</td><td>18</td></tr>
<tr><td>Sindhi Colony OHSR</td><td>325</td><td>18</td></tr>
<tr><td>Pratap Nagar OHSR</td><td>75</td><td>15</td></tr>
<tr><td>Mordern School OHSR</td><td>210</td><td>18</td></tr>
<tr><td>Ashok nagar OHSR</td><td>113</td><td>18</td></tr>
</table></td></tr>
<tr><td>Distribution Network</td><td>Water distribution</td><td>New

153.39 km Length</td><td>Location: Entire Town, within ROW
Ownership: Municipal Council</td></tr>
<tr><td>House Service Connections</td><td></td><td>New
12067 nos.</td><td>Houses</td></tr>
</table>

<table>
<tr><th>Component</th><th>Function</th><th>Description</th><th colspan="3">Location & Ownership</th></tr>
<tr><td>CRMCs and MCC</td><td>Consumer relations and SCADA system control for entire water supply system</td><td>New:
CRMC- 2 nos.
MCC- 1 no.</td><td colspan="3">Location- On Govt. Lands (to be decided)
Ownership- Govt. Land</td></tr>
<tr><td colspan="6">Sewerage</td></tr>
<tr><td>House Sewer Connections</td><td></td><td>New 6460 nos.</td><td colspan="3">Individual houses</td></tr>
<tr><td>Sewer Collection networks</td><td>Collect wastewater from houses and convey by a combination of gravity and pressure pumping to pumping station and ultimately to the STP</td><td>New Sewer Collection networks: 51.480 km
1. RCC pipes– 2.50 Kms.
2. HDPE DWC SN 8 pipe – 46.80 Kms.
3. HDPE pipes– 2.18 Kms</td><td colspan="3">Location: within existing ROW

Ownership: Municipal Council Dungarpur</td></tr>
<tr><td>Sewage Pumping Station (for ultimate design year 2055)</td><td>Sewer pumping stations are used to move wastewater to higher elevations in order to allow transport by gravity flow until the sewage reaches treatment plant.</td><td>New SPS of 3 3.0, 3.0 and 0.25 MLD capacities</td><td colspan="3"><table>
<tr><th>Location and capacity of SPS</th><th>Ownership</th></tr>
<tr><td>Near Padambhusan Shri Bhogi Lal Pandya Circle (3.0MLD). Location of SPS is in south direction of Dungarpur Town.</td><td>Rajasthan state Govt.</td></tr>
<tr><td>Near Ashram Vatika (3.0 MLD) Location of SPS is in west direction of Dungarpur Town.</td><td>Municipal Council, Dungarpur</td></tr>
<tr><td>Between RICCO & Gap Sagar (0.25 MLD). Location of SPS is in north-east of Dungarpur Town.</td><td>Rajasthan state Govt.</td></tr>
</table></td></tr>
</table>

Component	Function	Description	Location & Ownership
Rising mains	pumping from pumping station to STP	Rising mains for pumping sewers-**7300 m** (DI K-9 pipes of following details- 400 mm dia- 2700 m 400 mm dia- 800 m 150 mm dia- 3800 m)	**Location:** within existing ROW **Ownership:** Municipal Council Dungarpur
Sewage Treatment plants (for intermediate year 2040)	Treatment of collected wastewater to meet stipulated discharge standards	New 4 MLD STP	**Location: Zone-6 near Do river on Udaipur road. Ownership:** Rajasthan State Government The location of proposed STP is in north-west direction.
Faecal sludge and septage management (FSSM) works	Desludging of septage from household pits/ septic tanks, transportation & discharge to STP	New Procurement of desludging equipment with 4000 ltr (1 nos.) tanks capacity for collection of faecal sludge and septage from 5 wards	Proposed wards for collection of faecal sludge and septage from houses- 1, 2, 3, 4 and 5.

Table 8: Coordinates of Subproject Locations

COMPONENTS	Latitude	Longitude
Proposed STP 4.0 MLD site, Near Do River on Udaipur Road	23°51'47.51"N	73°41'33.06"E
Proposed SPS site 1 at Near Padambhusan Shri Bhogi Lal Pandya Circle	23°50'24.33"N	73°42'40.44"E
Proposed SPS site 2 Near Ashram Vatika	23°51'7.38"N	73°42'14.09"E
Proposed SPS site 3 Between RICCO & Gap Sagar	23°50'59.09"N	73°43'37.55"E
Proposed CWR at Chandpole	23°50'6.18"N	23°50'6.18"N
Proposed CWR at New Colony	23°50'52.30"N	73°42'38.67"E
Proposed Raw Water Sump Storage near Existing WTP in Bori, Dungarpur	23°50'2.62"N	73°41'2.64"E

4. Subproject Benefits

69. The subproject is primarily designed to improve environmental quality and living conditions of Dungarpur 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) collection of sewage from houses, appropriate treatment and safe disposal of sewage in scientific manner (iv) better public health particularly reduction in waterborne and infectious diseases; (v) reduced risk of groundwater contamination; (vi) reduced risk of contamination of treated water supplies; and, (vii) improvement in quality of water bodies due to disposal of treated effluent meeting disposal standards.

E. Implementation Schedule

70. Subproject is proposed for implementation under DBO modality, wherein which the successful bidder will design the water supply and sewerage systems and components (based on the feasibility/preliminary design/standards/guidelines provided in the bid document), construct, commission, and operate for 10 years, after which it will be transferred to Dungarpur Municipal Council. Therefore, at this stage, subproject is designed only in outline, and the details of components of the subproject provided in the draft IEE are as finalized at this stage based on the preliminary designs and as included in the bid documents. This IEE is based on the subprojects and components at primary stage, and the IEE will be further updated during the detailed design phase.

71. After the completion of preliminary designs, bids were invited in May 2022 for the subproject to be implemented under the DBO modality. After evaluation of Bids LOA was issued on 14 December 2022 and thereafter work is awarded. Project duration of Design Build is 36 months. After completion of construction and commissioning, scheme will be operated by DBO contractor for 10 years, and after which the O&M will be carried out by ULB and/or PHED.

Figure 3: Line diagram for water supply project, Dungarpur in Google Earth imagery

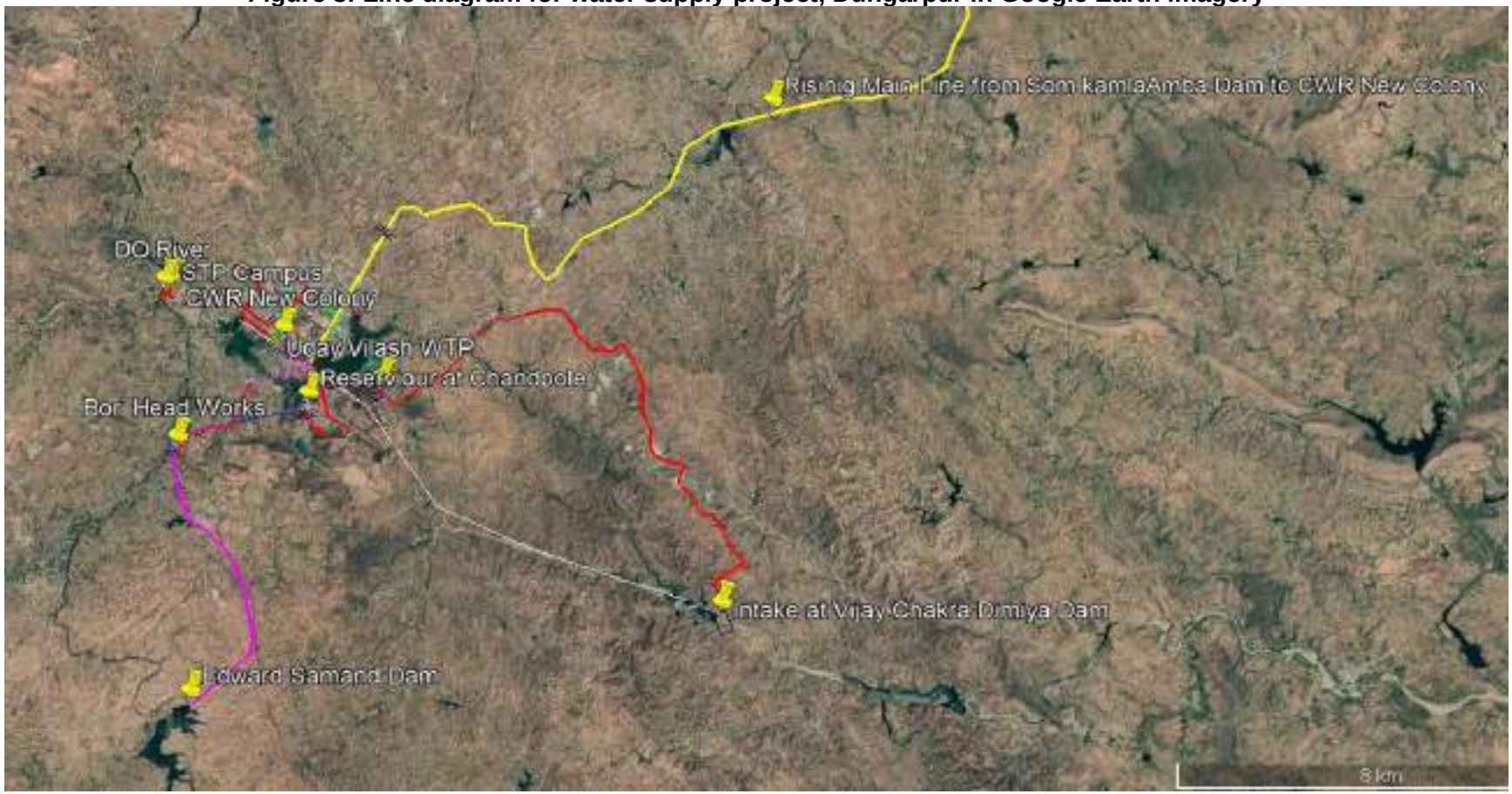


Figure 4: Schematic Layout of Proposed Water Supply Networks

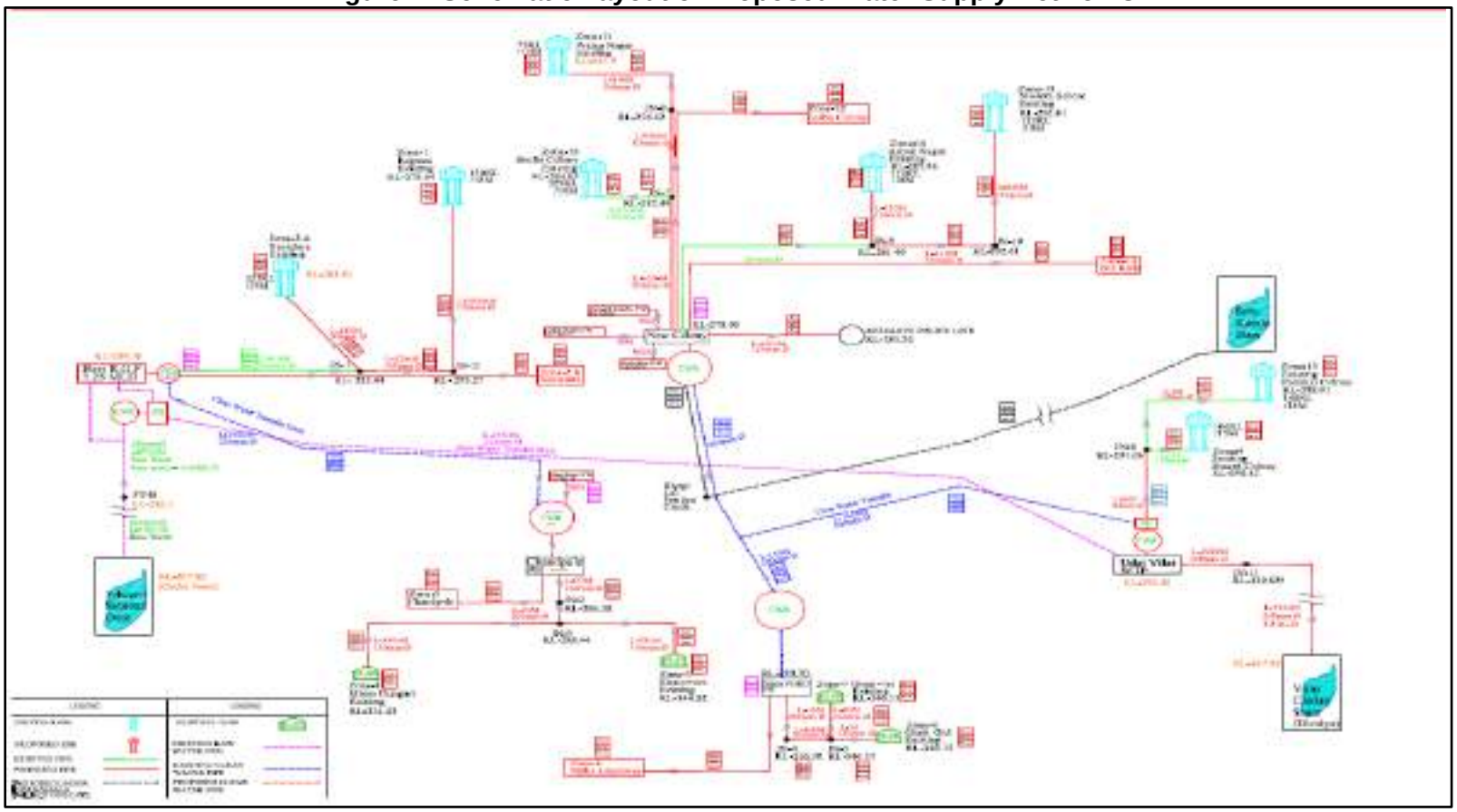


Figure 5: Location of Proposed Raw Water Sump Storage near Existing WTP in Bori, Dungarpur in Google Earth

Figure 6: Location of Proposed CWR1 location in Chandpole Colony, Dungarpur in Google Map

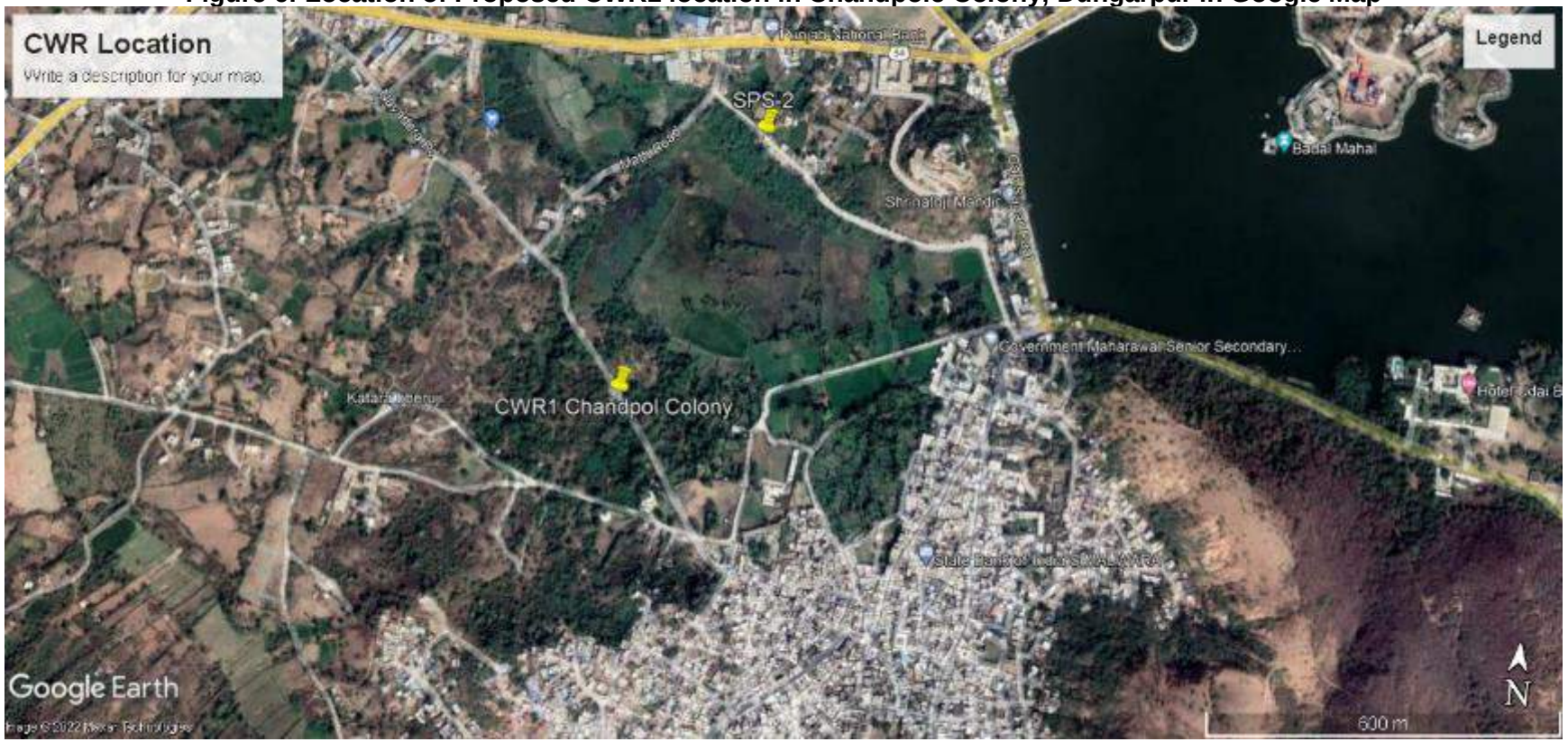


Figure 7: Location of Proposed CWR2 location in New Colony, Dungarpur in Google Map

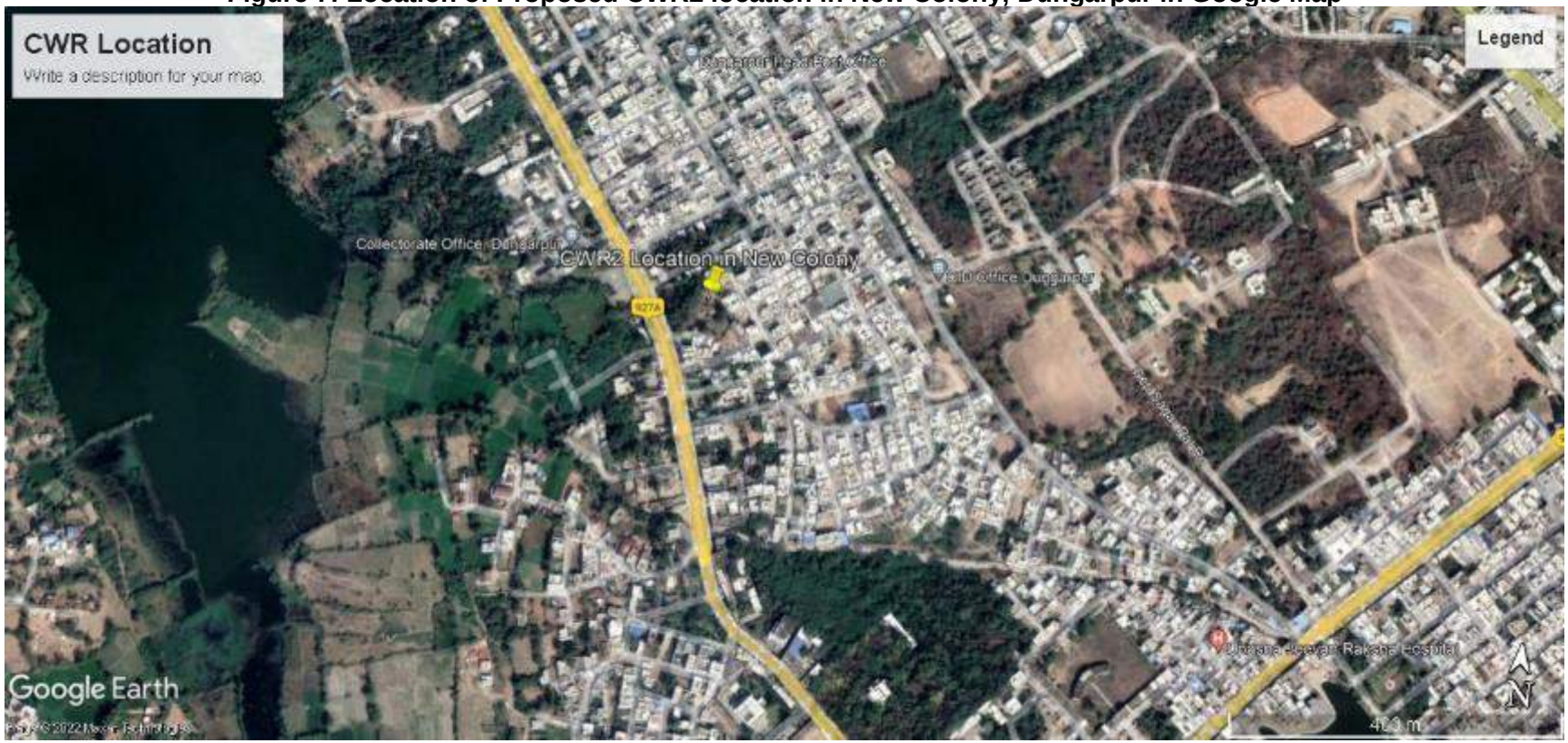


Figure 8: Location of Proposed STP near Do River on Udaipur Road in Google Earth

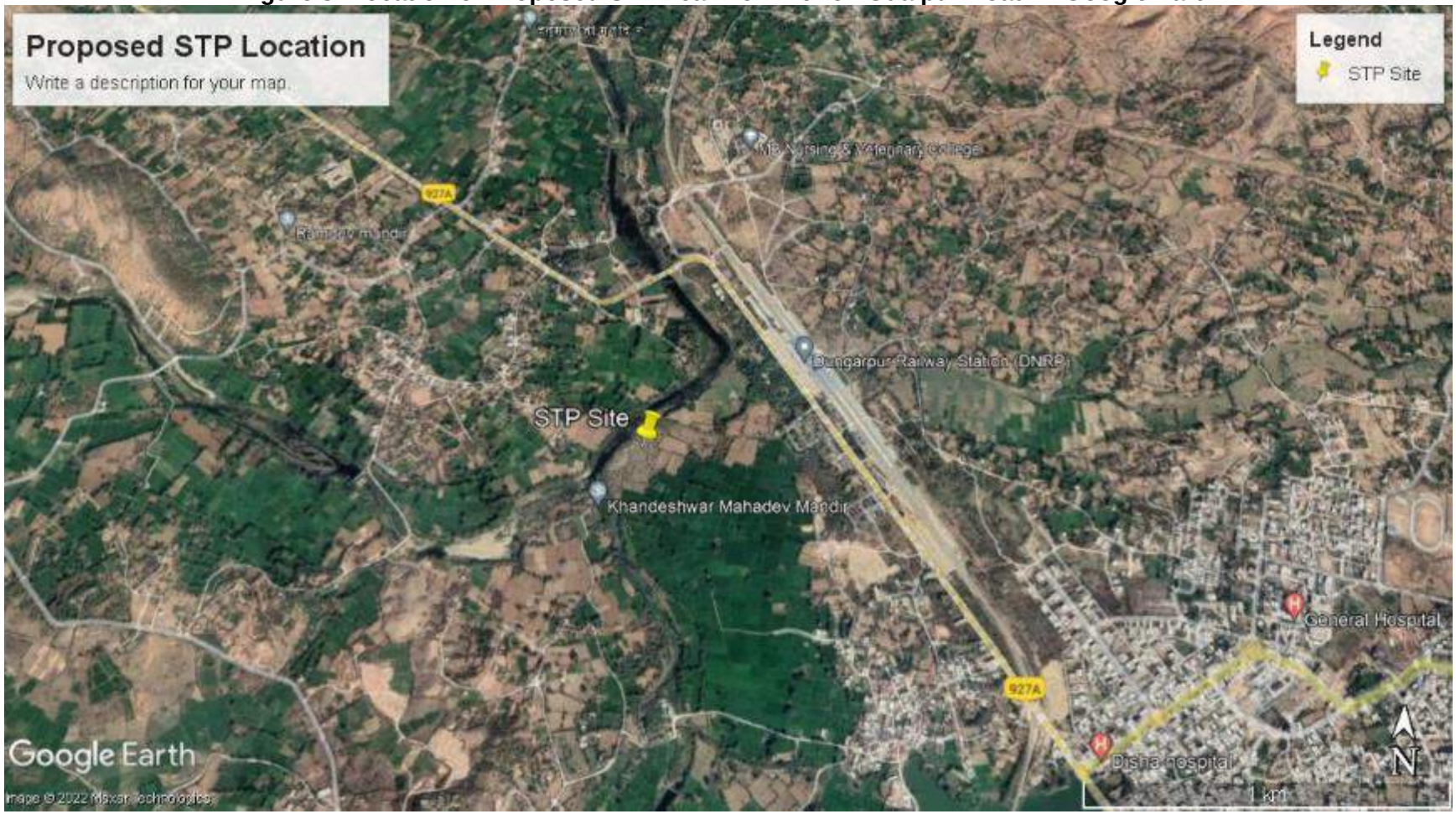


Figure 9: Location of Proposed SPS1 locations Near Ashram Vatika, Dungarpur in Google Earth

Figure 10: Location of Proposed SPS2 location Near near Bhogi Lal Pandya Circle in Google Earth Map

Figure 11: Location of Proposed SPS3 location Between RICCO & Gap Sagar, Dungarpur in Google Map

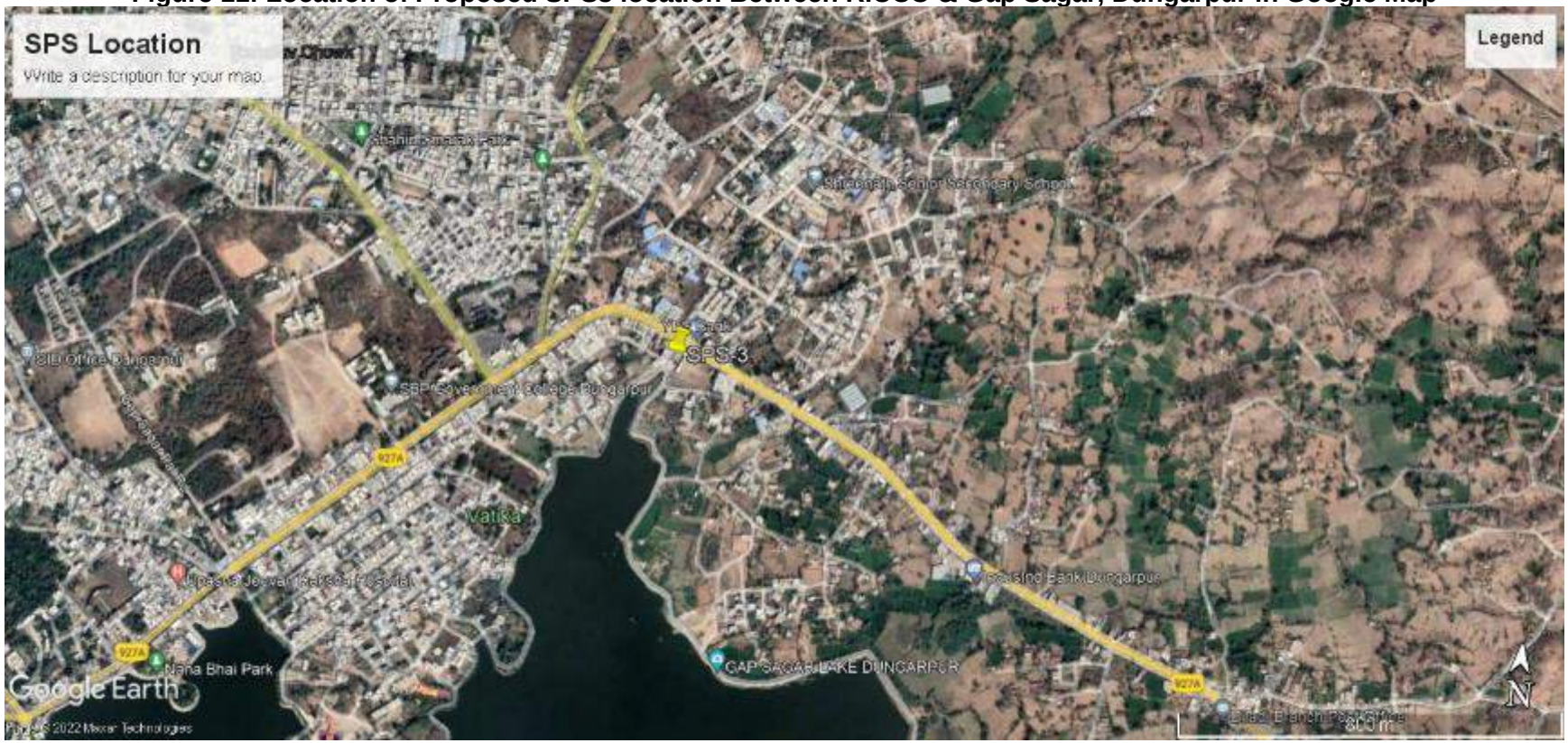


Figure 12: Layout of Proposed Sewer Networks and FSSM areas

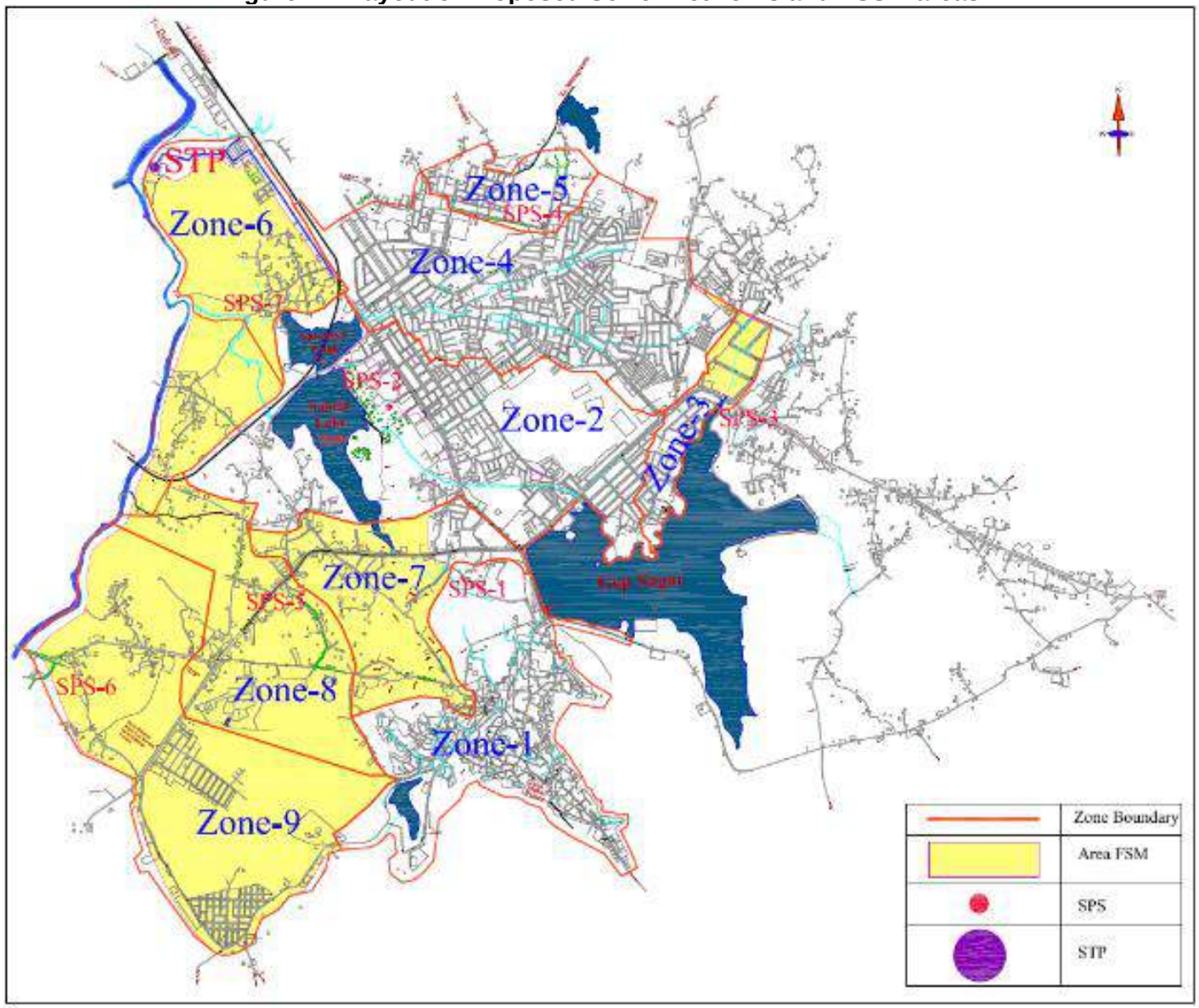
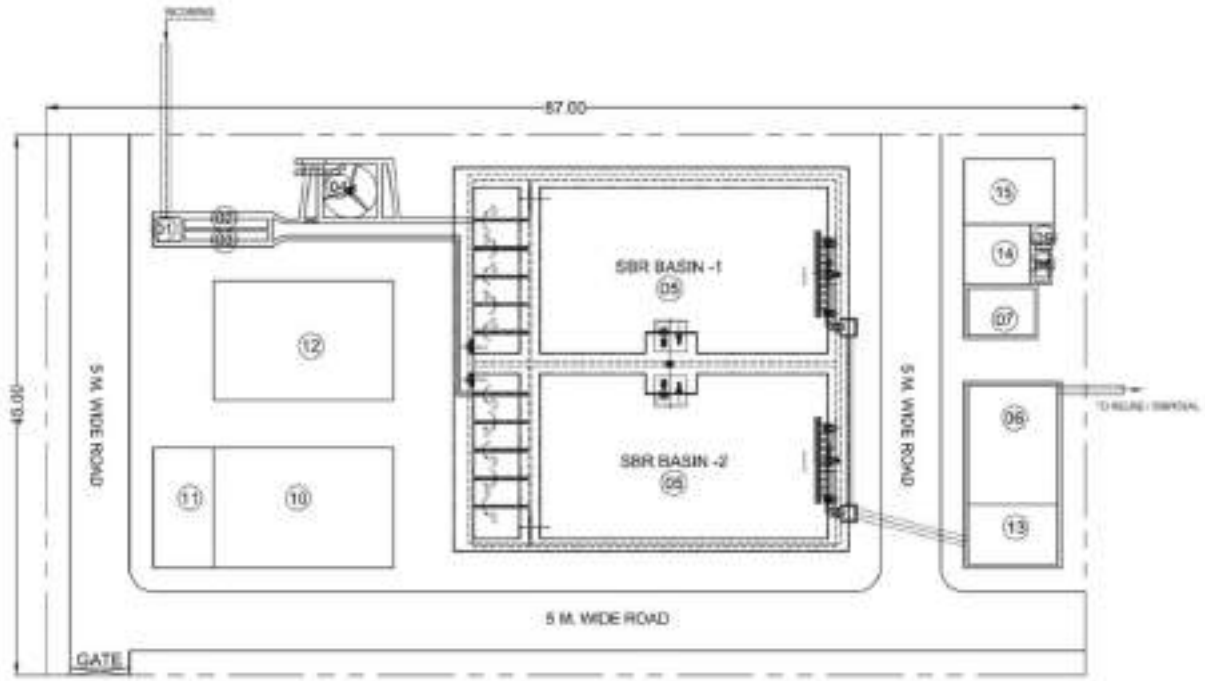


Figure 13: Typical Layout of Proposed STP



SL.NO.	PROCESS UNITS	SIZE/CAPACITY	QTY.	REMARK
01	INLET CHAMBER	2000 x 2000 x 2000 SWD.	01	
02	FINE SCREEN CHANNEL-MANUAL	7000 x 750 x 750 SWD.	01	
03	FINE SCREEN CHANNEL-MECHANICAL	7000 x 750 x 750 SWD.	01	
04	GRIT CHAMBER-MECHANICAL	4500 x 4500 x 800 SWD.	01	
05	SBR BASINS	30200 x 15100 x 5500 SWD.	02	
06	CHLORINATION TANK	15000 x 7000 x 3000 SWD.	01	
07	SLUDGE SUMP	5500 x 4000 x 2500 SWD.	01	
08	POLYELECTROLYTE DOSING TANKS	1200 x 1200 x 1200 SWD.	02	
09	CENTRATE SUMP	2000 x 1500 x 2000 SWD.	01	

BUILDING LIST				
10	HT SUBSTATION	15000 x 10000 x 4500 HT.	01	
11	DG SET HOUSE	10000 x 5000 x 4500 HT.	01	
12	SBR AIR BLOWER / MCC & CONTROL BLD.	15000 x 10000 x 10000 HT.		G+1
13	CHLORINATION CUM CHLORINE TONNER HOUSE (ABOVE CHLORINATION TANK)	7500 x 5000 x 4500 HT.	01	
14	CENTRIFUGE FEED PUMP HOUSE	5500 x 5000 x 4500 HT.	01	
15	CENTRIFUGE HOUSE	7500 x 5000 x 9500 HT.	01	G(STILT)+1

III. ANALYSIS OF ALTERNATIVES

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

73. The proposed water supply subproject component in Dungarpur include treated water conveyance, storage and distribution. Similarly, the sewerage component includes sewage collection network, transmission, treatment and treated wastewater reuse and disposal. Descriptions of various alternatives considered for critical components such as water source, sewage treatment, treated wastewater disposal etc., are presented in the following **Table 9**.

Table 9: Analysis of Alternatives

1.	**Project Need – No Project Alternative**
Type of alternative	'No project' alternative
Description of alternatives	Dungarpur subproject is proposed to improve the service levels of basic infrastructure – water supply and sewerage At present, residents of Dungarpur suffer from inadequate, intermittent and low-pressure supply. Presently, an intermittent water supply system is running in the town with actual service level of ~70 LPCD (once in a day for the average duration of 1-1.5 hours) at consumers' end, which is less than standard of 135 LPCD. The supply duration is about 1 to 1.5 hours with low pressure. System is old, inefficient, and leakages are frequent in water pipes, and consequently water losses are high. At present, no sever system is existing in Dungarpur Town. Living conditions due to lack of proper water supply and sewerage, are poor, unhealthy, unhygienic. Lack of sewerage treatment and disposal system infrastructure in town is also causing environmental pollution, overall poor quality of life. Poor environmental quality affects the urban poor more. The project intends to provide following benefits to the town population, and the "no project" alternative will deprive people of these benefits: (i) increased availability of potable water at appropriate pressure to all households including urban poor; (ii) reduced time and costs in accessing alternative sources of water. (iii) better public health particularly reduction in waterborne and infectious diseases; (iv) reduced risk of groundwater contamination; (v) reduced risk of contamination of treated water supplies; and, (vi) improvement in quality of water bodies due to disposal of treated effluent meeting disposal standards
Selected Alternative	Without subproject would yield the town to be continuously under-serviced that puts the health of the general public at an increasing risk and could potentially worsen the living environment. This 'no project' scenario would impede further social and economic development of the 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	**Water Demand** Total projected clear water demand for various design years is given below (including losses in the system) 2025 : 9.28 MLD 2040 : 10.28 MLD 2055 : 10.99 MLD **Present source:** At present water supply of the town at present the main sources of water are Edward Samand and Vijay Chakra Sagar dam. Beside these earlier some small quantity of water was also being obtained from nearby small Mandawa Khapeda anicut near to Taraghati, but now it has been closed as there is no sufficient water in this anicut. In addition to these, some sub surface sources (2 T/Ws and 2 O/Ws) are also at present running with the system. Therefore existing water supply in town is dependent on two local surface water Reservoirs viz Edward Samand and Vijay Chakra Sagar Dimiya dam, constructed exclusively for water supply needs, in addition to these, some sub surface sources (T/Ws and O/Ws) have also been connected with the system, but due to rocky terrain the yield of these ground water sources is very less and as the water table is regularly depleting fast therefore these would not sustain for longer. The details of surface sources together with the running tube wells & open wells and production details of water from these are given below in the table-

S. No.	Source	Net Capacity of Reservoir (mcft)	Present production MLD	Anticipated production in MLD for the year			Utility for this project
				2025	2040	2055	
1	Edward Samand	134	2.4	4.54	4.54	4.54	Proposed to keep continue for this project
2	Vijay Chakra Sagar	40	1.0	3.1	3.1	3.1	Proposed to keep continue for this project.
3	Tube wells	-	1.0	1.0	1.0	1.0	Proposed to keep continue for this project, after augmentation and will be used in case of lean Season and repair maintenance of surface water infrastructure
4	Open Wells	-	2.0	2.0	2.0	2.0	
5	SKA		-	0.59	2.46	4.36	New Source for

							Dungarpur town
		Total	6.4	11.23	13.1	15	

Details of proposed ground water sources is given below-

S.No.	Location	Type	No.	Production MLD
Tube wells				
1	Patrakar colony TW	Tube well	1	0.5
2	Darji wada TW	Tube well	1	0.5
	Total		2	1.0
Open wells				
1	Rani Bao OW	Open well	1	1.0
2	Kela bao OW	Open well	1	1.0
	Total		**2**	**2.0**

Proposed Surface water source- raw water of total
Two existing dams namely Edward Samand (for 4.54 MLD of water) and Vijay Chakra Sagar dam. (for 3.1 MLD of water) is proposed to be used additionally a new water source as SKA (Som Kamla Amba) dam. (for 4.36 MLD of water) will also be used.

The construction of Som Kamla Amba Project across Som river, a tributary of Mahi river was completed in the year 2000. The dam is located in Ashpur Tehsil of Dungarpur District, Rajasthan to provide the Irrigation cum drinking water facilities. The dam supplies drinking water to the tune of 8.1 MCM., besides irrigation supply to 26998.6 ha of Gross Command Area (GCA) and 19155.42 ha of Culturable Command Area (CCA).

Proposed Ground Water sources. At present there are 7 Nos Tube wells and 15 Nos Dug Wells / Open wells, out of these existing TW/ OW, 2 Nos Tube wells and 2 Nos Open wells are proposed to be used for abstracting 3MLD of raw water.

Selected Alternative	**Selected source:** **Ground Water: 2 nos. tube well2 and 2 nos. open/dug wells** **Surface Water:** Two existing surface water supply source dams namely Edward Samand and Vijay Chakra Sagar Dimiya dam and one new surface water source SKA (Som Kamla Amba) dam.
3	**Sewage treatment process**
Type of alternative	Sewage treatment technology

Description of alternatives

Various secondary treatment technologies have been considered in the sewage treatment process after the primary treatment consisting of screening and grit removal. Secondary treatment is the critical process that removes the organic putrescible organic matters and brings down the BOD of the effluent to meet the discharge standards. Following process technologies considered: Waste Stabilization Ponds; Aerated Lagoons; Up Flow Anaerobic Sludge Blanket (UASB) + FAL; Conventional Activated Sludge Process (ASP); and Cyclic Activated Sludge Process/Sequential Batch Reactor (SBR)

A comparison of various treatment technologies is presented below in terms pf merits of the process over key parameters like quality characteristics and land requirement:

Item	**Conventional Activated Sludge**	**Extended Aeration**	**UASB followed by Facultative Aerobic Lagoon**	**Cyclic Activated Sludge Process / SBR**
Performance (Typical)	Mostly stable	Mostly stable	Varying with temperature variations	Complete Stable
BOD	<30 ppm	<30 ppm	<30 ppm	<10 ppm
COD	<250 ppm	<250 ppm	<250 ppm	<50 ppm
Suspended solids	<50 ppm	<50 ppm	<100 ppm	<10 ppm
Total Nitrogen	No Treatment	No Treatment	No Treatment	<10 ppm
Total Phosphorous	No Treatment	No Treatment	No Treatment	<2 ppm
Coliform removal, %	60-90	60-90	-	99.99%
Re-use Options	can only be used for low end usages like flushing and gardening tertiary treatment required for high and usages like construction water, industrial usages, cooling water etc.	can only be used for low end usages like flushing and gardening tertiary treatment required for high and usages like construction water, industrial usages, cooling water etc.	can only be used for low end usages like flushing and gardening tertiary treatment required for high and usages like construction water, industrial usages, cooling water etc.	Can be used for low end usages as well as for high end usages without any tertiary treatment.
Land requirement (m2/person)	0.1-0.18	0.08-0.15	0.2-0.25	0.035-0.07
Process Power requirement (kWh/person/year)	12-15	16-19	4-5	6-8
Sludge handling	Sludge needs digestion prior to drying on beds or use mech. devices	Digested sludge, dry on beds or use mech. devices	Digested sludge, dry on beds or use mech. Devices	Digested sludge, dry on beds or use mech. devices
Equipment requirement (excluding screening and grit removal)	Aerators, recycle pumps, scrapers, thickeners, digester, dryers, gas equipment	Aerators, recycle pumps, sludge scrapers, (for large settlers)	Nil (gas collection optional)	Diffuse aeration system, recycle sludge and waste sludge pumps, decanters
Operational characteristics	Skilled Operation required	Simpler than activated sludge	Simpler than activated sludge	Complete automatic operation by computer and

<table>
<tr><td></td><td>
<table>
<tr><td></td><td></td><td></td><td></td><td>PLC. Negligible manpower Intervention required</td></tr>
<tr><td>Special features</td><td>Considerable equipment and skilled operation required especially if gas collection and usage involved. Method considered mainly for large sized plants</td><td>BOD removal high, effluent nitrified relatively high power requirement, favoured for small and medium sized plants</td><td>Minimal to negligible power requirement of the system makes it an economical alternative if gas revenue is neglected land requirement is also relatively small but depends on type of past treatment adopted</td><td>Highest treatment efficiency with crystal quality power requirement is 50% of conventional technologies land requirement is less than 50% of conventional technologies</td></tr>
</table>
</td></tr>
<tr><td>Selected Alternative</td><td>Selected processes: Sequential batch reactor (SBR)
The genesis of selecting a suitable treatment process is primarily correlated with degree of treatment aimed to be achieved. In India, the latest court Order of April 2019 (NGT Order dated 30 April 2019) mandates all the civic authorities to adopt the treated sewage characteristics applicable are as shown in table below:
<table>
<tr><td>Parameter</td><td>Standards</td></tr>
<tr><td>BOD, mg/l</td><td>10</td></tr>
<tr><td>TSS, mg/l</td><td>20</td></tr>
<tr><td>COD, mg/l</td><td>50</td></tr>
<tr><td>Nitrogen-Total, mg/l</td><td>10</td></tr>
<tr><td>Phosphorus- Total, mg/l</td><td>1</td></tr>
<tr><td>Fecal Coliform (MPN/ 100 ml)</td><td>100 (permissible 230)</td></tr>
</table>
SBR provides highest treatment efficiency possible in a single step biological process. The system is operated in a batch reactor mode this eliminates all the inefficiencies of the continuous processes. A batch reactor is a perfect reactor, which ensures 100% treatment. Separate modules are provided to ensure continuous treatment. The complete process takes place in a single reactor, within which all biological treatment steps take place sequence. The complete biological operation is divided into cycles. Each cycle is of 3 – 5-hour duration, during which all treatment steps take place.</td></tr>
<tr><td>4</td><td>Treated wastewater disposal</td></tr>
<tr><td>Type of alternative</td><td>Treated wastewater disposal – reuse applications</td></tr>
<tr><td>Description of alternatives</td><td>Discharge of treated wastewater into Water body
(ii) Reuse the treated wastewater in non-potable uses

Rajasthan is a water scarce region and receives low rainfall. Recognizing the importance of treated wastewater in reducing the demand on water, Sewerage and Wastewater Policy, 2016, of Rajasthan promotes the reuse of treated sewage for non-potable applications, and also to make sewerage projects environmentally sustainable. This policy prioritizes reuse in irrigation (agriculture, forestry, and landscaping), followed by fish farming, industry and non-potable domestic reuse. Policy suggests construction of storage tanks to store treated wastewater to facilitate reuse. Policy prescribes that the detailed project report (DPR) should clearly define the best reuse option specific to the town and prepare a Reuse Action Plan part of the DPR following water quality norms and legal implications.</td></tr>
</table>

	Accordingly, it is proposed to utilize the treated wastewater for non-potable uses. There are vast agricultural practices near the STP sites, where there is scarcity of water for irrigation, due to which mostly rain fed agriculture is being practiced. A detailed Reuse Action Plan will be prepared during the detailed design phase, and, implemented. It is also proposed that the excess / surplus treated wastewater which is not being utilized in reuse will be discharge into natural drain located near STP, and necessary facilities – pipelines and pumping facilities, will be developed.
Selected Alternative	Reuse in non-potable applications and discharge excess/surplus into natural stream located near STP site
5	**Project Locations**
Description of alternatives	**Intake Well and Pump House at Vijay Chakra Sagar Dam-** Proposed dam is in the possession of Water Resource Department (WRD) of Govt. of Rajasthan. Sufficient space is available in dam for the construction of intake well and pump house. **Location of RWR, CWRs and pump houses**. All the 5 proposed clear water pump houses, one Raw water pump house, Raw water reservoirs (1 no.) and Clear water reservoirs (2 nos.) are proposed within the existing PHED campuses as per Table-2). There are sufficient vacant lands available for the construction of these structures at these locations. Therefore no alternative locations are required to be considered for construction of these structures. **SPS Locations-** all the three SPSs are proposed in Rajasthan Govt. Lands to avoid any impact on livelihood of any person. Sewage pumping station are proposed in vacant government lands on the basis of drainage pattern of town, availability of government land with no any other use, adequate land parcel, site away from habitation etc. Out of 3 SPS location one location is located in market area. This location has been selected on the basis of its natural gravity flow of house discharge without any additional mechanical flow. There is no alternative govt. land in nearby location so this location has been selected to avoid any land acquisition and gravity flow and requirement of minimum electricity in sewer collection. **STP location**. Based on the technical feasibility of gravity flow system, sewerage system in Dungarpur is designed and optimized with one sewage treatment plants (4MLD). Site selection is guided by technical suitability, availability of government owned vacant land, adequate land parcel, site away from habitation, and where there is a channel to discharge the treated wastewater. The selected site of STP is away from habitations and surrounded by agricultural lands (no habitations within 100 mts from STP sites proposed at Do river on Udaipur Road, Dungarpur). As far as possible a 100 m distance from proposed STPs from habitation is desirable, and also considering the selected superior and compact sewage treatment technology (SBR), the proposed site for construction of WTP is suitable for the construction of STP and therefore no site alternative is considered. Proposed STP location is located in Malpur village at north direction from city area of Dungarpur. The allocated for the STP is approx. 11.14 ha from Khasra No. 312 and 313. **Water distribution and sewer lines**. Sewer and water supply pipes are proposed along the roads/streets in the town within the road right-of-way (ROW). In wider roads water 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. Sewers will be mostly laid in the center of the road, away from water pipes. There are existing asbestos cement pipes underground in the existing water supply networks, the alignment will be fine-tuned during the detailed design, to avoid existing AC pipe alignments as far as possible.

IV. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORKS

A. ADB Safeguard Policy

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

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

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

76. The environmental impacts of Dungarpur water supply and sewerage subproject have been identified and assessed as part of the planning and design process. An environmental assessment using ADB's REA checklist for water supply and sewerage (see **Appendix 1**) was conducted, and results of the assessment show that the subproject is unlikely to cause significant adverse impacts. Thus, this IEE has been prepared in accordance with ADB SPS's requirements for environment category B projects.

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

78. **Environmental Audit of Existing Facilities.** ADB SPS, 2009 requires an environmental audit, if a subproject involves facilities and/or business activities that already exist or are under construction, including an on-site assessment to identify past or present concerns related to impacts on the environment. The objective of this compliance audit is to determine whether actions were in accordance with ADB's safeguard principles and requirements for borrowers/clients, and to identify and plan appropriate measures to address outstanding compliance issues.

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

(i) For environmental category A projects, a draft EIA report at least 120 days before Board consideration;
(ii) Final or updated EIA and/or IEE upon receipt; and
(iii) Environmental monitoring reports submitted by the PMU during project implementation upon receipt.

80. **Consultation and Participation.** ADB SPS, 2009 require borrower to conduct meaningful consultation[1] with affected people and other concerned stakeholders, including civil society, and facilitate their informed participation. The consultation process and its results are to be documented and reflected in the environmental assessment report.

81. **Grievance Redress Mechanism.** ADB SPS, 2009 require borrowers to establish a mechanism to receive and facilitate resolution of affected people's concerns, complaints, and grievances about the subproject's performance. The grievance mechanism shall be scaled to the risks and adverse impacts of the subproject.

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

83. **Unanticipated Environmental Impacts.** Where unanticipated environmental impacts become apparent during subproject implementation, ADB SPS, 2009 requires the borrower to update the environmental assessment and EMP or prepare a new environmental assessment and EMP to assess the potential impacts, evaluate the alternatives, and outline mitigation measures and resources to address those impacts.

84. **Occupational Health and Safety.** ADB SPS, 2009 requires the borrower[2] to ensure that workers[3] are provided with a safe and healthy working environment, taking into account risks inherent to the sector and specific classes of hazards in the subproject work areas, including physical, chemical, biological, and radiological hazards. Borrower shall take steps to prevent accidents, injury, and disease arising from, associated with, or occurring during the course of

[1] Per ADB SPS, 2009, meaningful consultation means a process that (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle 1; (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.

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

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

work, including: (i) identifying and minimizing, so far as reasonably practicable, the causes of potential hazards to workers; (ii) providing preventive and protective measures, including modification, substitution or elimination of hazardous conditions or substances; (iii) providing appropriate equipment to minimize risks and requiring and enforcing its use; (iv) training workers and providing them with appropriate incentives to use and comply with health and safety procedures and protective equipment; (v) documenting and reporting occupational accidents, diseases, and incidents; and (vi) having emergency prevention, preparedness, and response arrangements in place.

85. **Community Health and Safety.** ADB SPS, 2009 requires the borrower to identify and assess risks to, and potential impacts on, the safety of affected communities during the design, construction, operation, and decommissioning of the subproject, and shall establish preventive measures and plans to address them in a manner commensurate with the identified risks and impacts.

86. **Physical Cultural Resources.** Borrower is responsible for siting and designing the subproject to avoid significant damage to physical cultural resources. ADB SPS, 2009 requires that such resources likely to be affected by the subproject are identified, and qualified and experienced experts assess the subproject's potential impacts on these resources using field-based surveys as an integral part of the environmental assessment process. When the proposed location of a subproject component is in areas where physical cultural resources are expected to be found as determined during the environmental assessment process, chance finds procedures shall be included in the EMP.

87. **ADB SPS International Best Practice Requirements**. ADB SPS, 2009 requires that, during the design, construction, and operation of the project, the executing agency shall apply pollution prevention and control technologies and practices that are consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety (EHS) Guidelines. (IFC's General EHS Guidelines[4] and Sector Specific [Water and Sanitation] Guidelines[5]). These standards contain performance levels and measures that are normally acceptable and applicable to projects. These standards contain performance levels and measures that are normally acceptable and applicable to projects. When Government of India regulations differ from these levels and measures, the PMU and PIUs will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the PMU and PIUs will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS, 2009.

B. National Laws

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

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

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

subprojects including design, construction, and operation and maintenance.

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

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

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

92. None of the components of this water supply and sewerage subproject falls under the ambit of the EIA Notification 2006, and therefore EIA Study or environmental clearance is not required for the subproject.

93. **Applicable environmental regulations.** Besides EIA Notification 2006, there are various other acts, rules, policies and regulations currently in force in India that deal with environmental issues that could apply to infrastructure development. The specific regulatory compliance requirements of the subproject are shown in **Table 10**.

C. Environmental Regulatory Compliance

94. Table 10 presents a summary of environmental regulations and mandatory requirements applicable to Dungarpur Town water supply and sewerage subproject.

Table 10: Applicable Environmental Regulations

Law	Description	Requirement	Relevance to Project Phase
National Environment Policy (NEP), 2006.	NEP is a comprehensive guiding document in India for all environmental conservation programs and legislations by Central, State and Local Government. The dominant theme of this policy is to	RSTDSP should adhere to NEP principle of “enhancing and conservation of environmental resources and abatement of pollution”.	All phases of project

Law	Description	Requirement	Relevance to Project Phase
	promote betterment of livelihoods without compromising or degrading the environmental resources. The policy also advocates collaboration method of different stakeholders to harness potential resources and strengthen environmental management.		
Rajasthan State Environment Policy, 2010 And Rajasthan Environment Mission and Climate Change Agenda for Rajasthan (2010-14)	Follows the National Environment Policy, 2006 and core objectives and policies are: -Conserve and enhance environmental resources; assure environmental sustainability of key economic sectors; and, improve environmental governance and capacity building - it recommends specific strategies and actions to address the key environmental issues: water resources, desertification and land degradation, forest and biodiversity, air quality, climate change: adoption and mitigation, mining, industry, tourism, energy, urban development, etc. - Establishment of Environment Mission under the chairpersonship of the Chief Minister and a Steering Committee under the chairpersonship of Chief Secretary, Government of Rajasthan Tasks force set up for six key areas	Project implementation should adhere to the policy aims of: conservation and enhancement of environmental resources, integration of environmental concerns into projects/plans, and capacity building in environmental management. Under water sector, major concerns, as the policy notes, are huge water losses and wastage, declining water availability, pollution. Relevant recommendations for the project include control of losses, integrated water resources management, control of raw water pollution[18], reuse and recycling. Avoid/minimize use of forest lands. With reference to climate change adoption and mitigation following should be considered in the project: (i) diminishing flows in surface water bodies, and groundwater depletion, and revival traditional water bodies as water sources (lakes/tanks); (ii) equal stress on demand side management in water; and (iii) minimize energy use - design energy efficiency systems.	All phases of project
EIA Notification,2006	Projects indicated in the schedule of this notification requires EIA study and environmental clearance.	None of the components of this subproject falls under the ambit of the notification; no EIA study or environmental clearance required	-

Law	Description	Requirement	Relevance to Project Phase
Central Ground Water Authority Public Notice 2/100	Public Notice specifies districts and areas where there are restrictions on the construction and installation of any new structure for extraction of groundwater resources without specific approval from the CGWA	Subprojects belonging to the Notified Areas in the Public Notice and will require new structures on extracting groundwater should seek the permission from the Central Groundwater Authority	Not applicable
Public Health Engineering Department Office Order P5 (1) PHE-2010 dated July 14 2020	PHED Office Order states that the State Government is instructed that permits for any new tube wells, bore wells or any structures extracting ground water shall be secured from the District Collector	Subprojects with components shall secure permits from the District Collector for components that include any new tube wells, bore wells or structures extracting groundwater	Not applicable
Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments (1987)	Act was enacted to provide for the prevention and control of water pollution and the maintaining or restoring of wholesomeness of water, by Central and State Pollution Control Boards and for conferring on and assigning to CPCB/SPCBs powers and functions relating to water pollution control. Control of water pollution is achieved through administering conditions imposed in consent issued under provision of the Water (Prevention and Control of Pollution) Act of 1974. These conditions regulate the quantity and quantity of effluent, the location of discharge and the frequency of monitoring of effluents. Any component of the subproject having the potential to generate sewage or trade effluent will come under its purview. Such projects have to obtain Consent to establish (CTE) under Section 25 of the Act from Rajasthan State Pollution Control Board (RSPCB) before starting implementation and Consent to Operate (CTO) before commissioning.	Proposed STP will require CTE (prior to start of construction works) and CTO (prior to start of operation) from Rajasthan State Pollution Control Board (RSPCB) For the refurbishment of 2 existing WTPs, CTE and CTO will also be required as per requirement of RSPCB 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)	Construction and Operation
Air (Prevention and Control of Pollution) Act of 1981, Rules of	This Act was enacted to achieve prevention, control and abatement of air pollution activities by assigning	The following will require CTE and CTO from RSPCB: (i) Diesel generators (more than 15 KVA); (ii) Batching Plant hot	Construction and operation

Law	Description	Requirement	Relevance to Project Phase
1982 and amendments.	regulatory powers to Central and State boards for all such functions. The Act also establishes ambient air quality standards. The projects having potential to emit air pollutants into the atmosphere have to obtain CTE and CTO under Section 21 of the Act from RSPCB. The occupier of the project/facility has the responsibility to adopt necessary air pollution control measures for abating air pollution.	mix plants; and (iii) stone crushers, if installed for construction. All relevant forms, prescribed fees and procedures to obtain the CTE and CTO can be found in the RSPCB website (http://environment.rajasthan.gov.in) If ready mix concrete and hot mix bitumen is procured from third party, contractor has to 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	-
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.	None of the components of the subproject are located within the protected Area. Therefore, this act is not applicable.	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	Most of the proposed components are within municipal boundary of Dungarpur where no forest areas are present. Intake and rising mains of water supply are away from municipal limits. Confirmation of presence of any forest areas in the alignment of rising main will be required during confirmatory survey	Pre-construction and construction

Law	Description	Requirement	Relevance to Project Phase
Environmental (Protection) Act, 1986 amended in 1991 and the following rules/notifications:	This is an "umbrella" legislation that empowers the Central Government to take all necessary measures to protect and improve the quality of the environment and prevent, control and abate environmental pollution. Empowers central government to enact various rules to regulate environmental pollution, including standards for quality of air, water, noise, soil; discharge standards or allowable concentration limits for environmental pollutants, handling of hazardous substances, locating/prohibiting industries, etc.,	There are rules / notifications that have been brought out under this Act, which are relevant to RSTDSP, and are listed below	Construction and operation
Environmental Standards (ambient and discharge).	Emissions and discharges from the facilities to be created or refurbished or augmented shall comply with the notified standards	**Appendix C-2** provides ambient air quality standards, emission limits and **Appendix C-3** emission stack height requirements for diesel generators. **Appendix C-8** provides STP discharge standards	Construction and operation
Noise Pollution (Regulation and Control) Rules, 2000 amended up to 2010.	Rule 3 of the Act specifies ambient air quality standards in respect of noise for different areas/zones.	**Appendix C-7** 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;	Contractor to follow all the rules during construction works	Construction and operation

Law	Description	Requirement	Relevance to Project Phase
	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.		
Construction and Demolition Waste Management Rules 2016	(i) Every waste generator shall segregate construction and demolition waste and deposit at collection centre or handover it to the authorized processing facilities. (ii) Shall ensure that there is no littering or deposition so as to prevent obstruction to the traffic or the public or drains. (iii) Large generators (who generate more than 20 tons or more in one day or 300 tons per project in a month) shall submit waste management plan and get appropriate approvals from the local authority before starting construction or demolition or remodelling 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;	Construction waste shall be collected at stockpile area for 8-10 days and will be sent to disposal site. Disposal site shall be identified and allotted by Municipal Council after mobilization of contractor (during SIP period) and can't be mentioned at this time. Contractor to follow all the rules during construction works. Sludge or any material if classified as hazardous waste / material is to be handled and disposed according to this Rules	Construction
Hazardous and Other Wastes (Management and	Responsibilities of the occupier for management of hazardous and other wastes. - (1) For the	Contractor to comply all the requirements of this Act during construction works.	Construction and operation

Law	Description	Requirement	Relevance to Project Phase
Transboundary Movement) Rules, 2016,	management of hazardous and other wastes, an occupier shall follow the following steps, namely:- (a) prevention; (b) minimization; (c) reuse, (d) recycling; (e) recovery, utilization including co-processing; (f) safe disposal. (2) The occupier shall be responsible for safe and environmentally sound management of hazardous and other wastes. (3) The hazardous and other wastes generated in the establishment of an occupier shall be sent or sold to an authorized actual user or shall be disposed of in an authorized disposal facility. (4) The hazardous and other wastes shall be transported from an occupier's establishment to an authorized actual user or to an authorized disposal facility in accordance with the provisions of these rules. (5) The occupier who intends to get its hazardous and other wastes treated and disposed of by the operator of a treatment, storage and disposal facility shall give to the operator of that facility, such specific information as may be needed for safe storage and disposal. (6) The occupier shall take all the steps while managing hazardous and other wastes to-6 (a) contain contaminants and prevent accidents and limit their consequences on human beings and the environment; and (b) provide persons working in the site with appropriate training, equipment and the information necessary to ensure their safety.		
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,	Not applicable as subprojects components are not located in or near to designated wetland area.	Not applicable

Law	Description	Requirement	Relevance to Project Phase
	and reclamation. The Central Government may permit any of the prohibited activities on the recommendation of Central Wetlands Regulatory Authority.		
Ancient Monuments and Archaeological Sites and Remains Act, 1958 and Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010.	The Act designates areas within 100 meters (m) of the "protected monument/area" as "prohibited area" and beyond that up to 200 m as "regulated area" respectively. No "construction" is permitted in the "prohibited area" and any construction activity in the "regulated area" requires prior permission of the Archaeological Survey of India (ASI).	Jain Temple, Baroda (approx. 16 km) and Dev Somnath Temple (approx. 37 km) in Dungarpur district are ASI Monuments, these temples are far away from municipal boundary and therefore project activities will not have impact on both the protected monuments.	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 et–.	Not applicable - there are no state protected monuments in the town	Not applicable
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	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	Construction

Law	Description	Requirement	Relevance to Project Phase
	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. • Safeguarding the machinery with flywheel of moving parts • Safe handling and use of plants operated by compressed air • Fire safety • Limit of weight to be lifted by workers individually. • Safety in electric wires, apparatus, tools and equipment • Provide safety net,	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 tunnelling Chapter XX- ladders and step ladders Chapter XXII- structural frame and formworks Chapter XXIV- medical facilities and first aid box	

Law	Description	Requirement	Relevance to Project Phase
	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 I, 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
The Child Labour (Prohibition and Regulation) Act, 1986	Prohibits employment of children below 14 years of age in certain occupations and processes	No child labour should be employed	Construction and operation

Law	Description	Requirement	Relevance to Project Phase
	Employment of child labor is prohibited in building and construction Industry.		
Minimum Wages Act, 1948	Minimum wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of buildings, roads and runways are scheduled employment.	Applicable to all construction works in the project. All construction workers should be paid not less than the prescribed minimum wage	Construction and operation
Workmen Compensation Act, 1923	Provides for compensation in case of injury by accident arising out of and during the course of employment.	Compensation for workers in case of injury by accident	Construction and operation
Equal Remuneration Act, 1979	Provides for payment of equal wages for work of equal nature to male and female workers and not for making discrimination against female employees in the matters of transfers, training and promotions etc.	Equal wages for work of equal nature to male and female workers	Construction and operation
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.	Most of the proposed components are within municipal boundary of Dungarpur where no forest areas are present. Intake and rising mains of water supply are away from municipal limits. Confirmation of presence of any forest areas in the alignment of rising main will be required during confirmatory survey	Pre-construction and construction
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	The objective of the caution is to make the person handling to take all pre-cautionary measures and make them aware of all the possible risk.	The following signs and personal protective equipment shall be used in handling ACM.	Construction

Law	Description	Requirement	Relevance to Project Phase
Contaminated Products.			
IS 11451: Safety and Health Requirements related to Occupational Exposure to Asbestos contaminated Products.	These standard details the occupational exposure allowable and safety at work place to be enforced.	In the project the norms pertaining to limiting number of hours working with ACM will be 8.0 hrs/48 hrs a week and the medical examination has to be periodic; the environmental monitoring has to be done as per the protocol. The safety at 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	There are no Ramsar sites in or near Durgapur Town. Not applicable to Durgapur Town water supply and sewerage subproject.	Not applicable

Law	Description	Requirement	Relevance to Project Phase
	countries to include wetland conservation in their national land use plans.		
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973	India is a signatory of this convention which aims to control international commercial trade in endangered species	Not applicable in this project as no endangered species of wild fauna and flora is found in project town.	-
Montreal Protocol 1992	India is a signatory of this convention which aims to reduction in the consumption and production of ozone-depleting substances (ODS), while recognizing differences in a nation's responsibilities. Ozone depleting substances are divided in two groups Chlorofluorocarbons (CFCs) and Hydrochlorofluoro 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	Not applicable to this project as no migratory species of wild animals are reported in the project areas.	Not applicable

Law	Description	Requirement	Relevance to Project Phase
	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.		

95. **Clearances / permissions to be obtained prior to start of construction**. **Table 11** 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 11: Clearances and permissions required for Construction activities.

S. No	Construction Activity	Statute under which Clearance is Required	Implementation
1	Land for project activity	Allotment and approval for specific land use	ULB
2	Pipe laying works	Permission from Dungarpur Council and PWD (where applicable)	PIU
3	Establishment of construction camps	Allotment and approval for specific land use	Contractor
4	Construction of new STP	Consent to establish and consent to operate under Water Act, 1974 from RSPCB	PIU & Contractor
5	Tree Cutting	State forest department/Revenue (Tehsildar)	PIU
6	Hot mix plants, Crushers, Batching plants and DG Set	Consent to establish and consent to operate under Air Act, 1981 from RSPCB	Contractor
7	Storage, handling and transport of hazardous materials	Hazardous Wastes (Management and Handling) Rules. 2016 Manufacturing, Storage and Import of Hazardous Chemicals Rules, 1989 from RSPCB	Contractor
8	Sand mining, quarries and borrow areas	Permission from District Collector/ State Department of Mines & Geology	Contractor
9	New quarries and borrow areas	Environmental clearance under EIA Notification 2006	Contractor
10	Use of vehicles and equipment	Pollution under control certificate (PUC) form RTO	Contractor
11	Temporary traffic diversion measures	Temporary traffic diversion measure including use of alternate road from District traffic police	Contractor
12	Use of Railways ROW for construction area/ crossing	Indian Railways	PIU
13	Use of highway ROW for construction area/ crossing	National Highway Authority of India	PIU
14	Forest Diversion	Forest Dept/MoEFCC (if required, will be confirmed after confirmatory survey)	PIU and Contractor

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

V. DESCRIPTION OF ENVIRONMENT

A. Physical Resources

1. Location, Area & Connectivity

97. Dungarpur is a city in the southern part of Rajasthan state of India. It is the administrative headquarters of Dungarpur District. It was founded by Dungariya bheel king in the 13th century. The district is roughly triangular. In East and North it borders on Banswara and Udaipur District respectively while it adjoins the State of Gujrat in South & West.

98. The rail line between Udaipur and Ahmedabad in Gujarat runs through the town, shortest distance to the National Highway 8 from Dungarpur town is 20 km. It is located in the southern part of Rajasthan between 23° 20' and 24° 01' north latitude and 73° 21' and 74° 01' east longitude. In East and North its borders on Banswara and Udaipur districts respectively while it adjoins the State of Gujarat in South and West. Most of the part of district and town are hilly. The elevation is 225 m (738 ft) above MSL. The municipal area of the city is about 14.65 Sq. Km. Location of Dungarpur town in Rajasthan State map is shown in **Figure 14**.

Figure 14: Location of Dungarpur Town in Rajasthan State Map

2. Topography, Soils and Geology

99. **Topography.** The district is characterised by uneven topography with hills of Aravalli comprising of mainly quartzite and intrusive rocks alternating with low lying areas of phyllites, slates and schists. The district, though fairly open in the south is interspersed with stony hills covered with low jungle. In the north and east, the landscape is rugged and wild, but towards the southwestern border, the harsh features gradually become softer and finally merge in the topography of Gujarat region. The eastern part slopes towards the basin of Mahi river and consists of 3 plain area. Cultivated areas are mainly confined to valleys and low-lying ground between the hills.

100. The rugged and wild aspect of the region is attributed to the off shoots of the Aravalli. The country is broken and hilly, but none of the hills attain a great height. The highest peak which is in the extreme northwest is about 572 m above mean sea level and the other highest point 2 km north of Sagwara is 497 m above mean sea level. The lowest point in the district is about 90 m above mean sea level near Solakari village in the bed of Mahi River. Dungarpur town is also hilly undulating terrain.

101. **Soil**. There are pre-dominantly two types of soils in the district. Red loam soils are found in the south-eastern parts of the district, adjoining Gujarat border. These are soils of hilly plains (flats) i.e., brought down from nearby hills and deposited in low lying areas. They are characteristically shallow to moderately deep, reddish in colour medium in texture, sandy loam to loam in nature, non-calcareous, granular, well drained, free of salts and may have slight calcareous carbonates in lower layers. Hilly soils are found along the hill ranges of Aravalli in the northern and western parts of the district. These soils are very shallow with gravelly material, very near to the surface. These are in general, light in texture and reddish brown to greyish brown in colour, non-calcareous and freely drained. These extend in small patches on uneven terrain.

102. **Geology.** The district is underlain by mainly hard rock formations belonging to Bhilwara Supergroup and Aravalli Supergroup intruded by granite. Along the major river courses, localized patches of shallow alluvium occur overlying the compact basement.

103. **Seismology.** According to the Vulnerability Atlas of India, most of Dungarpur District, including Dungarpur Town, is in an area of low earthquake risk (Zone II). Although Rajasthan has not experienced a major earthquake in the recent past, there have been 37 events with a magnitude of 5-7 since 1720, with the most recent occurring in 2001. This measured 6.9 on the Richter Scale, but because the epicentre was in neighbouring Gujarat, there was only limited damage in Dungarpur.

Figure 15: Earthquake Zone Map of Rajasthan

3. Climatic Conditions & Rainfall

104. Major part of the district enjoys sub humid type of climate. However, semi-arid type of climate is also experienced in a small area near northern boundary of the district. The summer season prevails from March to May, when peak temperatures are attained. Mean daily maximum temperature during May is 38.6°C and the mean daily minimum temperature is 24.9°C. Thereafter temperatures decrease with the onset of southwest monsoon. After the withdrawal of monsoon in September, the day temperature increases slightly, and a secondary maximum is attained in October. However, night temperature continues to fall. From November onwards both the day and night temperatures decrease rapidly till January, which is the coldest month with mean daily maximum temperature of 24.2°C and mean daily minimum temperature of 7.8°C. The annual potential evapotranspiration of the district is of the order of 1380mm with highest potential evapotranspiration (204.4mm) during the month of May and lowest (55.2mm) during the month of December. The highest average annual rainfall () has been recorded as 897.67mm and the lowest average annual rainfall has been recorded as 570.55mm.

4. Surface Water

105. The district is drained mainly by the rivers Som and Mahi. The former forms the natural boundary between Dungarpur and Udaipur districts and separates Dungarpur district from Banswara district. The Mahi River originates from the Mahi Kanta hills in the western part of Madhya Pradesh and enters Banswara and Dungarpur districts before entering Gujarat near village Salakari. On an average, the riverbed is about 100m to 130 m in width and mostly rocky. Its banks are steep in many parts though not very high. Its length in Dungarpur district is about 110 km. The Som River flows southeast from hills near Bichhabhera in Udaipur district, till it meets the border of Dungarpur district. It then turns first to the east and then to the south forming the northern boundary. After meeting the Jhakham, it enters the Dungarpur district and after traversing for a few km down it meets river Mahi at Baneshwar. The river traverses through the district for a distance of about 84 km.

106. Moran a seasonal river emerges in the central part of the district and flows in the southeastern direction to find its way into the Mahi. There are various streams like Jhakham, Majhham, Vatrak, Bhader, Gangli, Sapan and Very Ganga. All these dry up during summer. The seasonal nallahas are Nagdari, Phallu, Padar, Mahaya and Kadva Bagaria. Samples of raw water and treated water at Udaivilas headworks were tested by PHED and test report shows that water quality of treated water is well within the permissible limits. Test Results are given in **Table 12.**

107. **Vijay Chakra Sagar Dam:** Situated near Dimiya village, Dungarpur and this earthen dam with masonry opening comes under control of Water Recourse Department, GoR. Dam was constructed in 60th decade in constituency of Maharawal Laxmansingh for the full fill the requirement of drinking water of Dungarpur. This dam is used for raw water source for urban water supply in Dungarpur. Capacity of this dam is 44.87 Mcft, the dam is not used of irrigation purposes at all. The dam is located on Moran River a tributary of mahi river. at the coordinate 23°46'44.82"N and 73°46'5.69"E.

108. **Edward Sagar** Dam is a drinking water Reservoir, owned by PHED and used for only for drinking water purpose, also known as Dungarpur Reservoir. This earthen dam with masonry opening has the total storage of 137 McFt excluding the dead storage of the dam. It is not used for irrigation purpose. Dam is located on do river at 23°47'19.78"N and 73°40'16.78”E.

109. **Som Kamla Amba Dam:** The construction of Som Kamla Amba Project across Som river, a tributary of Mahi river was completed in the year 2000 and its stated in 1992. The dam is located in Ashpur Tehsil of Dungarpur District, Rajasthan to provide the Irrigation cum drinking water facilities. The dam supplies drinking water to the tune of 8.1 MCM., besides irrigation supply to 26998.6 ha of Gross Command Area (GCA) and 19155.42 ha of Culturable Command Area (CCA).

110. Samples of water at Raw Water RGF Plant Udai Vilas, Filter Water RGF Plant Udai Vilas, CWR- Near RGF Plant Udai Vilas, CWR- Near RGF Plant Udai Vilas Tank, and Bori headworks filter house were collected on 05.04. 2021 and tested by PHED lab Dugarpur and test report shows that water quality of treated water is well within the desirable limits of National drinking water standards, except for TDS and hardness which was marginally on higher side. Test results are presented in table 12 below.

5. Groundwater

111. The principal source of ground water recharge is precipitation. Out of the total, rainfall received, a major part is lost as runoff and evapotranspiration through soil and vegetation. Only a small portion of rainfall infiltrates down to join the ground water body. Central Ground Water Board periodically monitors the National Hydrograph Network Stations (NHNS) stations in the Dungarpur district, four times a year i.e., in January, May (Pre-monsoon), August and November (Postmonsoon). Depth to water level during pre-monsoon (May 2011) varied from 1.7 to 55.32 mbgl. During post monsoon period (November 2011), the depth to water level varied from 0.46 mbgl. In general depth of water level varied from 5 to 20 mbgl. The overall stage of ground water development in the district is 77.56%.

112. Presently Dungarpur town is partially dependent on ground water. Samples of raw water from Wells at Patrakar Colony, Darjuwada, Fatehgari, Near Railway Puliya, Near New Colony pumphouse, Near Kabristan and Jalan Math were collected and tested in summers of 2021 and tested by PHED lab Dugarpur and test report shows that water quality of treated water is well within the desirable limits of National drinking water standards, except for TDS which was marginally on higher side. Test results are presented in table 13 below.

113. After commission of subproject, during summer or during repair maintenance of systems when reduced flow will be available from dams. The ground water shall be used after blending with surface water. The blending with surface water will keep water quality within the permissible drinking water limits and water quality shall be monitored on regular basis before supplying it to the town.

Table 12: Test report of Surface water by PHED laboratory Dungarpur

National Standards for Drinking Water[a]			WHO Guidelines for Drinking-Water Quality, 4th Edition, 2011[b]	Raw Water	Treated Water			
Parameter	**Unit**	**Max. Concentration Limits[c]**		Raw Water RGF Plant Udai Vilas	Filter Water RGF Plant Udai Vilas	CWR- Near RGF Plant Udai Vilas	CWR- Near RGF Plant Udai Vilas Tank	Bori headworks filter house
Date of Sample				05.04. 21	05.04. 21	05.04. 21	05.04. 21	22.06.2021
Turbidity	NTU	1 (5)	-	16	0.2	0.2	0.2	8.5
pH		6.5 – 8.5	none	8	7.9	7.9	7.9	8.2
Color	Hazen units	5 (15)	none					none
Taste and Odor		Agreeable	-					
TDS	mg/l	500 (2,000)	-	480	**550**	**550**	**550**	330
Iron	mg/l	0.3	-					
Manganese	mg/l	0.1 (0.3)	-					
Arsenic	mg/l	0.01 (0.05)	0.01					
Cadmium	mg/l	0.003	0.003					
Chromium	mg/l	0.05	0.05					
Cyanide	mg/l	0.05	none					
Fluoride	mg/l	1 (1.5)	1.5	0.25	0.24	0.24	0.24	
Lead	mg/l	0.01	0.01					
Ammonia	mg/l	0.5	none established					
Chloride	mg/l	250 (1,000)	none established	70	100	100	100	
Sulphate	mg/l	200 (400)	none					
Nitrate	mg/l	45	50	7	5	5	5	
Copper	mg/l	0.05 (1.5)	2					
Total Hardness	mg/l	200 (600)	-	200	**230**	**230**	**230**	
Calcium	mg/l	75 (200)	-					
Zinc	mg/l	5 (15)	none established					
Mercury	mg/l	0.001	0.006					
Aluminum	mg/l	0.1 (0.3)	none established					
Residual Chlorine	mg/l	0.2	5					
E-coli	MPN/100 ml	Must not be detectable in	Must not be detectable in any 100					

National Standards for Drinking Water[a]			WHO Guidelines for Drinking-Water Quality, 4th Edition, 2011[b]	Raw Water	Treated Water			
Parameter	**Unit**	**Max. Concentration Limits[c]**		Raw Water RGF Plant Udai Vilas	Filter Water RGF Plant Udai Vilas	CWR- Near RGF Plant Udai Vilas	CWR- Near RGF Plant Udai Vilas Tank	Bori headworks filter house
Date of Sample				05.04. 21	05.04. 21	05.04. 21	05.04. 21	22.06.2021
Total Coliform	MPN/100 ml	any 100 ml sample	ml sample					

Source: PHED Regional Laboratory, Dungarpur, date of sample 04.02.2021 (Report copy attached as Appendix 4)

[a] Bureau of India Standard 10500: 2012.

[b] Health-based guideline values.

[c] Figures in parenthesis are maximum limits allowed in the absence of alternate source.

Table 13: Test report of Groundwater by PHED laboratory Dungarpur

National Standards for Drinking Water[a]			WHO Guidelines for Drinking-Water Quality, 4th Edition, 2011[b]							
Parameter	**Unit**	**Max. Concentration Limits[c]**		Patrakar Colony	Darjuwada	Fatehgari	Near Railway Puliya	Near New Colony pumphouse	Near Kabristan	Jalan Math
Turbidity	NTU	1 (5)	-							
pH		6.5 – 8.5	none							
Color	Hazen units	5 (15)	none							
Taste and Odor		Agreeable	-							
TDS	mg/l	500 (2,000)	-	**777**	**660**	**752**	**545**	**550**	**547**	**550**
Iron	mg/l	0.3	-							
Manganese	mg/l	0.1 (0.3)	-							
Arsenic	mg/l	0.01 (0.05)	0.01							
Cadmium	mg/l	0.003	0.003							
Chromium	mg/l	0.05	0.05							
Cyanide	mg/l	0.05	none							
Fluoride	mg/l	1 (1.5)	1.5	0.56	0.5	0.45	0.54	0.4	0.35	0.54
Lead	mg/l	0.01	0.01							
Ammonia	mg/l	0.5	none established							
Chloride	mg/l	250 (1,000)	none established	110	130	155	132	100	150	120

National Standards for Drinking Water[a]			WHO Guidelines for Drinking-Water Quality, 4th Edition, 2011[b]							
Parameter	**Unit**	**Max. Concentration Limits[c]**		Patrakar Colony	Darjuwada	Fatehgari	Near Railway Puliya	Near New Colony pumphouse	Near Kabristan	Jalan Math
Sulphate	mg/l	200 (400)	none							
Nitrate	mg/l	45	50	26	32	32	32	19	15	19
Copper	mg/l	0.05 (1.5)	2							
Total Hardness	mg/l	200 (600)	-							
Calcium	mg/l	75 (200)	-							
Zinc	mg/l	5 (15)	none established							
Mercury	mg/l	0.001	0.006							
Aluminum	mg/l	0.1 (0.3)	none established							
Residual Chlorine	mg/l	0.2	5							
E-coli	MPN/100 ml	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample							
Total Coliform	MPN/100 ml									

[a] Bureau of India Standard 10500: 2012.
[b] Health-based guideline values.
[c] Figures in parenthesis are maximum limits allowed in the absence of alternate source.

6. Air Quality

114. In Dungarpur town there are no major polluting industries and therefore level of pollution of gases like CO, NOx and SOx is not high. But particulate matters (PM10 and PM2.5) are very high due to presence of dust from sand. Transport also add pollution load in air in city. Ambient air quality in Rajasthan is monitored by Rajasthan Pollution Control Board. However, There is no any monitoring location in Dungarpur, nearest monitoring station is at Udaipur, which is approximately 105 kms (aerial distance) from Dungarpur, therefore there is no worth to mention air quality of Udaipur for Dungarpur. DBO contractor is required to conduct ambient air quality of Dungarpur in the pre-construction phase and will update in IEE report.

7. Noise Quality

115. There are no industrial or heavy development activities in the municipal areas of Dungarpur town, therefore noise quality in town is almost good though due to vehicular movements noise is increased as compared to prescribed limits. Noise level quality of Dungarpur is not available and DBO contractor is required to conduct noise level monitoring of Dungarpur; at prominent project sites, in the pre-construction phase and will update in IEE report.

B. Ecological Resources

116. **Protected areas.** The nearest wildlife sanctuary is Sita Mata Sanctuary located 86 km from project town. The nearest forest area is Gumanpua protected forest block in North-East direction which having 4 km distance from Dungarpur town. The nearest protected area is Sita Mata sanctuary at 86 km distance in east direction. IBAT results show no key biodiversity area within 10 km of project boundary, Jaisamand Lake and Wildlife Sanctuary and Phulwari Wildlife Sanctuary are located at 50 km from project boundary. There is no notified breeding or nesting bird site/ecological sensitive area/Ramsar convention site/Area notified under Wild Protection Act-1972 in these forest blocks as well as in town. In the project Town “Dundarpur” area no wildlife sanctuary or other protected area are existed.

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

118. **Flora.** Major tree species in project area include Babul, Sagwan, Khakhra, *Terminalia belarica* (Behara), *Azadirachta indica* (Neem), Khejri- *Prosopis cineraria*, Lasura or Lehswa-*Cordia dichotoma*, Kair or Teat -*Capparis deciduas*, Pakori-*Ficusrumphii*, etc. There are no vulnerable, threatened and/or endangered species of flora and fauna is available in the project areas. Common shrub species found in the area are *Adhatodavasica, Calotropis procera, Ipomea carnea, Prosopis juliflora, Achyranthes aspera, Ageratum conyzoides*, Argemone etc. in the project areas. On the review of available information, no rare or endangered species of flora and fauna prescribed by IUCN or WPC, 1972 are found along the project areas.

119. Biodiversity Assessment has been carried out through online IBAT analysis tool for potential presence of critical habitat within the proposed projects potential area of influence. In

addition, to the potential impacts on identified local biodiversity and ecosystems, 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.

Biodiversity Assessment Report (IBAT Analysis) for Water Supply (CWR) and Sewerage system (STP located on Do River in Dungarpur town has been attached with this report as **Appendix 7.** 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 14 species of concern fauna listed as IUCN Red list, most of which are wild species and not reported in urban areas of Dungarpur. The nearest wildlife sanctuary is Sita Mata Sanctuary located 86 km from project town. Proposed activities will not have impact on these species. There is no national or international protected area within the periphery of 50 km. There is no key bio-diversity areas within the buffer of 1-10 km, however there are two key biodiversity area Jaisamand Lake and Wildlife Sanctuary and Phulwari Wildlife Sanctuary are located at 50 km from project boundary**.**

C. Economic Development

Land use

120. Dungarpur Master Plan provides land use details of the town. Out of total 947.0 acre area, 81.1 % is developed urban area. Rest of the land is underwater body, vacant and agricultural land and government reserved land. Details of the land use is provided in **Table 14** below-

Table 14: Existing Land Use of Dungarpur

S. No.	Land Use	Area (in Acres)	Percentage of Developed area (%)	Percentage of Urban area (%)
1	Residential	259.0	33.8	27.3
2	Commercial	44.0	5.6	4.7
3	Industrial	66.0	8.6	7.0
4	Govt. / Semi Govt.	26.0	3.3	2.7
	Public and Semi Public	120.0	15.6	12.7
5	Recreational	8.0	1.1	0.8
6	Circulation	245.0	32.0	25.9
	Developed Area	**768.0**	**100%**	**81.1**
7	Water body	20.0	-	2.1
8	Vacant and Agricultural land	84.0	-	8.9

S. No.	Land Use	Area (in Acres)	Percentage of Developed area (%)	Percentage of Urban area (%)
9	Government Reserved	75.0	-	7.9
	Total Urban area	**947.0**	**-**	**100%**

*Source: Master Plan Dungarpur 2011-2031

121. In the Dungarpur town approx. 81.1 % area is developed area, 2.1 % is water bodies 7.9 % is govt. land and 8.9% is vacant and agriculture land.

1. Commerce, Industry & Agriculture

122. **Industries.** There are 22 small and medium industries functioning in the town out of which 15 industries are running in RIICO industrial area rest are scattered all over the town. Traditional 353 cottage and small scale service industries have been functioning within residential and commercial areas. These industries mainly comprises of repair workshops, engineering works handicrafts, gold smith etc.

123. **Agriculture.** The agriculture in the district is characterized by recurrent droughts, sloppy lands, dominance of low value and low demand crops, inadequate infrastructure, small size of land holding, poor irrigation sources, poor livestock productivity, lack of off farm employment opportunities, poor market support, non-availability of credit and high rate of illiteracy. The major crops of the Kharif season are maize, rice, black gram, soybean and cotton, while wheat, gram and barley are major Rabi crops. Area under Zaid green gram cultivation is increasing. Cereal crops (maize, wheat and rice) constitute 88.12% of gross cultivated area followed by pulses (black gram, pigeon pea, gram and green gram) 11.45% and oilseeds 0.23 % (soybean)**.**

D. Other Infrastructure

124. **Storm Water Drainage.** Dungarpur town is facing severe drainage problem resulting water logging on roads and low lined areas during the rainy season, even though the rain is moderate. The surface runoff from the town finally gets accumulated in every monsoon season in the outskirts of town in low lying areas.

125. **Power Supply.** Distribution of power in the town is the responsibility of the Rajasthan State Electricity Board. Power is generated and supplied from Mahi Hydal Project, Banswara. Main electricity line is 81 kms away from the town. The major sector for electric consumption is domestic which constitute 14.53% small scale industries consume 2.48% of power.

126. **Transport.** Transport in the city is mainly by personal vehicles (motorcycles and bicycles) and auto- and private taxis. The Rajasthan State Road Transport Corporation (RSRTC) runs public buses to neighbouring villages and towns and to larger towns farther afield, such as Banswara, Udaipur, with which there are good road connections. The rail line between Udaipur and Ahmadabad in Gujarat runs through the town, shortest distance to the National Highway 8 from Dungarpur town is 20 km which connects Dungarpur with all the major districts of Rajasthan.

E. Socio Cultural Resources

127. **Demography.** As of 2011 India census, Dungarpur had a population of 47,706 people. The population consists of 52% males and 48% females. Dungarpur has an average literacy rate of 76%, higher than the national average of 59.5%. The male literacy rate is 83%, and the female literacy rate is 69%. In Dungarpur, 13% of the population is under 6 years of age.

128. **History, Culture and Tourism.** The town of Dungarpur, was founded near the end of the 14th century by Rawal Bir Singh, the sixth descendant of Sawant Singh of Mewar, who named it after Dungaria, an independent Bhil chieftain who was assassinated. After the death of Rawal Udai Singh of Bagar at the Battle of Khanwa in 1527, where he fought alongside Rana Sanga against Babar, his territories were divided into the states of Dungarpur and Banswara. Successively under Mughal, Maratha, and British Raj control by treaty in 1818, it remained a 15-gun salute state. Dungarpur was founded by Raja Dungaria Bhil in the 13th century. Rawal Veer Singh defeated the Bhil chief Dungaria after whom the place was named Dungarpur. It was taken over by the East India Company in 1818. This place was the capital of Dungarpur Princely State. Holi is the most important festival for them, drums are played before the holy day of Holi. On the day of Holi, boys and girls dance, which is known as Gair. Gaib sagar Lake, Dev Somnath Temple, Museum, Juna Palace, Beneshwar dham, Galiyakot are the nearest tourist places of Dungarpur town. However, there are no any historical, cultural or important tourist places in Dungarpur Municipal areas. Jain Temple, Baroda (approx. 16 km) and Dev Somnath Temple (approx. 37 km) in Dungarpur district are ASI Monuments, these temples are far away from municipal boundary and therefore project activities will not have impact on both the protected monuments.

F. Environmental Settings of Investment Program Component Sites

129. Sewers and water supply pipes will be laid along the roads/streets in the town within the road right of way (ROW). In wider roads pipes/sewers will be laid in the road shoulder beside the tarmac, and in narrow roads, where there is no space, sewers will be laid in the road carriage way by break opening the tarmac. Roads in some parts of the town are narrow. Roads are lined both sides with open drains. In narrow roads sewers will be laid in the middle of the road, which may affect the traffic. Bigger diameter trunk sewers will be laid along the main roads, which are wide and have adequate space. No tree cutting is anticipated as there is adequate space to lay the water & sewer pipeline in those roads. Pipe networks for water supply will be laid in the entire town within the existing RoW. There is sufficient space available for laying of pipeline. These works will require advance permission from concerned authority for road cutting and traffic diversion etc. If any tree cutting will be required during execution mitigation measures shall be adopted.

130. STP (4.0 MLD) is proposed near Do river on Udaipur road in Zone-6, Durgapur on vacant government land under Municipal Council in Malpur village. Total area of allocated land is 11.14 ha and Khasra no. of proposed land are 312 & 313. There are no trees present at site, which may be required to cut for construction of STP. There are only agricultural activities in the periphery of this site. Khandeshwar Mahadev Temple at upstream of STP site at about 200 m distance, Indrakhet residential colony at 350 m distance and Do river along the proposed STP site at 50 m distance. No wildlife is reported in this area. There is no sensitive receptor and habitation in 100m periphery, Therefore there will be no adverse impacts on habitation.

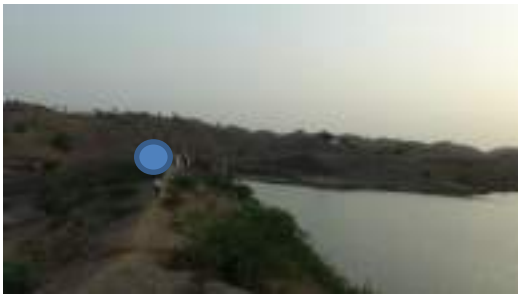
131. 3 nos. SPS are proposed at Padambhusan Shri Bhogi Lal Pandya Circle, Ashram Vatika, and between RICCO & Gap Sagar. All the sites are Govt. of Rajasthan lands. There are few habitations within 100-200 mtr area of the SPS except SPS between RICCO & Gap Sagar where market area is existed on LHS &RHS side but due the close circuit of SPS, there will be minimum odour nuisance. Adequate mitigation measures will be required during

construction works.

132. CWRs and pump houses are proposed in existing PHED campus at Chandpole and New Colony, Dungarpur. There is no habitation near the proposed CWR in Chandpole area, but new colony CWR is surrounded by habitation.

133. Site environmental features of all subproject sites and photographs are presented in the following Table 15.

Table 15: Environmental Features of Project sites

Proposed Structure	Environmental Features	Photo
new Intake – cum – raw water pump house at Vijay Chakra Dam	• It is proposed near to dam's masonry wall • There is no plantation at the location of intake and pump house. • There is no forest or protected areas at proposed location of intake and pump house. • Nearest forest area is Raajdhaani unclassified forest area at 830 m in north-east direction. • Proposed intake and pump house are having connectivity with single PMJSY BT road. • The nearest habitant (2 nos.) at 155 m in east direction. • Available area is 4000 sq.m. and required area 500 sq.m.	 Intake Location  Pump House Location
Proposed New Water Source: WTP at Somkamla Amba Dam. **Note:** This is part **associated project**	• It is under construction phase at nearby location of Dam. • The Nearest forest area is Rajdhani protected forest block in east side and having approx. 500m distance • WTP at Somkamla Amba is having connectivity with 2 lane SH 54 and a single lane village road. • Available area is 15000 sq.m. and required area 5000 sq.m.	

Proposed Structure	Environmental Features	Photo
550 KL Raw Water Reservoir at Bori Head Works Latitude-23°50'2.62"N Longitude-73°41'2.64"E	• This Site is located in Bori Head Works PHED Campus. • These is one WTP in this campus which was based on Rapis Sand Gravity Filter Technology. • In the proposed site one mango tree may be impacted. • There is one education campus of central school at adjoining of this site. • These is one small drain behind the proposed site and having approx. 50 m distance. • There are some asbestos pipes near the proposed location.. • The Nearest forest area is Kheria Mangra protected forest block in north side and having approx. 450 m distance. • Connectivity of the proposed raw water reservoir is with Dungarpur town via single lane cement concrete road. • Nearest household at 100 meters distance. • Required land is only 235 sqm against available land of 2000 sqm.	  **Proposes site of CWR at PHED headworks Bori, Dungarpur** 
CWR Location in Chandpole, Dungarpur Latitude-23°50'6.18"N Longitude-73°42'35.80"E	• This proposed location is existed on Navadera Road, Dungarpur. • There are out dated existing water reservoirs structures. • There is Dargah Mastan Baba at 40 meter distance, • There is dense habitation of Chanpole area in south-east direction of proposed CWR site. • These are Muslim Graveyards at adjoining of proposed site. • There will be no tree and wild life will be impacted.	

Proposed Structure	Environmental Features	Photo
	• The Nearest forest area is Rajdhani protected forest block in south-east side and having approx. 1.5 km distance. • CWR is connected with bituminous concrete road • Nearest Household at 50 meters distance from CWR. • Required land is only 235 sqm against available land of 700 sqm.	  **Proposes site of CWR**
CWR in PHED Campus new colony Latitude- 23°50'52.30"N Longitude- 73°42'38.67"E	• This site is located behind PHED office on Udaipur Road in new colony, Dundarpur. • There may be one Neem tree will be impacted. • This site is located in the residential area. • CWR in PHED is connected with 2 lane cement concrete road. • Nearest Household at 50 meter distance. • The Nearest forest area is Rajdhani protected forest block in south-east side and having approx. 3.2 km distance • Required land is only 235 sqm against available land of 650 sqm.	  **Proposes site of CWR**

Proposed Structure	Environmental Features	Photo
Existing WTP site in Uday Vilas, Dungarpur Latitude- 23°49'59.18"N Longitude- 73°43'32.52"E	• This Existing WTP site is existed near Udai Place on Gap Sagar Lake bank. • There is no habitation but Raajdhani protected forest block is at 150 m distance. • Hilly area and dense tree cover are observed behind the site. • WTP at Uday Vilas is connected with a 2 lane City Road. • Nearest Household at 190.74 meters distance. • No new land is required.	  
SPS Site at Ashram Vatika on Sabla Bypass Road, Dungarpur Latitude- 23°51'7.38"N Longitude- 73°42'14.09"E	• This proposed SPS site is located between Suneria lake and Sabla lake on Sabla bypass road. • There is Pit Composting Unit at adjoining of this site. • A small Tejaji Temple is existed in the proposed area but it will not be affected. • Surrounded by waterlogged area • The Nearest forest area is Rajdhani protected forest block	 **Proposes site of SPS**

Proposed Structure	Environmental Features	Photo
	in north-east side and having approx. 2.8 km distance. • The SPS Ashram is connected to 2 lane Dungarpur bypass road. • Nearest Household present at 65.01 meters distance. • Required land is only 1500 sqm against available land of 5159 sqm.	 
SPS Site on Sagwara Road near Gap Sagar, Dungarpur Latitude-23°50'59.09"N Longitude-73°43'37.55"E	• This proposed SPS site is existed in market area on Sagwara Road near Gap Sagar, Dungarpur. • A small treatment is existed in the proposed site. • There is no tree observed in the proposed site. • No wildlife and no forest area will be impacted. • Govt. bus stand and bus depot are existed at 400 m distance. • Gap Sagar is existed behind the proposed site at 100m distance. • SPS on Sagwara road is in the middle of Gap Sagar and RIICO which is connected to them via 4 lane NH 927A. • Nearest Household at 20 meters distance. • Required land is only 400 sqm against available land of 4636 sqm.	 **Proposes site of SPS** 

Proposed Structure	Environmental Features	Photo
SPS Site Uttam Marg near Bhogilal Pandiya Circle, Dungarpur. Latitude-23°50'24.33"N Longitude-73°42'40.44"E	• This proposed SPS site is existed on Uttam Marg near Bhogilal Pandiya Circle, Dungarpur. • In the proposed site no tree is observed but behind the site open land area is observed dense tree cover is present. • There is no major habitation near the proposed site. • No wildlife and no forest area will be impacted. • A Municipal Council Depot is present at adjoining of this site. • The Nearest forest area is Rajdhani protected forest block at more than 1500m • SPS Site Uttam Marg is connected to city through 2 lane city road. • Nearest household at 52 meters distance. • Required land is only 1500 sqm against available land of 4425 sqm.	 
Proposed STP at Do River near the Railway Quarter Colony, Dungarpur Latitude-23°52'6.32"N Longitude-73°41'37.57"E	• The Proposed STP Site is existed on riverbank of Do River • In the proposed site no tree is observed. • Do riverbed is spread in the valley side/lower side of the proposed site. • In the 1-2 km radius, agriculture fields are observed in which treated effluent can be used for irrigation. • The Nearest forest area is Gumanpura forest bock in north-east side and having approx. 2.6 km distance • STP at Do river is connected to 4 lane 927A National Highway. • There is no habitation within the range of 150-250 of Proposed STP location, however 3 nos. cattle shed are existed at 160 m distance and the nearest habitant at 210m distance. • Required land is only 3600 sqm against available land of 28173 sqm.	 **Proposes site of STP** 

Proposed Structure	Environmental Features	Photo
		

VI. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Introduction

134. 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.

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

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

136. 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).

137. 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 Checklist has been used to screen the project for environmental impacts and to determine the scope of the IEE.

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

B. Pre-Construction Impacts– Design and Location

1. Location Impacts

139. **Location Impacts of Sewage Treatment Plants.** STP (4.0 MLD) is proposed near Do river on Udaipur road in Zone-6, on vacant government land under Municipal Council. There are no trees present at site, which may be required to cut for construction of STP. There is neither agriculture nor other activities on the proposed land. No wildlife is reported in this area. Agricultural activities are observed at 150m distance around this site. Treated effluent and sludge from STP are proposed for utilized in agricultural and tree plantation purposes. Do river flows near the site and unused/excess treated effluent can be disposed in it. There is no residential or sensitive area within 100 m radius.

140. **Odor Nuisance from STPs.** As presented in the baseline profile, the proposed STP site is currently vacant, and do not have any notable sensitive environmental features. STP site is located near 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) Sludge generated from the STP will be used in construction work as block or other purposes.
(iii) Develop layout plan of STP such that odor generating units (such as sludge/ solids handling facilities) are located away from the residences and in surrounding area with future development potential.

141. **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 discharge of excess treated effluent in to adjacent Do River, when it is not being used.

142. **Location Impacts of proposed SPS sites:** 3 nos. SPS are proposed at Padambhusan Shri Bhogi Lal Pandya Circle, Ashram Vatika and Between RICCO & Gap Sagar. There are some residential areas, Some water bodies and some religious structures near proposed SPS sites. As per preliminary survey, no tree cutting is required for SPSs, If any tree cutting is required for construction works, prior permission from local administration for tree cutting will be required and compensatory plantation as per RUDSICO-EAP policy will also be required. All the precautions should be taken during construction and operation to minimize the impacts on nearby residents and water bodies. Additionally, public consultations should be held near the SPS location to provide project information, type of anticipated disturbances and gain the consent of the nearby residents for the construction of the proposed SPS.

143. 0.25 MLD SPS is proposed between RICCO & Gap Sagar location in the govt. land on

highway where some market activities like shops are observed. Although there are some shops within the 50 m radius but there is natural gravity flow of sewerage for collection and there is no other alternative site for the gravity flow collection of sewerage, Required land for construction of SPS is only 400 sqm against available land of 4636 sqm. Enough land is available for plantation and construction barrier wall between nearby household and SPS. Considering the gravity flow and negative impact of land acquisition, this site was selected

144. **Locations impacts of Water Supply and Sewerage Networks:** The water supply and sewerage collection networks will traverse through different city roads within ROW. There are no trees coming in the alignment of proposed pipe line works. Therefore no significant impacts shall be envisaged regarding location; though some temporary disturbance are expected and mitigation measures will be required to minimize these impacts. These works will require advance permission from concerned authority for road cutting and traffic diversion etc. If any tree cutting will be required during execution mitigation measures shall be adopted.

145. **Physical Cultural Resources.** There are no notable or significant archaeological places or protected monuments or areas in Dungarpur project area. 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) Create awareness among the workers, supervisors and engineers about the chance finds during excavation work;
(ii) Stop work immediately to allow further investigation if any finds are suspected;
(iii) Inform local Archaeological Department / Museum office if a find is suspected and take any action, they require to ensure its removal or protection in situ; and prepare a chance find protocol.

146. **Tree cutting at project sites.** There are one mango tree at proposed CWR site at Bori headworks and one neem tree at proposed site of CWR at PHED campus, New Colony, which may be impacted/required to be cut during construction works. Water pipelines and sewers will be laid along the road within road ROW. There are no notable trees in the alignment; therefore no major tree cutting is envisaged. Following measures need to be implemented to minimize and/or compensate for the loss of tree cover.

(i) Minimize removal of trees by adopting to site condition and with appropriate layout design of STP, SPS, 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.

147. In preliminary design stage 2 trees may be required to cut. During detail design DBO contractor will be required to confirm exact number of tree cutting. Tree cutting requirement for pipe line works can be decided only after confirmatory survey of full length of alignment by contractor. At this stage higher side of tree cutting numbers are taken as 5 trees. As per RUDSICO-EAP policy; compensatory plantation in the ratio of 1:3 is to be followed during construction works. Therefore 15 numbers of trees are taken as compensatory plantation. 15 numbers of trees are taken for plantation around STP as mitigation measures to reduce foul smell and 15 numbers of trees are taken for plantation around 3 SPSs.

148. **Design of the Proposed Components.** The Central Public Health and Environmental

Engineering Organization (CPHEEO) manual suggests a design period of 15/30 years[6] 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, 2025 shall be the base year and 2040 the intermediate year to cross check the designs pertaining to intermediate demand. The rate of water supply has been taken as 135 lpcd for 100% population. Sewage generation is 85% of water supply (including 5% to account for infiltration).

149. One of the critical aspects in sewerage system operation is, change in raw sewage characteristics at inlet of sewage treatment plant may affect the process and output quality. STPs are designed for municipal wastewater, which does not include industrial effluent. Characteristics of industrial effluent widely vary depending on the type of industry, and therefore disposal of effluent into sewers may greatly vary the inlet quality at STP and will upset process and affect the efficiency. Although legally the disposal of effluent meeting certain standards is allowed into municipal sewers (refer **Appendix C-8),** the monitoring of the same is not-practical.

150. To prohibit the industrial discharge into municipal sewers following measures should be considered:

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

151. **Design of Sewage Treatment Plant.** One 4.0 MLD STP is proposed to be constructed at the identified site to treat the sewage generated from Dungarpur Town. It is proposed to establish STP based on SBR (sequential batch reactor) process, followed by disinfection by chlorine. As the bid is DBO type, detailed design of the STP will be carried out by the contractor to the 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 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.[7]

[6] As per CPHEEO, pumps, motors, STP, storage reservoirs are to be designed for a life of 15 years.
[7] "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 16: Proposed Raw and Treated Wastewater Characteristics for STP Design

S. No		Parameter	Proposed Discharge Standards for Dungarpur STP NGT	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	≤20	<100	≤10	50	-
5		NH4-N, mg/l	<25	-	≤5	-	
6		Total nitrogen,	<10	-	≤10	10	-
7		Oil & grease, mg/l	-	-	-	10	-
8		Total phosphorus, mg/l	-	-	-	2	-
9		Fecal Coliform,	<1000	<1000	≤100	-	<1,000
10		Nematodes, number of eggs per	-	-	-	-	1

BOD = Biochemical Oxygen Demand; COD = Chemical Oxygen Demand; CPCB = Central Pollution Control Board; IFC = International Finance Corporation, the World Bank Group; TSS = Total Suspended Solids.

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

153. 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**).

154. **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.

155. **Allocation of treated wastewater for reuse.** 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. Memorandum of understanding between ULB and the users of the treated water.

156. **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 Dungarpur 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 Dungarpur 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 Dungarpur, 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 Dungarpur, 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 preset standards established for reuse

157. **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 faecal coliforms per 100 milliliters (ml). These shall be considered in the reuse plan that will be prepared during the detailed design and complied accordingly.

158. **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 at all times 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). 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.

159. **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.

160. 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.

161. 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.

162. 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”, given in **Table 17**.

Table 17: 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
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	-

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)
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

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

(i) Prepare a dried Sludge utilization plan for Dungarpur 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).

164. **Mixing of industrial effluent in wastewater**. One of the critical aspects in sewerage system operation is, change in raw sewage characteristics at inlet of sewage treatment plant may affect the process and output quality. STP is 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. 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; and
(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.

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

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

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

- Limit the sewer depth where possible
- Sewers shall be laid away from water supply lines and drains (at least 1 m, wherever possible);
- In all cases, the sewer line should be laid deeper than the water pipeline (the difference between top of the sewer and bottom of water pipeline should be at least 300 mm)
- If unavoidable, where sewers are to be laid close to storm water drains, appropriate pipe material shall be selected (stoneware pipes shall be avoided)
- For shallower sewers and especially in narrow roads, use small inspection chambers in lieu of manholes;
- Design manhole covers to withstand anticipated loads & ensure that the covers can be readily replace if broken to minimize silt/garbage entry.
- Ensure sufficient hydraulic capacity to accommodate peak flows & adequate slope in gravity mains to prevent build-up of solids and hydrogen sulfide generation.
- Take necessary precautionary measures to protect sewer network, and to avoid disposal of solid wastes, debris, wastewater into newly laid sewers from the time it is constructed to the start of operation phase.

168. **Faecal Sludge and Septage Management**. The proposed FSSM will help the ULB to cover entire population with safe disposal of human excreta by serving areas which are not feasible to be provided with a sewerage system. Under the FSSM, faecal sludge/septage will be collected from the household level septic tanks using truck mounted mobile desludging equipment and transported to STP for treatment. At this stage, the quantity of septage generated from this area is not available. This will be estimated during the detailed design phase, and number of mobile tankers required to collect the transport the septage to STP, frequency of collection depending on the size of septic tanks etc., will be worked out accordingly. Although handling, transportation and disposal into STP is completely mechanized, the system will however be operated by the workers, therefore proper precautions as workers will be dealing with highly harmful septage. Accessibility of septic tanks to mobile suction tankers to collect septage is critical for success of the septage management system. At STP, the septage will be mixed with the

sewage and will be treated combined in the STP. Septage will be in concentrated and partially degraded form, and disposal of the same into STP inlet stream may upset the sewage treatment process, may generate bad odors, and may ultimately affect the quality of treated wastewater. Treatment process needs to be properly designed. Following measures are suggested for implementation:

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

2. Design of Water supply components

169. 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 and keeping only sustainable wells and 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.
(v) Appropriate location of intake to ensure water availability throughout the year
(vi) Recovering backwash water from treatment process.
(vii) Treatment and disposal management of sludge from treatment process.
(viii) Minimizing water losses from pipelines by perfect jointing and alignments 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 optimising 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
(xiii) Using low-noise and energy efficient pumping systems

3. Intake design

170. Only one new intake is proposed for the subproject, Reservoir type of intake will be designed at Vijay Chakra Sagar Dam. Intake well is proposed to avoid the entrance of large and medium objects, fishes, insects, algal blooms, and settle down of suspended solids. Intake well enclose the electrical pumps and prevent aquatic life from disturbance occurs due to mechanical vibrations. Intake location is proposed within dam and coordinates are 23°46'28.16"N Latitude and 73°46'25.73"E Longitude.

171. In the intake well water is drawn through intake pipes located at different levels with a common vertical pipe. The vertical pipe is connected at its bottom to an intake conduit which is taken out through the body of the dam. Each intake pipe is provided with bell mouth inlet which is covered with a hemispherical shaped fine screen to permit the entry of relatively clear water. The intake pipes are provided with valves to control the entry of water through them. The valves are operated from the control room present at the top.

4. Selection of Source for water supply

172. To meet total water demand, there are 3 nos. surface water sources are proposed for town, Surface water source include Edward Samand Dam (4.54 MLD), Vijay Chakra Sagar dam (3.1 MLD) and Somkamla Amba dam (4.361 MLD). Along these surface water sources additionally 4 existing ground water sources including 2 tube wells and 2 open wells, proposed for lean season when surface water source have less amount of water. All these sources are already existing, and no new source development is required for the sub-project.

173. **Vijay Chakra Sagar Dam:** The earthen dam with masonry opening is located on Moran River, a tributary of mahi river at the coordinate 23°46'44.82"N and 73°46'5.69"E near Dimiya village is a drinking water reservoir owned by WRD, GOR. The water of this reservoir is reserved only for drinking water for Dungarpur. Capacity of this dam is 44.87 MCFT including dead storage and 40 MCFT (1.27 MCM) is live storage. The PHED has allocated 3.1 MLD (1.18 MCM) water for Dungarpur water supply subproject, which is about 93.40% of total water available in dam. The existing water abstraction of water from dam is 3.25 MLD and proposed capacity is 3.1 MLD. The water from dam is not used for irrigation or any other activity.

a) **Selection of Site:** Dam already connected with the existing ***water supply*** system are sustainable sources with respect to quantity & quality; Presently the existing intake well for pumping raw water from Dimiya dam is in back water of dam, during the summer season water is to be brought near existing pump house by the centrifugal submersible pumps. So in order to get the maximum benefit in pumping the raw water during severe drought conditions a new intake well is proposed near the spillway section of the Vijay Chakra Sagar dam (Dimiya dam).

b) **Gauge level of Dam**

Since the construction of the Dimiya dam PHED has continuously maintained the daily water level and storage capacity details of the same are as follows: -

Table 18: Gauge Details of VIJAY CHAKRA SAGAR (DIMIYA) DAM

S.no.	Year	Gauge of Dam	Filling of Dam	Vol. of Dam	Remark
1	2010	29 Feet	29 Feet	40 McFt	Full
2	2011	29 Feet	29 Feet	40 McFt	Full
3	2012	29 Feet	29 Feet	40 McFt	Full
4	2013	29 Feet	29 Feet	40 McFt	Full
5	2014	29 Feet	29 Feet	40 McFt	Full
6	2015	29 Feet	29 Feet	40 McFt	Full
7	2016	29 Feet	29 Feet	40 McFt	Full
8	2017	29 Feet	29 Feet	40 McFt	Full
9	2018	29 Feet	29 Feet	40 McFt	Full
10	2019	29 Feet	29 Feet	40 McFt	Full
11	2020	29 Feet	29 Feet	40 McFt	Full
12	2021	29 Feet	29 Feet	40 McFt	Full

174. The existing production capacity of reservoir is 3.1 MLD, same will be continue for the subproject after proposed repair and maintenance works.

c) **Distance from STP**

4 MLD STP is proposed at Do River, Udaipur Road (Dungarpur) which is 18.4 km away from Vijay Chakra Sagar Dam. No direct drain from STP site is connected with Vijay Chara Sagar Dam.

175. **Edward Sagar Dam (Durgapur reservoirs):** Situated on Do river, a seasonal stream is a drinking water reservoir owned by PHED, GOR water of this reservoir is reserved only for drinking water for Dungarpur. Capacity of this dam is 137 MCFT (3.879 MCM) live storage. The PHED has allocated 4.54 MLD (1.66 MCM) water for Dungarpur water supply subproject, which is about only 42.79 % of total storage capacity of dam.

176. The water from dam is not used for irrigation or any other activity. The PHED has recorded yearly water level data of dam and as per water level data of past 12-year, the dam was filled fully up to its storage capacity in all 12 years. CWR, Pump house and WTP are already existing on dam and are connected with existing water supply system of Dugarpur town.

Table 19: Water Quantity Report of Edward Sagar Dam

Gauge Details of Edward Sagar Dam (Dungarpur reservoir)					
S.no.	Year	Gauge of Dam	Filling of Dam	Vol. of Dam	Remark
1	2010	29 Feet	29 Feet	134 McFt	Full
2	2011	29 Feet	29 Feet	134 McFt	Full
3	2012	29 Feet	29 Feet	134 McFt	Full
4	2013	29 Feet	29 Feet	134 McFt	Full
5	2014	29 Feet	29 Feet	134 McFt	Full
6	2015	29 Feet	29 Feet	134 McFt	Full
7	2016	29 Feet	29 Feet	134 McFt	Full
8	2017	29 Feet	29 Feet	134 McFt	Full
9	2018	29 Feet	29 Feet	134 McFt	Full

10	2019	29 Feet	29 Feet	134 McFt	Full
11	2020	29 Feet	29 Feet	134 McFt	Full
12	2021	29 Feet	29 Feet	134 McFt	Full

177. **Sustainability and environmental considerations of Edward Sagar Dam.** The Edward Samand dam has the total storage of 137 McFt excluding the dead storage of the dam. For proposed water supply project only 4.54 MLD i.e. about 61 McFt water is proposed to be drawn from the source. Water abstractions from this dam on gravity basis and capacity of existing WTP, 11 feet water storage is maintained as dead storage.

178. Given the small storage compared to the total volume of water available in the dam, no significant impacts envisaged on downstream. Given the small size of dam, there are no notable sensitive environmental features. There is no notable, protected or unique aquatic plant/ creatures. The Aquatic life in the river is limited to local common species of fishes and aquatic plants and the fish is limited to local varieties (such as Rohu, Katla, and water snakes). There is no commercial fisherman activity take place in these dams.

179. No notable sensitive features are found. There is no forest area in the downstream of the proposed intake. Removal of trees and vegetation will not require during implementation phase as the work is confined to within dam site only.

5. Distance from STP

180. STP of 4 MLD is proposed at Do River, Udaipur Road which is 13 km away from Edward Sagar Dam. MSL of Proposed STP site and Edward Sagar Dam are 267m and 312 respectively. Proposed STP site and Edward Sagar Dam are corrected through a drain but runoff discharge is from Edward Sagar Dam to STP site therefore no adverse impact of STP to Dam.

181. **Ground Water Source: Development of Ground Water sources**. At present there are 7 Nos Tube wells and 15 Nos Dug Wells / Open wells, out of these existing TW/ OW, 2 Nos Tube wells and 2 Nos Open wells are proposed to be deepening and desilting, with re commissioning work. The ground water will be used in Lean Season or during repair maintenance works in infrastructures supplying surface water and details of existing tube wells & open wells are as follows. –

Table 20: Details of proposed wells

S. No.	Location	Type	No.	Production Per Day (In KL)
Tube Wells				
1.	Patrakar colony TW	Tube well	1	500
2.	Darjiwada TW	Tube well	1	500
	Total		**2**	**1000**
Open Wells				
1.	Rani Bao OW	Open well	1	1000
2.	Kelabao OW	Open well	1	1000
	Total		**2**	**2000**

182. Based on the reports, it was finalized that out of the complete water requirement for the project only 1.5 MLD water will be taken from the ground water source.

Sustainability and environmental considerations of Ground water sources. 1.5 MLD of the total requirement of the proposed project is planned to be taken from ground water sources. As per the data available, a total of 3 MLD water is available in the ground water sources. 2 Nos Tube wells and 2 Nos Open wells are proposed to be deepening and desalting, with re commissioning work. The ground water will be used only in lean season and repair and maintenance works when less amount of surface water will be available.

183. **New proposed Som Kamala Amba (SKA) Dam on Som River**: The construction of Som Kamla Amba Dam was completed in the year 2000. This dam is located in Ashpur Tehsil of Dungarpur District, Rajasthan to provide the Irrigation cum drinking water facilities. The dam supplies 8.1 MCM drinking water and irrigation supply to 26998.6 ha of Gross Command Area (GCA) and 19155.42 ha of Culturable Command Area (CCA).

Table 21: Details of Sam Kamla Amba Dam

Project	**Som Kamla Amba Project**
River	Som river, a tributary of Mahi
Lat/Long	23^0 58' 00"/ 74^0 02' 00"
GCA	26998.60 ha
CCA	19155.42 ha
Annual water supply	8.01 MCM
Catchment Area	5376 sq km
Main Dam	
Type	Earthen Dam
Length	620 m
Top elevation	217.50 m
Height of dam above lowest river bed level	27 m
Lowest river bed level	190.5 m
Reservoir	
Maximum water level	215.50 m
Full Reservoir Level	33.50 m

MDDL	200.50 m
Live storage	160.30 MCM
Gross storage	172.80 MCM
Reservoir spread area	36.18 sq km
Year of start of construction	1992
Date of completion	2000
Year of first impoundment	2004

184. To meet out the shortfall demand of surface water for the town Dungarpur, the state Government has sanctioned a public importance project namely Drinking Water Supply Project for 151 Villages and 1 town of District Dungarpur (Dungarpur town itself) based on Som Kamla Amba Dam on Som River. Presently the project is under execution, transmission main from the Som Kamla Amba Dam to Dungarpur town has been laid and construction work of intake well and water treatment plant is under progress. As per PHED officials project will be commissioned up to December 2022.

185. Som Kamla Amba Scheme: This is a scheme under PHED which proposes to take water from Som Kamla Amba Dam and supplies water to 151 villages and Dungarpur town itself. This project is under construction and the tentative date of completion is in December 2022.

186. Location: The dam is located at the coordinate 23°58'11.05"N and 73°58'56.77"E on Som River, tributary to Mahi river. The rising main of this scheme has already been laid and will supply water proposed for Dungarpur town at Bhogilal Pandya Circle.

Table 22 water availability in Somkamla Amba dam

S. No.	Year	Maximum live storage attained in the reservoir (MCM)	Designed live storage (MCM)	Reservoir storage efficiency
1	1999	82.9	160.3	52%
2	2000	47.2	160.3	30%
3	2001	163.8	160.3	100%
4	2002	69.8	160.3	44%
5	2003	157.5	160.3	98%
6	2004	172.8	160.3	100%
7	2005	172.8	160.3	100%
8	2006	172.8	160.3	100%
9	2007	172.8	160.3	100%
10	2008	100.6	160.3	100%
11	2009	133.4	160.3	100%
12	2010	170.1	160.3	100%
13	2011	171.3	160.3	100%
14	2012	172.8	160.3	100%
15	2013	172.6	160.3	100%
16	2014	152.6	160.3	100%
17	2015	172.8	160.3	100%
18	2016	172.8	160.3	100%
19	2017	172.8	160.3	100%
20	2018	172.8	160.3	100%
21	2019	172.8	160.3	100%
22	2020	172.8	160.3	100%
23	2021	172.8	160.3	100%

Maximum Live storage stained in the Som Kamla Amba Dam. (Source: WRD, 2021).

187. **Details of Dam**: - As per the report published by World Bank for Dam Rehabilitation and Improvement Project (Drip II). The construction of Som Kamla Amba Project across Som river, a tributary of Mahi river was completed in the year 2000. The dam is located in Ashpur Tehsil of Dungarpur District, Rajasthan to provide the Irrigation cum drinking water facilities. This dam supplies drinking water to the town with the capacity of 8.1 MCM., besides irrigation supply to 26998.6 ha of Gross Command Area (GCA) and 19155.42 ha of Culturable Command Area (CCA). It is proposed to fulfil 4.36 MLD in the year 2055 and as this project is designed to fulfil the requirement of Dungarpur. Summary of DPR report for proposed works for Dungarpur water supply is provided in appendix 4

188. **Sustainability and environmental considerations of Som Kamla Amba Dam** Capacity of dam at FTL of 213.5 is 172.75 MCM and live storage capacity 160 MCF there is 93.75 % dependability of required 47.33 MCF quantity for Dungarpur town on the basis of past 15-year record of storage of Sam Kamla Amba dam. The intake WPT and transmission lines form dam to down are already under construction by PHED and water will be available in town by December 2022

189. Proposed works The DPR of the project was prepared by the PDCOR limited. Work has been awarded and under execution, under this project there is provision of Intake Structure at Som Kamala Dam levels of the proposed for different stages of intake structure are as below:-

- Top Bank Level of Dam 217.50 m
- F.T.L. of Dam 213.50 m
- Sill level of Dam 200.50 m
- Lowest level on upstream side of dam 193.00 m
- Maximum Water Depth 20.50 m
- Top level of Intake structure 217.50 m

190. Length of the approach bridge to access the Intake is approx. 75m. Raw water pumping main is 600 mm DI k-7 for a length of 850 m. RWPS is proposed at Som Kamla Amba dam to pump raw water received through intake structure to pump water to WTP located at Main Head Works near Aspur. Capacity of the WTP is 21.90 MLD for phase-I demand and will be upgraded to 29.01 MLD for upcoming village scheme. 3000 KL CWR with pump house is to be constructed at WTP campus to transfer water to Dungarpur town. 45 kms clear water pumping main under laying dia. varying from 650 mm to 300 mm. Status note of Som Kamla Amba Dam is attached received from EE,PHED, Project. Estimated time for completion of this project is end of 2022.

C. Environmental Audit of Existing Water Supply Infrastructure

191. It is designed to utilize existing water supply infrastructure like tube wells, 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. The preliminary audit note is given in **Appendix 3**. A more detailed environmental audit and risk assessment shall be carried out during detailed design stage and incorporated into the final IEE.

192. All the existing infrastructure facilities are located in Dungarpur town, which is an urban area and where there are no protected or sensitive environmental areas such as forests, wildlife

sanctuaries or archeologically protected areas. Therefore, there are no risks or impacts on biodiversity and natural resources. The designed project will optimally utilize the surface and groundwater sources. Due to nature of components, the existing infrastructure components do not fall under the ambit of any environmental related regulations, and therefore there is no requirement of permissions or clearances. 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. Project, however, do not include rehabilitation or repair of AC pipes, and the project, in fact, designed to discontinue the use of AC pipes. Presence of AC pipes in the existing facilities may create hazardous conditions for the workers and surrounding community. 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. Following **Table 23** provides component wise compliances and concerns. Corrective actions for the identified environmental concerns are discussed in the following section.

Table 23: Environmental Audit of Existing Facilities

Infrastructure	**Details**	**Designed Rehabilitation**	**Compliance with environmental regulatory framework**	**Environmental Concerns**
3.2 MLD WTP at Bori Head Works	**Location**: PHED Bori Head Works **Year of Construction** of RGF Units : 1: 2002 and Unit 2: 2007 **Technology**: RGF **Total Area**: 3500 sq.m **Quantity** of Sludge generated from WTP: 400 kg/month **Disposal:** For the plantation in nurseries	Repairing RGF units and replacement of pipes, submersible pumps, cables, panels, valves, flow meters and synchronization with SCADA enabled devices Depth of the tube wells will not be increased.	CTE will be taken before start the refurbishment work and CTO will be taken before start the operation.	Occupational health and safety, public safety during the construction works
4.54 MLD WTP at Udai Vilas Head Works.	**Location**: PHED Udai Vilas Head Works **Year of Construction**: 1990 **Technology**: RGF **Total Area**: 2800 sq.m **Quantity** of Sludge generated from WTP: 300 kg/month	Civil works, Cleaning, and replacement of pipes, submersible pumps, cables, panels, valves, flow meters and synchronization with SCADA enabled devices	CTE will be taken before start the refurbishment work and CTO will be taken before start the operation.	Occupational health and safety, public safety during the construction works

Infrastructure	Details	Designed Rehabilitation	Compliance with environmental regulatory framework	Environmental Concerns
	Disposal: For the plantation in nurseries			
2. Tube wells and 2. open wells	• Patrakar colony TW, • Darji wada TW • Rani Bao OW, • Kela bao OW,	Replacement of pipes, submersible pumps, cables, panels, valves, flow meters and synchronization with SCADA enabled devices	No requirements under existing laws	Occupational health and safety, public safety during the construction works Disposal of discarded material, debris There are no asbestos containing material / AC pipes noticed
1 Raw water Storage	Bori (RCC) 235 KL	Civil repairs and rehabilitation, replacement of pipes, connections, electrical and mechanicals parts as required Cleaning	No requirements under existing laws	Storage of AC pipes in existing campus Occupational health and safety, public safety during the construction works Disposal of discarded material, debris including AC pipes
4 Clear water reservoirs (CWRs)	1. Udaivilas, RCC CWR,325 KL 2. Bori, RCC CWR, 325 KL 3. AEn, Office Masonry CWR, 263 KL	Civil repairs and rehabilitation, replacement of pipes, connections, electrical and mechanicals parts as required Cleaning	No requirements under existing laws	NO storage of AC pipes in existing campus Occupational health and safety, public

Infrastructure	Details	Designed Rehabilitation	Compliance with environmental regulatory framework	Environmental Concerns
	4. New colony / Nai Abadi,RCC CWR, 272 KL			safety during the construction works Disposal of discarded material, debris including AC pipes
04 GSLR and 08 OHSRs	1. Meera Dungari GLSR (Zone 04) 225 KL 2. Khantwara GLSR (Zone 05) 225 KL 3. Ghati GLSR new (Zone 07) 368 KL 4. Ghati (II) GLSR (Zone 08) 450 KL 1. New Rajpura OHSR (Zone 01) 150 KL 2. Navadera OHSR (Zone 02 A) 325 KL 3. Shastri Colony OHSR (Zone 09) 100 KL 4. Ptrakar Colony OHSR (Zone 15) 140 KL 5. Sindhi Colony OHSR (Zone 10) 325 KL 6. Pratap Nagar OHSR (Zone 11) 75 KL 7. Mordern School OHSR (Zone 13) 210 KL 8. Ashok nagar OHSR (Zone 16) 113 KL	Civil repairs and rehabilitation, replacement of pipes, connections, electrical and mechanicals parts as required Cleaning	No requirements under existing laws	Presence of AC pipes in existing connections Occupational health and safety, public safety during the construction works Disposal of discarded material, debris including AC pipes
07 Pumping stations	1. Vijay Chakra Sagar (Dimiya) PH-2 for Raw water (Size 5mX 4m) 2. Udaivilas RGF PH-(I) (Size 7mX8m)	Civil works, all New pump houses are proposed and old will be phased put	No requirements under existing laws	Presence of AC pipes in existing connections Spillage of oils, lubricants etc.,

Infrastructure	Details	Designed Rehabilitation	Compliance with environmental regulatory framework	Environmental Concerns
	3. Main pump house (Size 5mX7m) 4. Chandpole pump house (Size 5mX7m) 5. Bori RGF (I) (Size 4mX5m) 6. Bori RGF (II)) (Size 4mX5m) 7. Nai Abadi GLR-1 (Size 5mX10m)			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	Water Collected in CWR (from 2 Dams and 2TWs) and is transferred through DI transmission line to each OHSR. DI transmission mains AC (27.79 Km), DI (21.37 Km), GI (0.09 Km) and CI (3.87 Km) which are functioning properly are proposed to be retained.	No works proposed All AC pipes will be replaced by new distribution lines	No requirements under existing laws	Exact location and condition of AC pipes not known; no maps available. Accidental disturbance / need to remove in narrow roads Occupational health and safety, public safety during trenching

193. **Corrective Measures**. As presented in the above table, there are no regulatory non-compliance issues in the existing infrastructure other WTP Plant where CTE and CTO are not taken. 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. 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.

194. **Asbestos Containing Materials (ACM) Management.** Presence of ACM, mainly asbestos cement pipes, in the existing infrastructure is the main concern. Asbestos is recognized as a cause of various diseases and is considered health hazard if inhaled.

195. The old existing underground water transmission and distribution system consists asbestos cement pipes. Most of the asbestos cement pipes in the existing water supply are old and all these AC pipes are planned to be phased out after laying the new water supply networks. Since use of AC pipes are banned all over the India, there is no use of new asbestos cement pipes but for repairing work in the existing network, and for replace the damaged sections, asbestos cement pipes are being used. There will be no use of any asbestos cement pipe in the future as under the present project, water supply network is being provided in the entire town with non-asbestos cement pipes. It is normal practice in Rajasthan that existing asbestos cement pipes are left as it is in the ground and new pipes will be laid in a new alignment. As per the discussion with the PHED staff in Durgapur, there are about 94 kms of AC pipes in existing water supply distribution networks. Existing asbestos cement pipes are laid long back, they are deep in ground, more than 2 m at many places, as the road level has risen considerably. In wider roads, there will be adequate space to lay the new pipelines, and therefore there is no need to remove the existing pipelines.

196. However, complete avoidance of handling and disposal of asbestos cement pipes may not be possible. There are narrow lanes, where asbestos cement pipes may be encountered during the laying of new pipes. Some connections/inlet/outlet pipes at the existing CWRs are also of asbestos cement pipes. These will be removed and replaced with new non-asbestos cement pipes. At present no maps available on the exact location/position of asbestos cement pipes.

197. A temporary storage area shall be provided in the project site by the PIU. Asbestos materials present and removed from the construction activities will be temporarily maintained at the identified area. The temporary storage area shall be constructed by the DBO contractor based on the specifications of the asbestos management service contractor.

198. 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 matrix that comprises the rest of the materials and are termed as locked in asbestos products as these products have the asbestos fibers bound in cement. There is very little possibility of generation of airborne asbestos fibers during any reasonable handling, storage, and use of such products. However, during storing and installation, recommended work practices shall be followed to avoid harmful exposure”. According to Hazardous and other Wastes (Management and Transboundary Movement) Rules, 2016, any waste having asbestos concentration limit of 10,000 mg/kg (i.e. 1%), however this will apply only if the asbestos containing substances are in a friable, powdered or finely divided state. Under the Basel Convention,8 asbestos or asbestos waste in the form of dust and fibers is classified as hazardous waste.

199. Working with or handling asbestos cement pipes in manner that produces dust, fibres, air borne particles etc., is very harmful and hazardous to the workers and general 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 fibres before it is

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

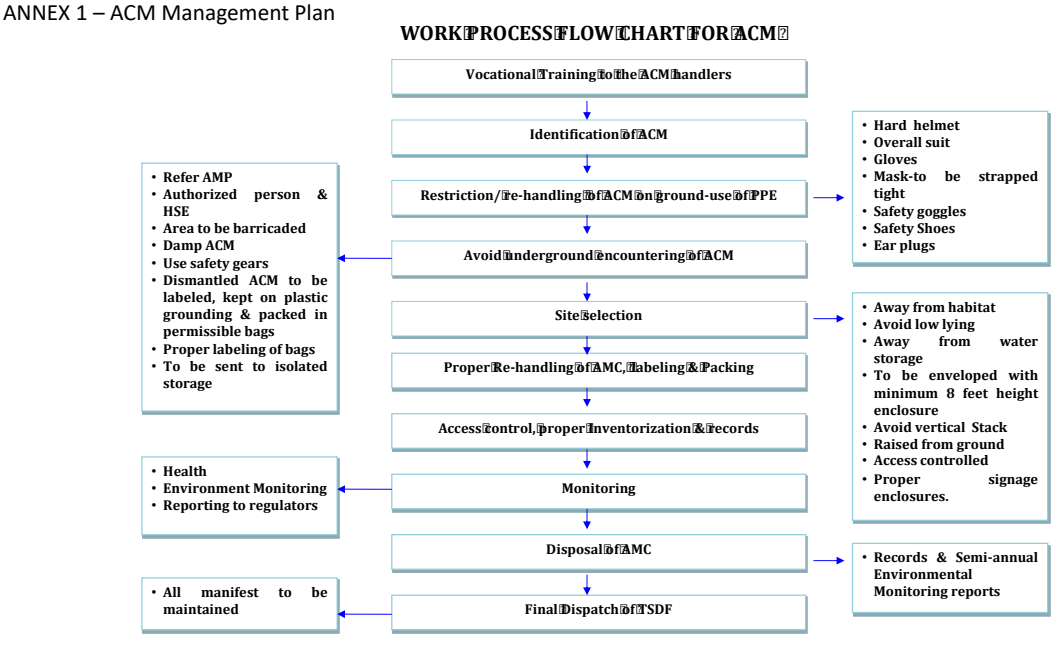
subjected any disturbance or removal.

200. 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 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 16;**
(ii) Conduct awareness program on safety during the construction work;
(iii) Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day;
(iv) Provide barricades, and deploy security personnel to ensure safe movement of people and also to prevent 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 16: ACM Management Plan – Work Process Flow Chart

ANNEX 1 – ACM Management Plan



201. 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 9 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;10
(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.

202. 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

203. **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

[9] 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.

[10] 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.

- (ii) instruct construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.

204. **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.

205. **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.

206. **Debris disposal.** Prior to the commencement of works, contractor shall identify a debris disposal site in consultation with the PIU and Consultant. Contractor will follow all the prescribed rules[11]during construction and adhering to following criteria (including but not limited to)-

- 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.
- The local governing body and community shall be consulted while selecting the site.
- Contractor shall prepare a construction and demolition waste management plan in pre-construction phase for safe disposal of construction and demolition wastes as per applicable rules and submit to Municipal Council through PIU for approval
- Debris disposal site shall be at least 200 m away from surface water bodies[12].
- No residential areas shall be located within 100 m downwind side of the site.
- The site is minimum 250 m. away from sensitive locations like hospitals, religious places, ponds/lakes or other water bodies.

[11]Construction and Demolition Waste Management Rules 2016 (refer appendix 8)

[12] 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.

6. Construction Impacts

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

208. **Laying of Water Supply and Sewer Networks.** Subproject include linear works (laying of water supply and sewage collection pipes). This covers almost entire project area of Dungarpur Town. Distribution lines/small sewers (tertiary sewers) will be laid in all streets and roads, the larger sewers and water mains will be laid mostly on wider main roads. Pipes/sewers 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. The maximum depth for sewers depends on the design, and in Dungarpur most of the sewers will be laid 1.2 m to 3.5 m below the ground, and some sewers will be laid deeper (>2 m) and maximum depth will be 6 m. As per the bid conditions, “the maximum depth of sewer is 3.5 m for open excavation; after 3.5 m sewer shall be laid by the trenchless method only. Trenchless method may also be used even where depth is less than 3.5 m for important roads in the city where traffic density is more, and in the streets where traffic diversion is not feasible etc. 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 of 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.

209. 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 land owners (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

210. 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.

211. **Demolition works.** In the initial stage of project planning it is accessed that there is no

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

212. **Storage and Disposal of excavated earth.** A large quantity of soil will be excavated for pipe laying, construction of CWR, pump house and other. Some part of this excavated soil will be reused for backfilling and/or surface leveling; 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 land owner/concerned authority for storage and disposal of excess earth is required. Prior to the commencement of works, Contractor will follow all the prescribed rules[13] and shall identify a debris disposal site in consultation with the PIU/ULB and adhering to following criteria:

- 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.
- Debris disposal site shall be at least 200 m away from any surface water body.
- No residential areas shall be located within 200 m downwind side of the site.
- The site is minimum 250 m. away from sensitive locations like hospitals, religious places, ponds/lakes or other water bodies.
- The local governing body and community shall be consulted while selecting the site.
- 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
- Soil storage site should be properly demarcated by fencing and information board should be placed at entrance
- At soil storage site soil should be covered by tarpaulin or regular water sprinkling should be done to reduce dust emission
- 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

213. **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:

- Use material sources permitted by government[14];
- Verify suitability of all material sources and obtain approval of PIU;
- 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
- Submit to PIU on a monthly basis documentation of sources of materials.. If contractor is purchasing ready mix concrete, asphalt/macadam and aggregates from third party,

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

[14]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.

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

214. **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:

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

215. **Surface Water Quality.** Do River, Sabela Lake and Gap Sagar Kale are major surface water bodies near the proposed locations of SPS (1, 2 & 3) CWR (new Colony) and STP site. These water bodies may be contaminated from leakage of fuel oil and lubricants during construction phase from house sewerage during operation phase. These potential impacts are temporary and short-term duration only. However, to ensure that these are mitigated, construction contractor will be required to:

- Prepare and implement a spoils management plan;
- 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;
- Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
- Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with PIU on designated disposal areas;
- Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
- Place storage areas for fuels and lubricants away from any drainage leading to water bodies and provide impermeable lining under the storage yard of fuels and lubricants;
- Dispose any wastes generated by construction activities in designated sites;
- Keep oil tray or pans under the DG set or during maintenance of mechanical equipment to avoid oil spillage resulting soil and water pollution, and

- Conduct surface water quality Monitoring according to the Environmental Management Plan (EMP).

216. **Noise and Vibration Levels.** Construction works will be conducted along the roads in Dungarpur urban area, where there are majorly houses, commercial activities, 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:

- 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;
- Use road cutters instead of breaker/hammer for cutting the road before excavation for pipe laying on roads
- Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach;
- 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;
- DGs being used at site should have sound reducing (acoustic) enclosures, preferably silent DGs should be used at site;
- 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;
- Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity;
- 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.;
- Provide all workers appropriate PPEs like ear plug/muff, working in high noise conditions;
- Keep all vehicles and equipment in good conditions to avoid excessive noise generation;
- 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;
- Avoid noisy works in nights in inhabited areas to avoid any disturbance to habitants; and
- Consult in advance with habitants and inform them about the nature and duration of works
- Conduct noise monitoring according to the Environmental Management Plan (EMP)

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

- 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.

- Contractor should plan for night works only after directions from PMU/PIU/CMSC
- Contractor should submit plan for night works for approval from PIU.
- 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.
- 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.
- Contractor is required to have following equipment/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 equipment 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 equipment 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 and vehicles
- Workers should not shout and create noise
- First aid and emergency vehicles should be available at site
- Emergency preparedness plan should be operative during night works
- Old persons and pregnant women and women having small kids should not work in night time
- All the vehicles and equipment being used at night works should have adequate type of silencers/enclosures/mufflers to reduce noise
- All the vehicles should be checked for working head lamps, tail lamps, inner lights etc. before start of night works
- PIU/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
- Night works should be stopped early in the morning at least one hour before start of pedestrian/traffic movement
- After completion of night works all the site should be cleaned and maintained obstruction free for day time movement of vehicles and pedestrians
- Drivers and workers should be alert and responsive during night works
- All the wages to workers working in night hours should be as per the applicable labour acts
- Avoid any nuisance which may create problems to nearby habitants and work peacefully during night hours
- Night works should not be conducted near hospitals and during peak seasons such as peak tourist season, students' exam times etc.

218. **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:

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

219. **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:

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

220. **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:

- Prepare and implement a Traffic Management Plan **(Appendix C-14**)
- Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
- Schedule transport and hauling activities during non-peak hours;
- Locate entry and exit points in areas where there is low potential for traffic congestion;
- Keep the site free from all unnecessary obstructions;
- Drive vehicles in a considerate manner;
- Coordinate with Traffic Police for temporary road diversions and for provision of traffic aids if transportation activities cannot be avoided during peak hours; and
- Notify affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.

221. 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:

- Inform the affected local population 1-week in advance about the work schedule
- Plan and execute the work in such a way that the period of disturbance/ loss of access is minimum.
- 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.

222. **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:

- Prepare and implement spoils management plan (**Appendix C-13**);
- Leave spaces for access between mounds of soil;
- Provide walkways and metal sheets where required to maintain access across for people and vehicles;
- Increase workforce in the areas with predominantly institutions, place of worship, business establishment, hospitals, and schools;
- Consult businesses and institutions regarding operating hours and factoring this in work schedules; and
- Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.
- Notify community/ water users in advance about likely interruptions in water supply.
- Provide alternate sources of clean water until water supply is restored.
- Provide all mitigation measures as given in resettlement plan (RP) prepared for the project to mitigate impacts on vendors and shopkeepers

223. **Socio-Economic-Employment.** Manpower will be required during the 36-monthsconstruction 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:

- 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
- Secure construction materials from local market.

224. **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:

- Comply with all national, state and local labor laws (see **Appendix C-12**);
- 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 Training15 for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;
- Ensure that qualified first-aid is provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;
- Provide medical insurance coverage for workers;
- Secure all installations from unauthorized intrusion and accident risks;

[15] 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.

- 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 work place; allow periodic resting and provide adequate water
c. Provide necessary medicine and facilities to take care of dehydration related health issues

- Provide supplies of potable drinking water;
- Provide clean eating areas where workers are not exposed to hazardous or noxious substances;
- 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;
- 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;
- Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
- Ensure moving equipment is outfitted with audible back-up alarms;
- 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
- 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.

225. **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 come in contact with the workers and general public and may have serious health implications. This is already discussed under heading **Design Impacts**, and necessary measures are suggested.

226. **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:

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

227. Some part of the town is characterized by narrow roads. Particularly, the areas located in old town have very narrow roads with dense habitation and heavy traffic and are accessible only to pedestrians. Besides impeding the access, the trench excavation and pipe laying will pose safety risks to pedestrians, and the people living in these areas. Though the width (<500 mm) and depth (<750mm) of trench is minimal, it will pose safety risk, especially for children and elders

The construction contractor will be required to:

- Trench excavation and pipeline works shall be conducted in a safe manner; if the allowing public movement along the work sites (pedestrians or vehicles as the case may be) is likely to cause safety risks, movement should be blocked temporarily and work shall be conducted; in such areas, conducting night work or working in small stretches to avoid blockage of traffic/movement no more than few hours in due consultation with the local community and ULB shall be planned;
- 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;
- Survey the surrounding vulnerable buildings for likely issues in structural stability/ differential settlement during the excavation works;
- Provide prior information to the local people about the nature and duration of work;
- 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; and
- 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.

228. **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:

- Consult PIU before locating project offices, sheds, and construction plants;
- Minimize removal of vegetation and disallow cutting of trees;
- Provide drinking water, water for other uses, and sanitation facilities for employees;
- Provided temporary rest and eating area at all work sites;
- 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 accommodation16 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 (Suggested guidelines based on IFC benchmark standards for workers accommodation is provided in **Appendix C-21**);
- Prohibit employees from poaching wildlife and cutting of trees for firewood;
- Train employees in the storage and handling of materials which can potentially cause soil contamination;
- Recover used oil and lubricants and reuse or remove from the site;

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

- Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- Remove all wreckage, rubbish, or temporary structures which are no longer required; and
- Report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.

229. **Social and Cultural Resources.** 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 pipe line works for water supply and contractor will require to follow the mitigation measures as given below-

- 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
- 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.
- 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,
- provide proper signage, barricades etc. to protect public and devotees from dangers of construction works.

230. **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:

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

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

- Inform the affected local population 1-week in advance about the work schedule
- Plan and execute the work in such a way that the period of disturbance/ loss of access are minimum.
- 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
- Excavate only that stretch in a day that could be finished in the same day by laying of pipes and backfilling.

E. Operation and Maintenance Impacts

232. **Water Supply System.** O&M of the water supply system will be carried out by DBO contractor for 10 years and then by Dungarpur Municipal Council 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.

233. 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.

234. 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.

235. Since backwash water/wastewater from the process is recovered and recirculated in the WTP, no wastewater will be generated from water treatment process. Water treatment process will generate 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. The management and safe disposal of wastewater and sludge have already been considered in the design phase, and if these activities are implemented as intended will have no negative impacts.

236. It is proposed to use chlorine for disinfection of water, therefore there is a safety risk due to handling of large quantities of chlorine at the WTP. Likely impacts will be negligible if the various measures are 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.

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

(i) Judiciously utilize the available surface water and groundwater resources by adapting conjunctive use; prepare a water utilization plan every year post monsoon season depending on the water storage in Dams;
(ii) Ensure that dead storage is always maintained in Dams; 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 Dams; 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 at all times 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, management and disposal/reuse actions suggested in the management plan;
(viii) Conduct periodic testing of sludge as per the EMP;
(ix) Ensure valid consent to operate (CTO) from RPCB for operation of WTP;
(x) Ensure that all conditions/standards prescribed by RPCB are complied 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; and
(xii) Implement emergency response system (ERS) for the chlorine leakage; Guidelines and Emergency plan for handling and storing chlorine is attached as Appendix **C-22**.

238. **Sewerage System**. O&M of the sewerage system will be carried out by DBO contractor for 10 years and then by Dungarpur Municipal Council 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.

239. 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 in to 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.

240. 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.

241. 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.

242. 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:

- 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;
- Ensure implementation of reuse plan, and ensure intended quality for each direct reuse;
- 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;
- 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;
- Ensure valid consent to operate (CTO) from RSPCB for operation of STP;
- Ensure that all conditions/standards prescribed by RSPCB are complied duly;
- 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;
- Implement emergency response system (ERS) for the chlorine leakage; Guidelines and Emergency plan for handling and storing chlorine is attached as **Appendix C-22**;
- Ensure proper knowledge transfer, hands-on training to municipal staff engaged in STP operation has been provided by contractor prior to handover of facility;
- Operate and maintain the facility following standard operating procedures of operational manual;
- Undertake preventive and periodic maintenance activities as required;
- 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;

- 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.

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

- 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).
- 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;
- 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;
- 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;
- Develop an ERS for the sewerage system leaks, burst and overflows, etc.;
- Provide necessary health & safety training to the staff;
- Provide all necessary personnel protection equipment;
- During cleaning/clearing of manholes and sewer lines great precautions should be taken for the safety of workers conducting such works:
    - (f) As far as possible use remote/CCTV mechanism to identify/detect the problems in sewers and do not engage persons for this purpose;
    - (g) 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;

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

244. 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.

245. **Operation of FSSM**. Households of 13 Wards will be covered with FSSM system wherein which septage from individual septic tanks at houses will be collected via mobile/vehicle mount tankers with suction equipment, transport and discharged into STP for safe treatment and disposal. Although system will be completely mechanized, given the very harmful nature of septage, following precautionary measures shall be implemented:

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

Cumulative Impacts

246. Cumulative impacts are those that result from the successive, incremental, and/or combined effects of a project or activity when added to other existing, planned, and/or reasonably anticipated future ones. The subproject aims to improve urban water supply and sewerage in Dungarpur Town, by rehabilitating, augmenting, and creating required new infrastructure.

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

248. **Project Benefits.** The citizens of the Dungarpur will be the major beneficiaries of the improved water supply and sewerage systems, as (i) they will be provided with a constant supply of better quality water, piped into their homes at an appropriate pressure; and (ii) the human waste from the homes will be removed rapidly, which otherwise would flow in open drains. This should improve the environment, should deliver major improvements in individual and community health and well-being. The project will improve the over-all health condition of the town as water borne diseases will be reduced. Diseases of poor sanitation, such as diarrhea and dysentery, should be reduced, so people should spend less on healthcare and lose fewer working days due to illness, so their economic status should also improve, as well as their overall health.

VII. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Overview

249. 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.

250. 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, Dungarpur Municipal Council, 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

9. Informal and formal consultation are conducted with local population of the area, about at 8 places along with proposed alignment with about 54 persons in month of March and April 2022. Discussions were held about proposed project components, EMP measures, grievance redressal, ownership of land, tree cutting, wastewater, reuses of treated effluent of proposed STP, and general people perception for proposed project. **(Appendix 6**). Due to pandemic situation, fewer consultations took place; only informal consultations were carried out. The consultations shall be done on regular basis and shall be reported in updated IEE Report/SEMR. When the contractor will mobilize with full team then complete presentation mentioning deliveries of all stake holders to be formalized.

1. Consultation during Project Preparation

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

252. 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.

253. It was observed that people are willing to extend their cooperation as the proposed activities are supposed to enhance the infrastructure service levels and the living standard of the public. The public expressed their concern regarding the nuisance and disturbance (dust, road closure and traffic management activities) during the construction stage which can have impact on their day to day activities. Public demanded for advance notice before construction and proper warning signs along the construction area to avoid accidents and inconvenience. Public opined that an appropriate operation and maintenance system should be in place, especially for sewerage system, for its best functioning and to have the maximum health and aesthetic benefits. Regarding water supply people were ready to bear cost of water through modern meters but demanded continuous supply of water in day. Regarding sewerage works people were demanding sewage house connections in whole town because they are suffering a lot due to unsafe sewage disposal in drains.

254. A town-level City Level Committee (CLC) has been formed in Dungarpur district by Government orders. City Level Committee meeting was organized during the initial design stage in which representatives of primary and secondary stakeholders were invited. Consultation were also conducted with the Khandeshwar Mahadev Mandir temple priest, the temple is located about 200 m upstream of STP location on Do river, he informed that a tube well is present in the temple premises which fulfil all water requirement in the temple. Temple is not using Do river water. CLC meeting was conducted on 30.06.2022 to discuss various issues like

demand and supply gap in water supply, land availability, scope of works etc. under the chairmanship of District Collector in which representatives of primary and secondary stakeholders were invited. The feedback and concerns of the stakeholders have taken into consideration in detail designs of the project. Proposed works were approved by CLC members in this meeting. Minutes of Meeting of CLC vide dated 30.06.2022 and photographs are attached in **Appendix 6**.

2. Consultation During Construction

255. Prior to start of construction, Dungarpur Municipal Council 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.

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

C. Information Disclosure

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

258. Public information campaigns via newspaper/radio/TV, to explain the project details to a wider population will be conducted. Public disclosure meetings will be conducted at key project stages to inform the public 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 general public.

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

VIII. GRIEVANCE REDRESS MECHANISM

A. Project Specific Grievance Redress Mechanism

260. A project-specific, three-tier grievance redress mechanism (GRM) covers both environment and social issues. The GRM will be established to receive, evaluate, and facilitate the resolution of affected persons' concerns, complaints, and grievances about the social and environmental performance at project level. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns related to the project. Assessment of the GRM designed and implemented for Rajasthan Urban Sector Development Program (RUSDP)[17] the system was effective in timely resolution of grievances in a transparent manner.[18] The multichannel, project-specific, three-tier GRM is functional at RUSDP, hence the design of GRM for RSTDSP takes into account the proposed institutional structure for RSTDSP and the positive features and learnings from the previous GRM.[19]

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

262. 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.

B. Grievance Redress Process

263. Affected persons will have the flexibility of conveying grievances/suggestions by dropping

[17] 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.

[18] 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.

[19] 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.

grievance redress/suggestion forms in complaint/suggestion boxes that will be installed by project PIUs or by e-mail, by post, or by writing in a complaints register in ULB offices/complaints register at contractor's work site[20] or by sending a WhatsApp message to the PIU[21] or by dialling the phone number of town level PIU/CAPPC or by dialling a toll-free number.[22] 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.[23] 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 personal will be posted at all construction sites at visible locations.

(i) **1st level grievance.** The contractors, PIU executive engineer/assistant engineer designated as safeguard and safety officer (social and environment), CMSC (safeguard staff) and CAPPC can immediately resolve issues on-site, in consultation with each other and will be required to do so within 7 days of receipt of a complaint/grievance. If required, city level monitoring committee (CLMC)[24] 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.[25]

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[20] 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.

[21] 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.

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

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

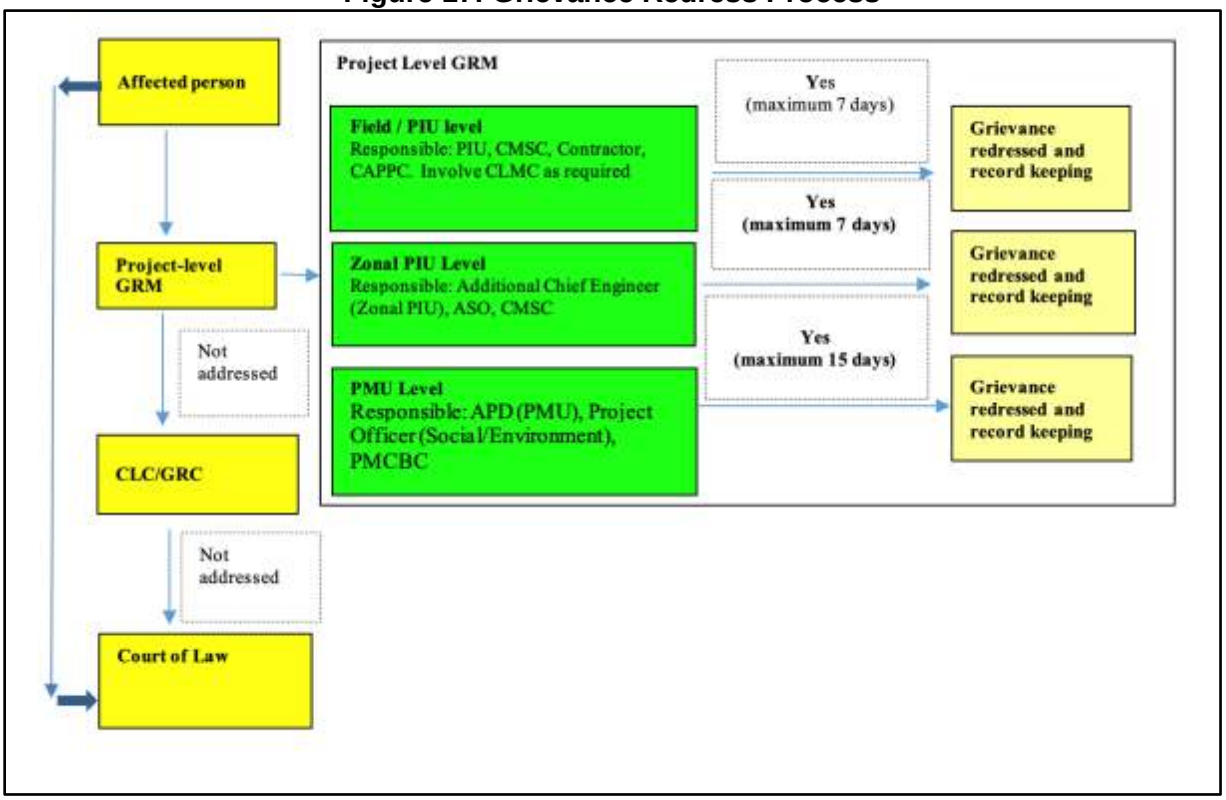
[24] The CLMC has been formed at the town/city level for planning and monitoring of work, resolve issues related to departmental coordination etc. It is headed by Commissioner/Executive Officer ULB (Chairman) and city engineer of public health engineering department (PHED), public works department (PWD)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

[25] 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.

(v) The multi-tier GRM for the project is outlined below (**Figure 17**), 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.

Figure 17: 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.

264. 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

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.

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.[26]

265. People who are, or may in the future be, adversely affected by the project may submit complaints to ADB's Accountability Mechanism. The Accountability Mechanism provides an independent forum and process whereby people adversely affected by ADB-assisted projects can voice, and seek a resolution of their problems, as well as report alleged violations of ADB's operational policies and procedures. Before submitting a complaint to the Accountability Mechanism, affected people should make an effort in good faith to solve their problems by working with the concerned ADB operations department. Only after doing that, and if they are still dissatisfied, should they approach the Accountability Mechanism[27].

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

267. **Periodic review and documentation of lessons learned.** The PMU Project Officer (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.

268. **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.

269. 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 shall be formed in upcoming project towns after PIUs in new towns are established through office order from PMU for the same.

IX. ENVIRONMENTAL MANAGEMENT PLAN

A. Environmental Management Plan

270. 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.

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

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

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

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

Table 24: Design Stage Environmental Management Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Cost and Source of Funds
Intake in Vijay Chakra Sagar Dam	Water quality and ecological impacts	(i) Do not utilize the dead storage for supply; ensure that dead storage is available in the dam all times (ii) Design inlet of intake pipe in the dam with appropriate screen to avoid entry of aquatic organisms into inlet (iii) 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 (iv) 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; (v) Erect temporary barriers to form enclosed construction area with least disturbance (vi) 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 (vii) Avoid/minimize use of fuels, chemicals and lubricants; ensure no spillage (viii) 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 (ix) Implement work site safety at works in water body	DBO Contractor / PIU	Project costs
Water Treatment Plant (WTP)	Inefficient treatment, treated water characteristics not satisfying the standards	i) Design treatment process that is suitable for raw water source characteristics duly considering the seasonal variation in quality if any (ii) Duly consider quality of groundwater that will be supplemented for surface water supply variations (iii) Treated water and supplied water at consumer end should meet the drinking water standards all times	DBO Contractor/PIU	Design consultants' cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Cost and Source of Funds
Water Treatment Plant (WTP)	Design to prevent pollution due to wastewater and sludge	Ensure that the following are included in the WTP design: (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) Sludge management system components: Gravity thickeners for sludge from clarifiers, mechanical sludge dewatering system, storage facility for dewatered sludge (iv) Disposal of sludge at a landfill or the disposal site provided by the ULB	DBO Contractor/PIU	Project costs
WTP, CWRs and STP	Hazardous / harmful chemicals	(i) Reduce the use of chemicals in the treatment process to the extent possible (water treatment); provide non-chemical alternatives or easily recoverable and/or reusable chemicals or biocompatible alternatives. (ii) Establish proper handling / storage / application system according to the relevant standards, safety precautions and prevent accidental release / spill (iii) Provide leak/spill detection, collection / capture and safe disposal facilities such as chlorine absorption and neutralization facility (iv) Provide ventilation, lighting, entry and exit facilities; visible & audible alarm facilities to alert chemical/chlorine leak (v) Facility for isolation in the event of major leakages (vi) Eye wash & shower facility (vii) Personal protection and safety equipment for the operators (masks, oxygen cylinders, gloves, etc.,) (viii) Provide training to the staff in safe handling and application of chemicals, material safety, and standard operating procedures and emergency responses (ix) Develop emergency response procedures	DBO Contractor/PIU	Project costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Cost and Source of Funds
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	Consultants / PMU	Project Costs
	Impairment of STP treatment efficiency	Ensure continuous uninterrupted power supply (i) Provide back-up facility (such as generator) and make sure that adequate fuel supplies during operation for running of generator when required; (ii) Provide operation and maintenance 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. (iii) 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 Dungarpur Municipal Council (iv) Design should include online monitoring for the minimum BOD, pH and Ammonia at the inlet and outlet of the plant	Consultants / PMU	Project Costs
	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 (i) Ensure that there is no illegal discharge through manholes or inspection chambers (ii) Conduct public awareness programs; in coordination with RSPCB, issue notice to all industries for compliance	PIU / ULB	Project Costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Cost and Source of Funds
		(iii) Conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated effluent quality complies with the standards		
STP	Treated effluent discharge into West Do River, and associated impacts on river water and downstream users	(i) Obtain of consent of RPCB for discharge of treated wastewater into West Banas River (ii) Conduct a baseline water quality assessment of receiving water body – Do River at the discharge location (iii) 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	DBO Contractor/ PIU	Project Costs
STP	Sludge management and reuse	(i) Prepare a sludge management plan (ii) Prepare a dried Sludge utilization plan for Dungarpur within the help of Agriculture Department / CLC; plan should also include if any additional processing is required for sludge to use as soil conditioner (iii) Plan should clearly various potential uses and demand in Dungarpur and surroundings (iv) Establish usage limits, where required, (geographical / crops / type of application / type of soils etc.,); adopt international good practice suggested by agencies like World Health Organization (WHO), Food and Agricultural Organization (FAO) of the United Nations. (v) Identify a landfill / suitable site for disposal of surplus dried sludge (vi) Monitor sludge quality during operation phase as per the Environmental Monitoring Plan, ensure that it meets the quality parameters established by FCO) In case of sludge not meeting the quality parameters, it shall not be used as soil condition, and shall be disposed at appropriate disposal site (if it falls under hazardous category, it shall be disposed as per the Hazardous Waste Management Rules, 2016)	DBO Contractor/ PIU	Project costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Cost and Source of Funds
Sewer network – collection & conveyance	Poor design leading to overflows, blockages, and creating nuisance, pollution	(i) Limit the sewer depth where possible (ii) Sewers shall be laid away from water supply lines and drains (at least 1 m, wherever possible); (iii) In all cases, the sewer line should be laid deeper than the water pipeline (the difference between top of the sewer and bottom of water pipeline should be at least 300 mm) (iv) In unavoidable, where sewers are to be laid close to storm water drains, appropriate pipe material shall be selected (stoneware pipes shall be avoided) (v) For shallower sewers and especially in narrow roads, use small inspection chambers in lieu of manholes; (vi) Design manhole covers to withstand anticipated loads & ensure that the covers can be readily replaced if broken to minimize silt/garbage entry (vii) Ensure sufficient hydraulic capacity to accommodate peak flows and adequate slope and gas vents in gravity mains to prevent buildup of solids and hydrogen sulfide generation (viii) Take necessary precautionary measures to protect sewer network, and to avoid disposal of solid wastes, debris, wastewater into newly laid sewers from the time it is constructed to the start of operation phase	DBO Contractor / PIU	Project costs
FSSM	Occupational health and safety issues, and impact on STP process	(i) Conduct detailed survey of the households to be covered with FSSM to design the system to suit the local conditions, such as type of septic tanks and their location in the houses (ii) Create awareness program on the FSSM from collection to treatment system that will be adopted (iii) Design the sewage treatment process duly considering mixing of septage (iv) Ensure that the FSSM system is completely mechanized no human touch, even accidentally, from	DBO Contractor / PIU	Project costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Cost and Source of Funds
		collection at household to discharge into STP, and in periodic cleaning of tankers (v) Demarcate a proper area for cleaning of mobile tankers in STP premises, and ensure that the wastewater shall be discharged into STP (vi) Provide proper training to the workers, and staff in safe handling of FSSM tasks, provide all necessary personal protection equipment (vii) Ensure proper facilities for workers including showers, wash areas, toilets, drinking water, eating and resting places (viii) Conduct regular health checks (ix) Prepare Health and Safety Plan for FSSM		
Asbestos cement (AC) pipes in existing water supply system: clearing, transfer and disposal; work in narrow streets, and interventions in existing AC pipelines	Health impacts due to air borne asbestos if handled unsafely, cut, drilled or broken into pieces	(i) Develop ACM Management Plan (AMP) that includes identification of hazards, the use of proper safety gear and disposal methods. Sample AMP is provided in Appendix 20. Adhere to the workflow process suggested in IEE (ii) Conduct awareness program on safety during the construction work (iii) Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day (iv) Provide barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches (v) Identify risk of intervention with existing AC pipes. If there is significant risk, implement the AMP strictly that includes identification of hazards, the use of proper safety gear and disposal methods. (vii) Maintain records of AC pipes as per the AMP (viii) Refer to the instructions of the Asbestos Expert	DBO Contractor/PMU	Project costs
Asbestos materials in	Health impacts due to air borne asbestos if	(i) Conduct survey and inventory of existing asbestos materials on site	DBO Contractor/PMU	Project costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Cost and Source of Funds
existing PHED campus	handled unsafely, cut, drilled or broken into pieces	(ii) Conduct risk assessment to determine extent of asbestos materials currently on-site (ii) Coordinate and provide support to the asbestos management service provider on the requirement of sampling, testing and disposing existing asbestos materials (iii) Ensure the selected area for temporary storage is suitable for safe storage of asbestos materials (iv) Incorporate international and national standards considered in designing the temporary storage (v) Ensure that handling and disposal of asbestos materials are carried out by specially trained service provider/s following Government of India requirements, or in their absence, internationally recognized procedures Refer to the requirements of the Asbestos Management Plan and instructions of the Asbestos Expert		
Location impacts of proposed components	Nearby community may be affected due to increased pollution during construction and operation	(i) sites should be selected so that nearby community may have no or minimum impact due to proposed works (ii) Mitigation measures are prepared and included in design and EMP is attached with contract documents	Consultants/PMU	No cost required
Requirement of tree cutting	Tree cutting may result loss of aesthetics and increase in air pollution	(i) sites should be selected so that minimum tree cutting is required (ii) project documents should include the minimum tree cutting provisions (iii) Provision for Compensatory plantations should be included in contract documents	Consultants/PIU/PMU	No cost required
Energy Efficiency	Loss of natural resources	(i) Use energy efficient electrical equipment (ii) Provision of use of energy efficient equipment in contract agreements and BOQ	Consultants/PMU	No cost required
Incorporating EMP and Health and Safety	Implementation of the EMP	The EMP should be included in the Bid Document so that the selected Contractor understands the issues and makes necessary plans to prepare and implement the EMP	PMU	Project Costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Cost and Source of Funds
requirements into Contractor Bid Document	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.	PMU	Project Costs
Preparation of plans and protocols	Various impacts	(i) Preparation of ACM Management Plan (ii) Prepare traffic management plan (iii) Prepare occupational health and safety plan (iv) Prepare spoils management plan	DBO Contractor and CMSC with the assistance of PMCBC (for ACM plan)	Project costs

Table 25: 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 A compliance checklist is appended to this report (**Appendix 2**)	Consents, permits, clearance, NOCs, etc. A compliance checklist is appended to this report (**Appendix 2)**	PIU and Dungarpur Municipal Council	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	Consents, permits, clearance, NOCs, etc.	PIU/Consultants in coordination of Dungarpur Municipal Council	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
		contractor are in place before start of construction				
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	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	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

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Disruption to traffic flow and sensitive receptors	Prioritize areas within or nearest possible vacant space in the project location; 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; Do not consider residential areas; Written consent of landowner/s (not lessee/s) for reuse of excess spoils to agricultural land Take extreme care in selecting sites to avoid direct disposal to water body which will inconvenience the community. (v) For excess spoil disposal, ensure (a) site shall be selected preferably from barren, infertile lands. In case agricultural land	-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
		needs to be selected, written consent from landowners (not lessees) will be obtained; (b) debris disposal site shall be at least 200 m away from surface water bodies; (c) no residential areas shall be located within 50 m downwind side of the site; and (d) site is minimum 250 m away from sensitive locations like settlements, ponds/lakes or other water bodies.				
Sources of Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution.	Prioritize sites already permitted by the Department of Mines and Geology 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 If additional quarries will be required after	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

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		construction is started, inform construction contractor to obtain a written approval from PIU. Bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.				
Consents, permits, clearances, NOCs, etc.	Failure to obtain necessary consents, permits, NOCs, etc. can result to design revisions and/or stoppage of works	Obtain all necessary consents (including CTE for STP from RSPCB), permits, clearance, NOCs, etc. prior to award of civil works. (following consents are required- Tree cutting- local authority Storage, handling and transport of hazardous materials- RSPCB Sand mining, quarries, borrow areas- Department of mines and Geology Traffic diversion/road cutting- local authority, traffic police	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 PIU and Consultants

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		Ensure that all necessary approvals for construction to be obtained by contractor are in place before start of construction. Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc. Include in detailed design drawings and documents all conditions and provisions if necessary				

Table 26: 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 (OH&S), core labor laws, applicable environmental laws, etc. (ii) Contractor has to depute a qualified EHS personnel in the start of the project to conduct training to	Training Plan and its implementation Achievement of the environmental performance targets by the Contractor;	Construction Contractor	CMSC/ PIU	Cost of EMP Implementation Orientation Training to contractor is responsibility of PMU. Other costs responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		all the personnel and effective monitoring of mitigation measures during construction				
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	(i) Prepare and implement a spoils management plan (ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;	Areas for stockpiles, storage of fuels and lubricants and waste materials;	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
	lubricants during installation of pipelines can contaminate nearby surface water quality.	(ii) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; (iii) Place storage areas for fuels and lubricants away from any drainage leading to water bodies; (iv) Dispose any wastes generated by work in designated sites; and (v) Conduct surface quality Monitoring according to the Environmental Management Plan (EMP).	-Number of silt traps installed along trenches leading to water bodies; -Records of surface water quality Monitoring; -Effectiveness of water management measures; -No visible degradation to nearby drainages, nallahs or waterbodies due to civil works			
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	-Complaints from sensitive receptors; -Use of silencers in noise-producing equipment and sound barriers; -Equivalent day and nighttime noise levels (see **Appendix C-6**)	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
		(iv) Maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at 10 m or more from the vehicle/s. (v) Quarterly environmental monitoring for ambient noise as per EMP				
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	-CTO and CTE compliance; -Periodic GW Quality Monitoring Reports; -Areas for storage of fuels and lubricants and waste materials; - Number of oil traps installed in oil and lubricant storage areas; ;	Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
Landscape and aesthetics	Impacts due to excess excavated earth, excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers,	(i) Prepare and implement spoils management plan); (ii) Avoid stockpiling of excess excavated soils; (iii) Coordinate with ULB/PIU for beneficial uses of excess excavated soils or immediately dispose to designated areas; (iv) Recover used oil and lubricants and reuse or remove from the sites; (v) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;	(i) Complaints from sensitive receptors; (ii) Worksite clear of hazardous wastes such as oil/fuel (iiv) Worksite clear of any excess excavated earth, excess construction materials, and	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
	spoils, oils, lubricants, and other similar items.	(vi) Remove all wreckage, rubbish, or temporary structures which are no longer required; and (vii) Request PIU to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.	solid waste such as removed concrete, wood, packaging materials, empty containers			
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;	(i) Traffic route during construction works including number of permanent signages, barricades and flagmen on worksite	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
		(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 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.	(**Appendix C-14**); (ii) Complaints from sensitive receptors; (iii) Number of signages placed at project location.			
Socio-Economic – Income.	Impede the access of residents and customers to nearby shops	(i) Prepare and implement spoils management plan Contractor to Implement RP and to follow mitigation measures prescribed 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	(i) Complaints from sensitive receptors; (ii) Spoils management plan (iii) Number of walkways, signages, and metal sheets placed at project location.	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
		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.				
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	(i) Employment records; (ii) Records of sources of materials (iii) Compliance to labor laws	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 C-12**) (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	(i) Site-specific OH&S Plan; (ii) Equipped first-aid stations; (iii) Medical insurance coverage for workers; (iv) Number of accidents; (v) Supplies of potable drinking water; (vi) Clean eating areas where workers are not exposed to hazardous or noxious substances;	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
		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 affect the health of workers engaged in construction work. Contractor should take necessary measures during summers including the following: (a) work schedule should be adjusted to avoid peak temperature hours (12 – 3 PM); (b) provide appropriate shade near the workplace; allow periodic resting and provide adequate water, and (c) provide necessary medicine and facilities to take care of dehydration related health issues (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	(vii) record of H&S orientation trainings (viii) personal protective equipment; (ix) % of moving equipment outfitted with audible back-up alarms; (xi) permanent sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. (xii) Compliance to core labor laws (see **Appendix C-12**)			

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; (ix) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; (x) Ensure moving equipment is outfitted with audible back-up alarms; (xi) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and (xii) Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively. (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.				
Community Health and Safety.	Traffic accidents and vehicle collision with	(i) Plan routes to avoid times of peak-pedestrian activities. (ii) Liaise with PIU/ULB in identifying high-risk areas on route cards/maps.	As per Traffic Management Plan given in **Appendix C-14**	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
	pedestrians during material and waste transportation	(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.				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 movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches	-H&S plan including appropriate signs for each hazard present -Construction vehicles condition in H&S plan. Complaints from neighborhood and monitoring of accidents	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
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	(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;	-Condition in list of preapproved sites for construction work camps, areas for stockpile, storage and disposal prepared by the Contractor. Drinking water and sanitation	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
	living conditions for workers	(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.	facilities for employees			
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 equipments otherwise sound proof/super silent 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 equipments should	As per Management Plan for night works (**Appendix 21**).	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
		be done in day time and avoided in night time (viii) Workers engaged in night works should have adequate rest/sleep in day time before start of night works (ix) Worker engaged for night works should have previous experience of night works and should be physically fit for such works including clear vision in night (x) All the necessary provisions of traffic aids such as traffic signals, road signage, barricades, cautions boards, traffic diversion boards etc. should be available with fluorescent/retro-reflective arrangements (xi) Workers should be trained before start of night works about risks and hazards of night works and their mitigation measures and should be provided all the protective aids (PPEs) including fluorescent/retro-reflective vests (xii) Horns should not be permitted by 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 nighttime.				

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		(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) 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 sites, undertake excavation and construction work in such a way that no structural damage is caused to the religious building. (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, (iv) provide proper signage, barricades etc. to protect public and devotees from dangers of construction works.	Chance find protocol	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation measures responsibility of contractor.
Monsoon preparedness	Disruption of utilities and	(i) As for a possible avoid trench works and excavation works (pipe laying) during monsoon season to	As per monsoon preparedness	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
	water logging in trenches	avoid any water logging and accident due to it (ii) if open trenches are not avoidable during monsoon, keep ready all the mitigations measures to avoid water logging such as dewatering pumps and sufficient pipes, traffic assistance, barricades etc. (iii) Guidelines for safety during monsoon is attached as **Appendix C-19**	plan& as per **Appendix C-19** "Guidelines for Safety during Monsoon/Heavy Rainfall"			measures responsibility of contractor.
Submission of EMP implementation report	Unsatisfactory compliance to EMP	(i) Appointment of supervisor to ensure EMP implementation (ii) Timely submission of monitoring reports including pictures	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-23**)	Compliance of COVID-19 protocol and guidelines	Construction contractor	PIU/Consultants	Contractor
Post-construction clean-up	Damage due to debris, spoils, excess	(i) Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and	PIU/Consultant report in writing that	Construction Contractor	CMSC/ PIU	Cost for implementation of mitigation

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
	construction materials	latrines) which are no longer required; and (ii) All excavated roads shall be reinstated to original condition. (iii) All disrupted utilities restored (iv) All affected structures rehabilitated/compensated (v) The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up. (vi) All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be top soiled and regrassed 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.	(i)worksite is restored to original conditions; (ii)camp has been vacated and restored to pre-project conditions; (iii)All construction related structures not relevant to O&M are removed; and (iv) worksite clean-up is satisfactory.			measures responsibility of contractor.

Table 27: 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
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**	All the dust control will be done by water sprinkling measures at site, noise will be kept well within prescribed limits of standards, Follow Traffic management Plan as given in **Appendix C-14** and all the safety measures such as PPE's etc. Site inspection will be done as per checklist is given in **Appendix C-16**.	Weekly during construction	Supervising staff and safeguards specialists	No costs required
Check the leakages blockages, overflow problem in sewers	It may affect the sewer system, contaminate land, water and create public health issues	Effective operation to avoid and/or immediate clearance of such leaks, blockages Implementation of regular O&M schedules	Follows regular O & M schedule	Dungarpur Municipal Council/O&M contractor	Dungarpur Municipal Council	DBO contractor cost O&M Cost
Check the leakages blockages, overflow problem in sewers	Occupational health & safety: for personnel cleaning underground sewers there is a risk due to oxygen deficiency and harmful gaseous emissions (hydrogen sulphide, carbon monoxide, methane, etc.);	(i)Provide necessary health & safety training to the staff engaged sewer cleaning & maintenance (ii) provide appropriate personal protection equipment (including oxygen masks)	-Training and Awareness campaign for Occupational, Health& Safety to ensure the use of PPE's.	Dungarpur Municipal Council/O&M Contractor	Dungarpur Municipal Council	O&M Cost
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 STP before expiry date and follow all the conditions set forth in CTO	RSPCB	Dungarpur Municipal Council/PHED /O&M Contractor	Dungarpur Municipal Council/PHED /O&M Contractor	Dungarpur Municipal Council/PHED /O&M Contractor

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Treated effluent quality	Water pollution of the receiving body if treated effluent does not meet the standards set by CPCB/RSPCB	Regular monitoring (parameters tests) of treated effluent quality Follow all the parameters given in CTE/CTO	Test results records	Dungarpur Municipal Council/O&M Contractor	Dungarpur Municipal Council/O&M Contractor	Dungarpur Municipal Council/O&M Contractor
Reuse of Treated effluent/safe disposal	Adverse impact on water hydrology and crops	Prepare a plan of reuse of treated effluent in agriculture or other gainful purposes	Records on treated water reuse	Dungarpur Municipal Council/O&M Contractor	Dungarpur Municipal Council/O&M Contractor	Dungarpur Municipal Council/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	Dungarpur Municipal Council/O&M Contractor	Dungarpur Municipal Council/O&M Contractor	Dungarpur Municipal Council/O&M Contractor
Safety precautions during sewage manhole cleaning	Health and safety risk to workers engaged in sewage manhole cleaning	Ensure all the safety equipment are available during manual cleaning As for as possible, use CCTV and mechanical cleaning (sewage jetting machine) for cleaning of manhole	-Training and Awareness campaign for Occupational, Health& Safety to ensure the use of PPE's.	O&M contractor for 10 years and then Dungarpur Municipal Council	Dungarpur Municipal Council	Dungarpur Municipal Council
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, Dungarpur.	PHED, Dungarpur	O&M cost of contractor
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, Dungarpur.	PHED, Dungarpur	O&M cost of contractor

Field	Anticipated Impact	Mitigation Measures	Indicator of Compliance	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
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, Dungarpur	PHED, Dungarpur	O&M cost of contractor

Table 28: 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	STP, SPS, Pipe laying, RWR and CWR sites	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 Management	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	Weekly	EHS officer, Environment Specialist of consultant	contractor
Consent to establish of STP, WTP, batching plants, crusher, hot mix plant. DG sets etc.	STP, 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	9 locations (STPs-1, SPS-3, CWRs-2, RWR-1, Pipe laying-1), Intake-1 during construction)	PM_{10}, $PM_{2.5}$, NO_2, SO_2, CO	Quarterly except Monsoon period	Contractor	Contractor Contractor
Ambient noise	9 locations (STPs-1, SPS-3, CWRs-2, RWR-1, Pipe laying-1), Intake-1 during construction)	Day time and night time noise levels	Quarterly	Contractor	Contractor

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Ground Water quality	8 locations (STPs-1, SPS-3, CWRs-3, RWR-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
Soil quality	8 locations (STPs-1, SPS-3, CWRs-3, RWR-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
Surface Water	2 locations-Vijay Chakra Sagar Dam and other water body	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

Table 29: Environmental Monitoring Plan of Anticipated Impacts during Operation

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Monitoring of raw sewage quality	Inlet of the STP	Suspended solids, pH, Temperature Oil and grease, Total residual chlorine, Ammonical nitrogen (as N), BOD, COD,	As per O&M Plan	O&M Contractor/Municipal Council	O&M Contractor/Municipal Council

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
		Nitrate Nitrogen The values should be within the limit specified by CPCB to discharge into municipal sewers			
Monitoring of treated effluent quality	Outlet of STP	pH, BOD, COD, TSS, NH_4-N, N-total, Fecal Coliform (as per **Appendix C-8**)	As per O&M Plan	O&M Contractor/Municipal Council	O&M Contractor/Municipal Council
Monitoring of plantations	Plantations locations	Nos. of tree survived	monthly	O&M Contractor/Municipal Council	O&M Contractor/Municipal Council
Sewer network to sustain operational efficiency and avoid clogging and early occurrence of leakages	Sewer network	to be included in the O&M plan prepared under the project	as per O&M plan	O&M Contractor/Municipal Council	O&M Contractor/Municipal Council
Consent to operate (CTO) from RSPCB	STP/WTPs	CTO should be renewed before expired	5 yearly	Dungarpur Municipal Council /PHED	Dungarpur Nagar Palika, PHED
Reuse of treated effluent and safe disposal	STP outlet	Treated effluent is being used in agriculture or other gainful purposes	Continuously	O&M Contractor/Municipal Council	O&M Contractor/Municipal Council
Sludge Reuse and safe disposal	Sludge Management	Sludge is being gainfully used	Continuously	O&M Contractor/ Municipal Council	O&M Contractor/ Municipal Council
Monitoring of quality of water supplied to consumers	Consumer end-random sampling in all zones	As per CPHEEO norms (refer **Appendix - C-1**)	Daily	O&M Contractor	DBO contractor Cost
Pipeline network to sustain operational efficiency and avoid early occurrence of leakages	Pipeline network	to be included in O&M plan prepared under the project	Daily/when required	O&M Contractor	DBO contractor Cost
Reduction of NRW	Pipe line networks	As per RUDSICO-EAP norms	Daily/when required	O&M Contractor	DBO contractor Cost

B. Institutional Requirements

273. 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 Honorable Minister), the LGSD and the City Level Monitoring Committees (CLMCs, under the chairmanship of their respective commissioner/executive officer) is proposed to monitor the project implementation. The PMU is 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.

274. 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.

275. 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.

276. There are two zonal PIUs 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.

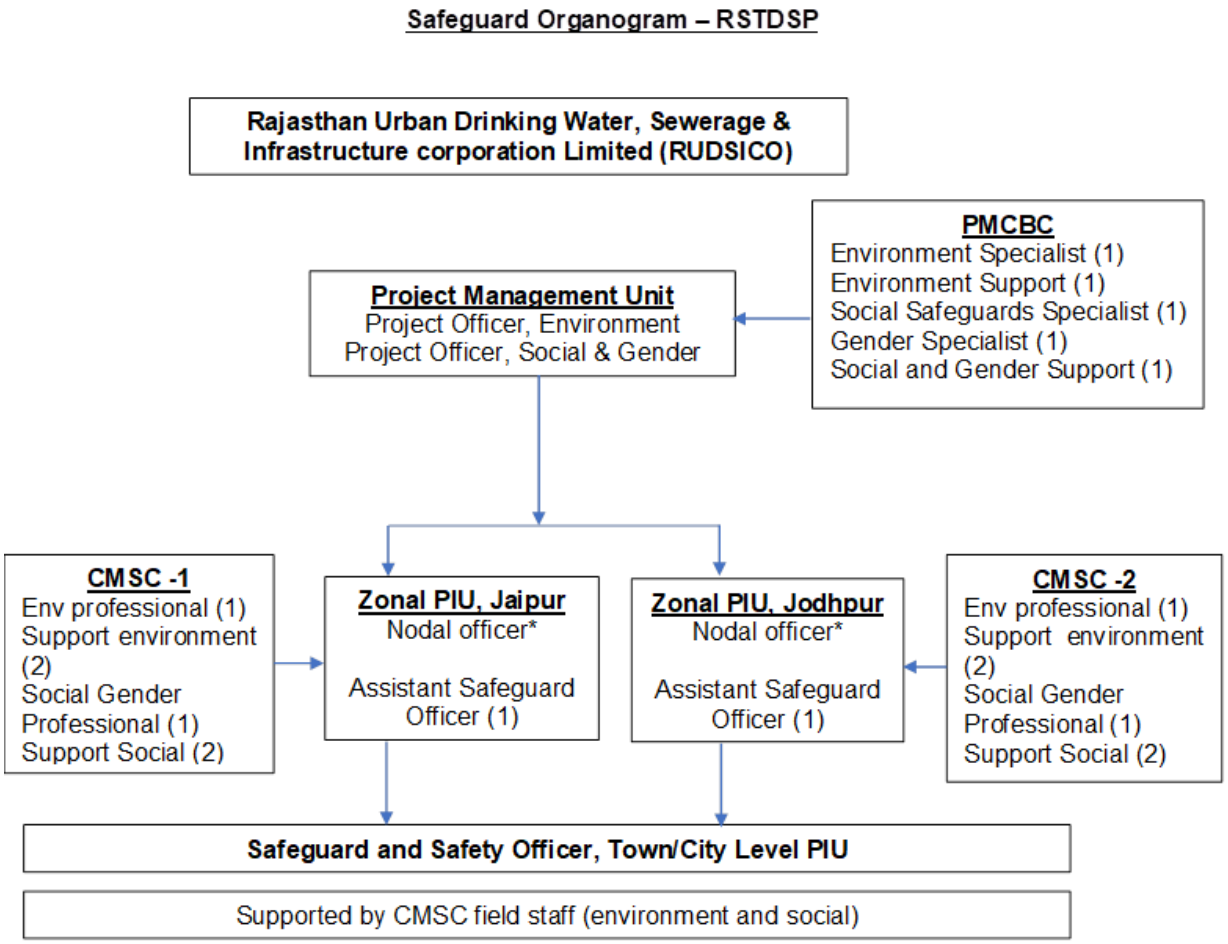
277. **Construction management and supervision consultants (CMSCs) -** 2 nos. of CMSCs catering to Jaipur and Jodhpur units are already established. They shall directly support PIUs in day to day contract management, construction supervision including quality management of ongoing works etc. This shall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

278. **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 will be established in upcoming project towns after PIUs are formed in new towns. CAPC

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

279. **Figure 18** shows Environmental Safeguards Implementation Arrangements within RUDSICO-EAP and **Table 30** and **31** summarize the institutional responsibility of environmental safeguards implementation at all stages of the project.

Figure 18: Environmental Safeguards Implementation Arrangement



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

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

gender in program implementation. Key responsibilities of the project officer (Environment) are enumerated in **Table 30**.

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

282. **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 will serve as the Nodal Officer, Safeguards and Gender. Each Zonal PIU will be staffed with an assistant safeguards officer (ASO Environmental and Social Safeguards) who will assist PMU project officer (environment/social) in implementation of the environmental/social safeguards and GESI action plan in PIUs under its jurisdiction. Zonal PIUs will undertake internal monitoring and supervision and record observations throughout the project period to ensure that the safeguards and mitigation measures are provided as intended.

283. 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.

284. **Town/City Level Project Implementation Unit.** The town-level PIUs shall be responsible for the quality of works executed under the project and will be guided by the zonal PIUs. The city/town PIUs will be responsible for implementation of the IEE. The town-level PIUs will be headed by a project manager (executive engineer or assistant engineer) and supported by CMSC field staff. Environment 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.

285. **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,28 consultations with interested/affected people, (iv) field-level grievance redress; and (iv) reporting.

286. The Contractor has required to submitted 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.

28 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.

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

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

Table 30: Safeguards Management Roles and Responsibilities

Table 30: 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.	(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	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**
	(vii) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs (viii) Organize an induction course for the training of contractors preparing them on EMP implementation, environmental monitoring requirements related to mitigation measures; and taking immediate actions to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation. (ix) Ensure compliance with all government rules and regulations regarding site and environmental clearances as well as any other environmental requirements (x) Assist PMU, PIUs, and project NGOs to document and develop good practice construction guidelines to assist the contractors in implementing the provisions of IEE. (xi) Assist in the review of the contractors' implementation plans to ensure compliance with the IEE.	involving the community and affected persons and ensure that environmental concerns and suggestions are incorporated and implemented	
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	(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,	(i) Conducting environmental monitoring, as specified in the EMP. (ii) Issuance of clearance for contractor's post-construction activities as specified in the EMP.

Responsible Agency	Responsibility		
	Pre-Construction Stage	**Construction Stage**	**Post-Construction**
	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.	(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	
Consultant – 1.PMCBC-Environmental Safeguard Specialist – 1 no. Asbestos Expert – 1no. Heritage Expert – 1no. Biodiversity Expert – 1no.	(i) Review IEE/EMP submitted by CMSC and revise report to submit to PMU (ii) Assist PMU and PIU in obtaining all necessary clearances, permits, consents, NOCs, etc. Ensure provisions and conditions are incorporated in the IEE and detailed design documents. (iii) Assist in ensuring IEE is included in bid documents and contract agreements. (iv) Assist in determining adequacy of cost for EMP implementation. (v) Assist in addressing any concern related to IEE and EMP. (vi). Conduct specific assessment requirements	(i) Monitor EMP implementation (ii) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs.	
Consultant- 2. CMSC- 2 nos. Environmental safeguards professional	(i) Update initial environmental assessment for proposed project using REA checklists and submit to PIU/PMCBC (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	(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	(i) Ensure EMP post-construction requirements are satisfactorily complied (ii) Request certification from PIU

Responsible Agency	Responsibility		
	Pre-Construction Stage	**Construction Stage**	**Post-Construction**
	cost is included in the methodology. (iii) Undergo EMP implementation orientation by ESS of supervision consultant prior to start of works (iv) Provide EMP implementation orientation to all workers prior to deployment to worksites (v) Seek approval for camp sites and sources of materials. (vi) Ensure copy of IEE is available at worksites. Summary of IEE is translated to language understood by workers and posted at visible places at all times.	conversant with the requirements of the EMP; (v) Brief his staff, employees, and laborer about the requirements of the EMP and provide environmental awareness training to staff, employees, and laborers; (vi) Ensure any sub-contractors/ suppliers who are utilized within the context of the contract comply with all requirements of the EMP. The Contractor will be held responsible for non-compliance on their behalf; (vii) Bear the costs of any damages/compensation resulting from non-adherence to the EMP or written site instructions; (viii) Ensure that PIU and ACM/SO are timely informed of any foreseeable activities related to EMP implementation.	

3. Capacity Building and Development

219. 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.

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

221. 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 31**.

Table 31: Capacity Building Program on EMP Implementation

Sl. No.	Description	Target Participants and Venue	Cost and Source of Funds
1	Introduction and Sensitization to Environmental Issues (1 day) - ADB Safeguards Policy Statement -EARF of RSTDSP -Government of India and Rajasthan applicable safeguard laws, regulations and policies including but not limited to core labor standards, OH&S, etc. -Incorporation of EMP into the project design and contracts -Monitoring, reporting and corrective action planning	All staff, ULBs and consultants involved in the project At PMU, Jaipur	PMU cost
2	Treated Effluent Reuse Concepts, Design and Management	All staff at PMU and ULBs	PMU cost
3	Sludge Reuse Concept, Design and Management	All staff at PMU and ULBs	PMU cost
4	EMP implementation (2 days) -Roles and responsibilities -OH&S planning and implementation -Wastes management (water, hazardous, solid, excess construction materials, spoils, etc.) -Working in congested areas, - Public relations - Consultations - Grievance redress -Monitoring and corrective action planning -Reporting and disclosure -Post-construction planning	All staff and consultants involved in the subproject All contractors before start of construction works At PIU	PMU cost
5	Plans and Protocols (1 day) -Construction site standard operating procedures (SOP) - Asbestos Management Plan -Heritage Impact Assessment -Biodiversity and Critical Habitat Assessment - Site-specific EMP -Traffic management plan -Spoils management plan -Waste management plan - Chance find protocol - O&M plans - Post-construction plan	All staff and consultants involved in the project All contractors before start of construction works or during mobilization stage. At PIU	PMU cost Contractors cost as compliance to contract provisions on EMP implementation
6	Experiences and best practices sharing - Experiences on EMP implementation - Issues and challenges - Best practices followed	All staff and consultants involved in the project All contractors All NGOs At PMU Jaipur	PMU Cost

7	Contractors Orientation to Workers on EMP implementation (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

4. Monitoring and Reporting

222. 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.

223. 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.

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

225. 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.

226. The PMU will submit 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 PMCBC based on inputs from the PIU's safeguard officers, CMSC, 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.

227. 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.

C. EMP Implementation Cost

228. 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 32**).

Table 32: Cost Estimates to Implement the EMP

	Particulars	Stages	Unit	Total Number	Rate (INR)	Cost (INR)	Costs Covered By
A.	**Mitigation Measures**						
1	Plantation measures*	Construction	per tree	15	4050	60750	Civil works cost
	Subtotal (A)					**60750**	
B.	**Monitoring Measures**						
1	Air quality monitoring**	Pre-construction and Construction (quarterly)	per sample	81	4920	3,98,520	Civil works cost
2	Noise levels monitoring**	Pre-construction and Construction (quarterly)	Per sample	81	1980	1,60,380	Civil works cost
3	Groundwater quality**	Pre-construction and Construction (quarterly)	per sample	72	6720	4,83,840	Civil works cost
4.	Soil quality**	Pre-construction and Construction (quarterly)	per sample	72	5880	4,23,360	Civil works cost
5	Surface Water	Pre-construction and Construction (quarterly)	per sample	18	6720	1,20,960	Civil works cost
	Subtotal (B)					**15,87,060**	
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 cost
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 cost
	Subtotal (C)					**325,000**	
D	**Civil Works**						
1	Water Sprinkling for dust suppression	Construction	KL	5000	111	555,000	Civil works cost
2	Rainwater Harvesting for water conservation	Construction at proposed STP sites	Nos.	1	438819	438819	Civil works cost

	Particulars	Stages	Unit	Total Number	Rate (INR)	Cost (INR)	Costs Covered By
3	Implementation of Asbestos Management Plan	Construction- Inventory Testing Overall Supervision for Asbestos Removal Storage Transportation Disposal / Treatment Documentation and Reporting	Lumpsum		-	7,000,000	Civil works cost
4	Barricading						
	Providing and fixing Barricading using 40 mm dia M.S. pipe vertical and horizontal posts	Construction	m	162637	50	8131850	Civil works cost
	Providing and fixing using 40 mm dia M.S. pipe ("B" class) as vertical post and PVC tape	Construction	m	159277	38.50	6132164	Civil works cost
	MS Pipe with nut and bolt and GI corruglated sheets	Construction	Sq.m.	775	101	78275	Civil works cost
	Sub Total (D)					**22,774,927**	
E	**Grievance Redressal Mechanism**				Lump sum	350,000	Civil works cost
	Sub Total (F)					**350,000**	
	Total (A+B+C+D+E+F)				**INR**	**2,50,97,737**	

* In preliminary design stage 2 trees may be required to cut. During detail design DBO contractor will be required to confirm exact number of tree cutting. Tree cutting requirement for pipe line works can be decided only after confirmatory survey of full length of alignment by contractor. At this stage higher side of tree cutting numbers are taken as 5 trees. As per RUDSICO-EAP policy; compensatory plantation in the ratio of 1:3 is to be followed during construction works. Therefore 15 numbers of trees are taken as compensatory plantation.

Summary of EMP Cost incurred by Institution :

Contractor Cost - INR 250,97,737/-
PMU Cost - INR 275,000/-
Total - INR 25372737/-

(In Words: Rupees Two Crores Fifty Three Lacs Seventy Two Thousand Seven Hundred and Eighty Seven only)

Table 33: 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 one year (three quarters leaving quarter of monsoon)	Project duration	Total number of environmental monitoring required during project duration
STP-1 SPS-3 CWR-2 RWR-1 Intake Well-1 WS/WW networks-1 **Total-6 Locations**	Air- 9 Noise- 9 Ground Water- 8 Surface Water-2 Soil- 8	Air- 27 Noise- 27 Ground Water- 24 Surface Water-6 Soil- 24	3 years	Air-81 Noise- 81 Ground Water- 72 Surface Water-18 Soil- 72

X. CONCLUSION AND RECOMMENDATION

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

230. Presently water is supplied to consumers daily but the frequency of supply is once in a day for the average duration of 1-1.5 hours and supply is only ~70 LPCD against the desired service of 135 LPCD.

231. In present source of water at Dungarpur are (I) surface water sources: Edward Samand and Vijay Chakra Sagar Dimiya dam (II) underground water: tube wells/ bore wells and open wells/dug wells. Due to rocky terrain the yield of these ground water sources is very less and as the water table is regularly depleting fast therefore these would not sustain for longer.

Proposed sources for water supply for Dungarpur are-

232. Existing Edward Samand Dam and Vijay Chakra Sagar Dam is a drinking water reservoir already connected with the existing system are sustainable sources with respect to quantity & quality; The Edward Samand dam has the total storage of 137 McFt excluding the dead storage of the dam. For proposed water supply project only 4.54 MLD i.e. about 61 McFt water is proposed to be drawn from the source. PHED has provided past 12 year water level Details of both the dams and dam was full in all the 12 years

233. New proposed Som Kamala Amba (SKA) Dam on Som River: To meet out the shortfall demand of the town Dungarpur, the state Government has sanctioned a public importance project namely Drinking Water Supply Project for 151 Villages and 1 town of District

Dungarpur (Dungarpur town itself) based on Som Kamla Amba Dam on Som River, (called source project) which is a sustainable source for the project proposed by PHED. Som Kamla Amba dam is located on Som river basin amidst in Dungarpur district of Rajasthan state. This dam is situated about 45 KM distant from Dungarpur town. Presently the project is under execution, transmission main from the Som Kamla Amba Dam to Dungarpur town has been laid and construction work of intake well and water treatment plant is under progress. As per PHED officials project will be commissioned up to December 2022. Source sustainability report of Somkamla Amba dam and other surface and ground water sources is given in Appendix 4. The construction of Som Kamla Amba Dam was completed in the year 2000. This dam is located in Ashpur Tehsil of Dungarpur District, Rajasthan to provide the Irrigation cum drinking water facilities. Capacity of dam at FTL of 213.5 m is 172.75 MCM and live storage capacity 160 MCF there is 93.75 % dependability of required 47.33 MCF quantity for Dungarpur town on the basis of past 15-year record of storage of Sam Kamla Amba dam. PHED has provided past 23 year water level Details of dam and out of 23 year 19 years dam was 100 % full.

234. Development of Ground Water sources. At present there are 7 Nos Tube wells and 15 Nos Dug Wells / Open wells, out of these existing TW/ OW, 2 Nos Tube wells and 2 Nos Open wells are proposed to be deepening and desilting, with re commissioning work. The ground water will be used in Lean Season or during repair maintenance works in infrastructures supplying surface water

235. Dungarpur Municipal Council does not have any organized sewerage system. Presently the wastewater from kitchens & bathrooms is discharged into storm water drains culminating finally to the Nallah or on ground, which pollutes the environment and contaminates the ground water. Most of the residential, commercial buildings and educational institutions have on-site septic tanks and soak pits. The effluents from the septic tanks directly drain into the open drains. In the absence of safe disposal system of sewage, the people of town are exposed to unhealthy and unhygienic environment.

236. The subproject is formulated to address gaps in water and sewerage infrastructure in a holistic and integrated manner. The Project Components include improvements in water supply and sewerage infrastructure to improve the service level of water supply as per PHED recommended norms of 135 LPCD. Whole the sewage generated from municipal limits shall also be treated at STP as per latest effluent norms.

237. Proposed sites of STP and SPSs are located away from habitation areas. However, there are only shrubs and 2-3 trees at these locations which may need to be cut during construction. Adequate compensatory afforestation measures are being proposed under the project to counter the tree-cutting activity. Also, It is proposed to reuse the treated effluent for use in agriculture, horticulture, development of urban forestry etc. and remaining treated effluent is proposed to be discharged in to a nearby drains or vacant govt. lands**.** In order to achieve recommended standards it is proposed to achieve very low BOD (BOD 10) and suspended solids in the treated effluent from proposed STPs.

238. At the STP, sewage sludge will be removed continuously from reactors, and solidified using decanter, and stored in sludge drying beds for a period of 7-15 days. The treatment and drying processes kill enteric bacteria and pathogens. Because of its high content of nitrates, phosphates and other plant nutrients the sludge can be used as organic fertilizer.

239. Contractor will propose the plan with best methods for reuse of treated effluent and sludge as per guidelines of CPHEEO and best international practices in consultation with RUDSICO-EAP and Municipal Council and submit it in RUDSICO-EAP for approval. In order to aid preparation of a viable treated wastewater reuse and sludge reuse plan, an institutional and capacity building component shall be incorporated in the Project to enable the ULB staff to develop an understanding of the relevant issues.

240. Certain new initiatives have been taken in the project viz., promoting wastewater reuse, sludge reuse and contractor to work on private properties to provide sewerage connections. Hence, appropriate guidelines for these measures should be provided for these new initiatives. These could include viz., Guidelines for the ULBs for promoting wastewater reuse; Guidelines for the ULBs for sludge reuse; and Guidelines for the Contractors to work within the private properties.

241. Anticipated impacts of sewerage system during operation and maintenance will be related to repair of blocks, overflows and leakages in sewers. Sewers are not 100% watertight and leaks can occur at joints. Faulty section will be exposed and repaired following the same basic procedure as when the sewer was built. Also, sewer pipes require regular maintenance as silt inevitably collects in areas of low flow over time. Necessary equipment for cleaning and removal of blockages in the sewers are included in the project.

242. 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.

243. 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.

244. 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. the EMP Plan. Total estimated cost for EMP implementation is approx. INR 25372737/- (In Words: Rupees Two Crores Fifty Three Lacs Seventy Two Thousand Seven Hundred and Eighty Seven only

245. 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 kept on-site during the construction period at all times. The EMP shall be made binding on all contractors operating on the site, and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document shall constitute a failure in compliance.

246. The project will benefit the general public by contributing to the long-term improvement of water supply and sewerage system and community liveability in Dungarpur. 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.

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

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

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

Appendix 1: REA Checklist

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)/Dungarpur Water Supply and Waste Water Project, Distt. Dungarpur, Rajasthan
Sector Division: ***Urban Development***

REA Checklist- Sewerage

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting Is the project area…			
Densely populated?	√		Subproject activities are scattered to entire town including the low, medium and densely populated areas.
Heavy with development activities?	√		Dungarpur Town 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		√	There are no any cultural heritage site in Dungarpur Municipal areas or near to any proposed site. Jain Temple, Baroda (approx. 16 km) and Dev Somnath Temple (approx. 37 km) in Dungarpur district are ASI Monuments, these temples are far away from municipal boundary and therefore project activities will not have impact on both the protected monuments
Protected Area		√	
Wetland		√	
Mangrove		√	
Estuarine		√	
Buffer zone of protected area		√	
Special area for protecting biodiversity		√	
Bay		√	
Potential Environmental Impacts Will the Project cause…			

SCREENING QUESTIONS	Yes	No	REMARKS
Impairment of historical/cultural monuments/areas and loss/damage to these sites?		√	There are no any cultural heritage site in Dungarpur Municipal areas or near to any proposed site. Jain Temple, Baroda (approx. 16 km) and Dev Somnath Temple (approx. 37 km) in Dungarpur district are ASI Monuments, these temples are far away from municipal boundary and therefore project activities will not have impact on both the protected monuments
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?		√	There are three major surface water bodies namely Do River, Sabela Lake and Gap Sagar lake. Spoil leakage from construction sites of SPS and STP may be possibly into the water bodies. There is proposal of reuse of treated effluent from STP and unused treated effluent shall be discharged in to 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.

SCREENING QUESTIONS	Yes	No	REMARKS
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 wastewater, 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.
Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances, and protect facilities?		√	STP is located in remote areas away from habitation. ULB will 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 Dungarpur Town, 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.

SCREENING QUESTIONS	Yes	No	REMARKS
traffic disturbances due to construction material transport and wastes?	√		Linear activities like sewer laying along the roads is likely to disrupt traffic. Vehicle movement for construction purpose will increase the traffic. Identification of alternate routes, allowing limited - at least one-way traffic, prior information about the works and alternative arrangements, providing information/sign boards etc will reduce the impact.
temporary silt runoff due to construction?	√		Mitigation measures will be required to protect silt runoff from construction activities during rains
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. Adequately trained staff and necessary equipment will be in place for regular operation and maintenance of the system. Proposed treatment system will be efficient and appropriate repair and maintenance procedure will be developed. Sufficient funds for operation will be ensured. Backup power supply system is part of project.
deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?		√	No untreated/partially treated sewage will be disposed. 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.
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.

SCREENING QUESTIONS	Yes	No	REMARKS
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

REA Checklist- Water Supply

SCREENING QUESTIONS	Yes	No	REMARKS
Water Supply			
Project Siting Is the project area-			
Densely populated?	√		Some part of the city is densely populated, whereas outer area is less dense. Water supply is proposed in all town including densely populated areas of town
Heavy with development activities?	√		Dungarpur is a developing town; urban expansion is considerable
Adjacent to or within, any environmentally sensitive areas?		√	
Cultural heritage site	√		There are no any cultural heritage sites in Dungarpur Municipal areas or near to any proposed site. Jain Temple, Baroda (approx. 16 km) and Dev Somnath Temple (approx. 37 km) in Dungarpur district are ASI Monuments, these temples are far away from municipal boundary and therefore project activities will not have impact on both the protected monuments
Protected Area		√	
Wetland		√	
Mangrove		√	
Estuarine		√	
Buffer zone of protected area		√	
Special area for protecting biodiversity		√	
Bay		√	
Potential Environmental Impacts Will the Project cause…			
Pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?		√	There are three major surface water bodies namely Do River, Sabela Lake and Gap Sagar Lake. No water supply components are proposed at adjoining to these water bodies.
Impairment of historical/cultural monuments/areas and loss/damage to these sites?		√	There are no any cultural heritage sites in Dungarpur Municipal areas or near to any proposed site. Jain Temple, Baroda (approx. 16 km) and Dev Somnath Temple (approx. 37 km) in Dungarpur district are ASI Monuments, these temples are far away from municipal boundary and therefore project activities will not have impact on both the protected monuments
Hazard of land subsidence caused by excessive ground water pumping?		√	No new ground water source will be used for proposed water supply
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?		√	Water allocation is done for Dungarpur from Surface Water (Dams) and Under Ground Water Sources as per Government norms.

Unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?		√	Raw water shall be taken from Som Kamla Amba Dam and Edward Samand, which may contain pathogens or mineral constituents, for which sufficient treatment of raw water will be done at WTPs at At Udai vilas H/W and At Bori H/W, from where treated water shall be supplied for Dungarpur Town Water Supply project.
Delivery of unsafe water to distribution system?	√		Adequate treatment of water will be done at WTPs by DBO contractor to ensure delivery of safe water.
Inadequate protection of intake works or wells, leading to pollution of water supply?	√		Adequate safety measures will be required during construction and operation of intake proposed in Dungarpur
Over pumping of ground water, leading to salinization and ground subsidence?	√		No any new Ground water pumping will be done for water supply
Excessive algal growth in storage reservoir?		√	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?		√	Construction of One new STP is proposed under RSTDSP works. Sewerage system has been designed keeping in mind for future waste water discharge from residences
Inadequate disposal of sludge from water treatment plants?	√		Rehabilitation of 2 WTPs is proposed in RSTDSP works. Sludge handling and disposal will be considered DBO contractor
Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?		√	Proposed sites for pumping stations are demarcated with boundary wall and away from habitations
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 WTPs where mitigation measures for safety in chlorine handling will be required
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?	√		Chlorination is proposed in WTPs where mitigation measures for safety in chlorine handling will be required
Dislocation or involuntary resettlement of people		√	There is no resettlement of people for project implementation. Only temporary livelihood impacts are anticipated for which 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
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 storage and distribution facilities. O&M contractor has to ensure the quality of water to be supplied. Penalty provisions should be made 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 (PVC pipes) shall be used in the project and provision should be made in designs
Accidental leakage of chlorine gas?	√		Chlorination is proposed in WTPs where mitigation measures for safety in chlorine handling will be required
Excessive abstraction of water affecting downstream water users?		√	Only water allocated for the water supply from PHED/WRD shall be used for proposed project.
Competing uses of water?		√	Only water allocated for the water supply from PHED/WRD shall be used for proposed project.
Increased sewage flow due to increased water supply		√	Sewerage system is already considered under RSTDSP works considering proposed water supply development works in Dungarpur
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 during operation and construction?		√	No explosives shall be used in project. Fuel and other chemicals will be used in very less quantities which will not have significant impact on community health and safety. Safe handling of fuels and chemicals will be ensured by contractor.
community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	√		Community safety risk may be there during construction during excavation for pipe laying, equipment and vehicle operation, construction of CWRs, OHSRs, pump houses 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), Dungarpur Town Water Supply and Waste Water Project, District Dungarpur, Rajasthan
Sector : Urban Development
Subsector: Water Supply and Waste Water
Division/Department: SARD/SAUW

Screening Questions		**Score**	**Remarks**[29]
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	0	No such issue may affect the project
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	0	No such issue may affect the project
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	No such issues may affect the project
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	0	No such issue may affect the project
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	No problem will envisaged in future which likely affect the performance of project output

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

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

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

[29] 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.

Other Comments: The proposed subproject activity involves construction of One new 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: Compliance with Environmental Criteria for Subproject Selection

Components	Criteria	Compliance
All subprojects		
	Subproject will avoid potentially significant adverse impacts that are diverse, irreversible or unprecedented (ADB SPS Category A for environment).	Complied- Sub project is not having significant adverse impacts, anticipated impacts are temporary and reversible and can be mitigated through mitigation plans suggested in IEE
	Comply with all requirements of ADB SPS 2009 and follow procedures set in this EARF.	Complied- Sub project complies all the requirements of ADB SPS 2009
	Comply with relevant national, and local laws, rules and regulations regarding EIA, environmental protection, pollution prevention (water, air, noise, solid waste, etc.), wildlife protection, core labor standards, physical cultural resources, health and safety, and other laws in specific sectors as indicated below	Complied- Sub project complies all relevant national and local laws, rules and regulations applicable to this type of sub projects
	Reflect inputs from public consultations	Complied- Stakeholder's consultations are conducted in the project planning phase and suggestions are incorporated in project designs
Location	Avoid involuntary resettlement by prioritizing rehabilitation over new construction using vacant government land where possible, and taking all possible measures in design and selection of site or alignment to avoid resettlement impacts	Complied- All components of sub project are planned on government land only. No land acquisition is done to avoid any involuntary resettlement.
	Avoid or minimize the cutting of trees	Complied- Tree cutting is avoided as far as possible and if tree cutting is unavoidable, it has been minimized to lowest level and If any tree cutting is required for construction works, prior permission from local administration for tree cutting will be required and compensatory plantation as per RUDSICO-EAP policy will also be required
Biodiversity	Avoid locating subprojects in critical habitats, such as, but not limited to, wildlife/bird sanctuaries, national parks, tiger reserves, elephant reserves, conservation reserves or core zone of biosphere reserves. Appendix 1 provides preliminary analysis using the International Biodiversity Assessment Tool (IBAT) key biodiversity areas, protected areas, IUCN red list species and likelihood of critical habitats per town.	Not applicable- There are no any environmentally protected areas, core zones of biosphere reserves and highly valued habitat ibn the town

	Should not directly affect environmentally protected areas, core zones of biosphere reserves and highly valued habitat	
	If work is proposed with the aim of improving the conservation or management of designated subproject sites (e.g. improved drainage), this must only be undertaken: (i) after a comprehensive study and development of management plans and criteria; and (ii) with the direct involvement and approval of national and local bodies responsible for the subproject site.	Not applicable to this sub project
Physical Cultural Resources	Should not result in the destruction/damage of or encroachment onto physical cultural resources (PCR) [30] such as archaeological monuments; heritage sites and movable or immovable objects, sites, structures, group of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic or other cultural significance.	Complied- There are no any prohibited or protected areas or any archaeological or historical or protected monuments in the town. Project components will not impact any religious structures.
Existing Facilities to be rehabilitated or expanded	Conduct environmental audit of existing facilities[31]per ADB SPS	Complied- only refurbishment of existing OHSRs, CWRs, and pump houses and Rehabilitation of existing Tube Wells are proposed and no environmental issues are anticipated in proposed refurbishment/ rehabilitation works
Associated Facilities[32]	Analyze environmental impacts and risks to be included in the IEE	Not applicable to this sub project
Asbestos-containing materials (ACM) including, but not limited to, pipes, roofing, ceilings, insulation materials, excess pipes stored in PHED campuses, walls, etc.	Avoid handling or removing any ACM. Ensure asbestos concrete (AC) pipes facilities containing asbestos will not be disturbed and left in-situ. Appendix 4 (of EARF) provides asbestos management plan. RUDSICO shall include AMP in all contracts.	Being complied- No use of new ACM is proposed in sub project. There are existing asbestos cement pipes underground in the existing water supply networks, the alignment will be fine-tuned during the detailed design, to avoid existing AC pipe alignments as far as possible. Outline of ACM management plan is included in IEE and shall be updated before start of

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

[31] ADB SPS Appendix 4 para 12 on Existing Facilities

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

		construction works by DBO contractor
	When designing subproject infrastructure that involves excavation in urban areas the relevant authorities must be consulted to ascertain the location of any ACM prior to any subproject activity. Locations of new infrastructure must then be designed to avoid excavating or disturbing any ACM.	Will be complied- DBO contractor shall provide details (location and quantity) of ACMs in the updated ACM management plan
Right-of-way	Locate water supply pipelines within the right of way (ROW) of other linear structures (roads, irrigation canals) as far as possible, to reduce new land acquisition.	Complied- Water supply pipes will be laid with ROW of roads
	Ensure that pipelines ROW do not require land acquisition from individual farmers that is a significant proportion of their total land holding (>10%).	Complied- no land acquisition is required for pipe laying works
Water Supply		
Sustainability	Utilize water sources at sustainable levels of abstraction only (i.e. without significant reductions in the quantity or quality of the source overall)	Being Complied- Presently source of water at Dungarpur Town is ground water whereas surface water Som Kamla Amba Dam and Edward Samand Dam will be used in proposed water supply system under RSTDSP.
Quality (raw water, treated water)	Ensure that water supply to consumers comply with the national drinking water standards at all times and confirm this by regular monitoring at WTPs and in domestic premises.	Will be complied- Regular water quality monitoring shall be done and before supply of the water to consumers, it shall be ensured that water quality meet the national drinking water standards at all times
	Avoid using water sources that may be polluted by upstream users	Being Complied- there are no source of pollution in Som Kamla Amba Dam and Edward Samand Dam.
	Avoid water-use conflicts by not abstracting water that is used for other purposes (e.g. irrigation)	Being Complied- Only allocated water from source will be utilized for proposed water supply
Location	As for as possible locate all new facilities – Water Treatment Plants (WTP), Tube Wells (TW), etc. away from houses, shops or any other premises used by people, thus establishing a buffer to reduce the effects of noise, dust and the visual appearance of the site.	Will be complied
	Locate WTPs at sites where there is no risk of flooding or other hazards that might impair functioning of the WTP or present a risk of damage to the WTP or the surrounding area	Not applicable to this sub project- no WTP is proposed under the sub project
Design	Ensure that the water supply system improvements are combined with improvements in sewerage to deal with the increased discharge of domestic wastewater.	Complied- Water supply and sewerage system in town are designed considering the water supply to consumers at standard of 135 lpcd therefore increased

		discharge due to increased water supply will not affected sewerage system of town
Sewerage		
Location	Previous projects considered 500m as distance consideration from nearest habitation. This has been reduced to 100m considering facilities will be located in developed areas and technology to be used. RSTDSP considered using Sequencing Batch Reactor (SBR) technology in STPs, which is proven to cause minimal odor as compared to other treatment technologies such as Waste Stabilization Pond or Activated Sludge Process. As far as possible, new Sewage Treatment Plants (STP) should be preferably 100m away from any inhabited areas, in locations where no urban expansion is expected in the next 20 years, thus establishing a buffer to reduce effects of odor, visual appearance or other nuisance of the site (this may be reviewed depending on the technology adopted for the treatment of effluent).	Complied- No dense habitations are found within 100 mts from both STP site. STP site has sufficient area for future expansion of STP
	As far as possible Sewage Pumping Stations (SPS) and wet wells should be located preferably 50m from any inhabited areas and from sites such as hospitals, schools, temples, etc. to minimize nuisance impacts from odor, rodents, etc.	Complied- No habitations exist within 50 mts from SPS sites.
	Locate STP at sites where there is no risk of flooding or other hazards that might impair function of the STP or present a risk of damage to the STP or the surrounding area	Complied- There is no risk of flooding or other hazards at both STP sites that might impair function of the STP or present a risk of damage to the STPs or the surrounding area.
Quality	Ensure that sewage is treated at all times to national waste water discharge standards and confirm this by regular monitoring of effluent from the STP.	Will be complied- Regular monitoring of Treated waste water shall be done and after meeting all national waste water discharge standards
Treated water	Ensure that no wastewater is discharged into a water course in which it could be a hazard to downstream users (e.g. a waterway that is used as a source of water for domestic or municipal supply)	Will be complied- treated water STP shall be discharged in Treated water Storage ponds located within the proposed STP site campus from where it shall be reuse by nearby farmers.
Sludge	Include measures to ensure the safe disposal of sewage sludge and if possible, to promote its safe and beneficial use as an agricultural fertilizer	It is proposed that safe and beneficial use of sewage sludge as an agricultural manure shall be promoted
Right-of-way for sewer network	Locate sewage pipelines within the right of way (ROW) of other linear structures (e.g. roads)	Complied- Sewers pipes will be laid along the roads/streets in

	wherever feasible, to reduce new land acquisition.	the City within the road right of way (ROW) therefore there is no need of land acquisition.
	Ensure that routes of sewage mains do not require land acquisition from individual farmers that is a significant proportion of their total land holding (10%)	

Appendix 3: Audit report of existing water supply system in Dungarpur

1 Introduction

Based on 2011 census the population of town is 47706 people, accordingly the present population for the year 2021 is about 53540. At present an intermittent water system is running in the town. The water supply of the town is depending on two local surface water Reservoirs viz Edward Samand and Vijay Chakra Sagar dam constructed exclusively for water supply needs, in addition to these, some sub surface sources (T/Ws and O/Ws) are also connected with the system, but due to rocky terrain the yield of these ground water sources is very less and the water table is regularly depleting fast therefore these would not sustain for longer. Owing to short fall in demand, the residents of town are facing acute scarcity of drinking water. To provide the relief from problem mentioned above, this project report is being framed, for this an over view of the existing system & infrastructure along with its utility for this project is being discussed in this chapter as follows:

2 Present water production and supply

At present an intermittent water supply system is running in the town. The present production of clear water is 6.4 MLD, but in fact due to system losses only 3840 KL of treated water is being reached to the consumers giving a service level of supply is only ~70 LPCD against the desired service of 135 LPCD. Thus, there is 35- 40% NRW in the system. The frequency of supply is once in a day for the average duration of 1.00-1.5 hours.

3 Quality of water

The raw water drawn from surface Reservoirs undergoes through the water treatment plant and is filtered and well treated before supply to the beneficiaries. After that, treated water is distributed among the consumers. The quality of water drawn from underground water sources is also potable and fit for domestic use.

4 Present sources and production

As mentioned above at present the main sources of water are Edward Samand and Vijay Chakra Sagar dam. Beside these earlier some small quantity of water was also being obtained from nearby small Mandawa Khapeda anicut near to Taraghati, but now it has been closed as there is no sufficient water in this anicut. In addition to these, some sub surface sources (2 T/Ws and 2 O/Ws) are also at present running with the system. The details of surface sources together with the running tube wells & open wells and production details of water from these are given below in the table:

Table C–1 : Details of sources and production

S. No.	Source	Net Capacity of Reservoir (mcft)	Present production MLD	Anticipated production in MLD for the year			Utility for this project
				2025	2040	2055	
1	Edward Samand	134	2.4	4.54	4.54	4.54	Proposed to keep continue for this project
2	Vijay Chakra Sagar	40	1.0	3.1	3.1	3.1	Proposed to keep continue for this project.

S. No.	Source	Net Capacity of Reservoir (mcft)	Present production MLD	Anticipated production in MLD for the year			Utility for this project
				2025	2040	2055	
3	Tube wells	-	1.0	1.0	1.0	1.0	Proposed to keep continue for this project, after augmentation and will be used in case of lean Season and repair maintenance of surface water infrastructure
4	Open Wells	-	2.0	2.0	2.0	2.0	
5	SKA	172.75	-	0.59	2.46	4.36	New Source for Dungarpur town
		Total	6.4	11.23	13.1	15	

5 Location of ground water sources

Table C–2 : Details of ground water sources

S.No.	Location	Type	No.	Production MLD
Tube wells				
1	Patrakar colony TW	Tube well	1	0.5
2	Darji wada TW	Tube well	1	0.5
	Total		2	1.0
Open wells				
1	Rani Bao OW	Open well	1	1.0
2	Kela bao OW	Open well	1	1.0
	Total		**2**	**2.0 MLD**

6 Site Visuals

Figure 1 : Edward Dam

Figure 2 : Vijay Chakr Sagar (Dimiya) Dam

Raw water conveyance system

7 The raw water from Edward Samand is carried out to raw water Sump at Bori H/Ws (WTP) by means of DI pipe line (by gravity flow) from there raw water is being pumped to WTP (3.25 MLD) at the same H/Ws for treatment. Balance 1.29 MLD me raw water is also carried out to Udaivilas H/Ws where another WTP (4.54 MLD) exists. Similarly, 3.25 raw water from Vijay Chakra Sagar (Dimiya) is carried out to Udaivilas H/Ws (WTP-3.25+1.29= 4.54 MLD) by means of DI pipe line through inter mediate pumping at Taraghati pumping station. The details of these raw water conveyance pipe lines are given below in Table Below:

Table C–3 : Details of ground water sources

S.N.	From	To	Details of raw water pipe line			Utility for this project
			Material	Dia in mm	Length In Mtr.	
1	Edward Samand	RW Sump at Bori H/Ws (WTP)	DI K-7	(a) 400 (b) 350	1490 7510	Useful, shall be utilised for this project
2	RW Sump at Bori H/Ws	Udaivilas H/Ws (WTP)	DI K-9	200	5950	Useful, shall be utilised for this project
3	Vijay Chakra Sagar (Dimiya)	Udaivilas H/Ws (WTP) Via Intermediate pumping station at Taraghati	DI K-9	200	9500	Replacement by 250 mm dia to accommodate flow and change of alignment along road.
		Total				

8 **Raw water storage**

There is at present only 4 raw water reservoirs with the system the details of the same are given below:

Table C–4 : Details of RWRs

S. No.	Location	Nos.	Capacity of RWRs in KL	Year of construction	Utility for this project
1	At Bori (Masonry)	1	350	1980	Heavy leakages in bottom hence new RCC RWR proposed.
2	At Bori (RCC)	1	235	2000	Useful, shall be utilised for this project
3	At Tara ghati (RCC)	1	175	1996	Not useful for this project, as it is being proposed to carry the raw water directly to the WTP at Udaivilas H/Ws
4	At Tara ghati (RCC)	1	175	2007	
	Total	**4**			

Figure 3 : Bori R.W.R. (235 KL)

Figure 4 : Bori R.W.R. (350 KL)

Figure 5 : Taraghati R.W.R. (175 KL)

9 Existing clear water reservoirs

Details of head works and CWRs

There was Five Head works in the system with the six CWRs & pump houses but at present only four Head works are in use in the system, as one Head Works has now been closed due to ruined & unusable condition of CWR and pump house. The details of H/Ws and CWRs are given below.

Table C–5 : Details of CWRs

S.no	Location of Head Works	Location of Existing CWR	Capacity of existing CWR (kl)	Year of construction	Condition (Based on Preliminary Inspection) and feasibility for reuse in this project.
1	Udaivilas	1. RCC CWR -1	113	1990	No need of this CWR as a new CWR of sufficient capacity (325 KL) has been constructed adjoining to existing Pump house.
		2. RCC CWR-2	325	2007	Useful, recommended to be kept continue for this project.
2	Bori	RCC CWR	325	2007	Useful, recommended to be kept continue for this project.
3	Chandpole	Masonry CWR-	500	1960	Ruined & unusable condition at present not in use.
4	Aen Office	Masonry CWR	263	1985	Useful, recommended to be kept continue for this project.
5	New colony / Nai Abadi	RCC CWR	272	1980	Useful, recommended to be kept continue for this project.

Figure 6 : CWR at Udaivilas (113 KL)

Figure 7 : CWR at Udaivilas (113 KL)

Figure 8 : CWR at Udaivilas (325 KL)

Figure C-9 : CWR at Bori head works (325 KL)

Figure 10 : Masonry CWR at AEN office (263 KL)

10 Existing service reservoirs

At present from water supply distribution point of view, the entire town has been divided into 20 zones. In these zones 23 Service Reservoirs (13 ESRs and 10 GLSRs) of various capacities are available in the respective zone areas; from these clear water is being supplied to the consumers. The details of Service Reservoirs are as follows:

Table C–6 : Details of existing SRs

Sl. No.	Location	Type of service Reservoir	Capacity of OHRs in KL	Staging in m	Year of construction	Condition (Based on Preliminary Inspection) & utility for this project.
1	Rajpura/New ESR (existing zone-1)	RCC ESR	150	18	2015	OK, may be kept continue for this project.
2	Navadera(existing zone-2A)	RCC ESR	325	15	2007	OK, may be kept continue for this project
3	Chand pole (existing zone-3)	Masonry GLSR	200	On hill	1968	Heavy leakages and new RCC OHSR proposed.
4	Meera Dungari (existing zone-4)	RCC GLSR	225	On hill	2007	OK, may be kept continue for this project
5	Khantwara (existing zone-5)	(a) GLSR 1	250	On hill	1979	Damaged therefore Replaced by new CWR given at 5 (b)
		(b). RCC GLSR-2	225	On hill.	2016	OK, may be kept continue for this project
6	Ghati-I (existing zone-7)	Masonry GLSR At Aen office campus.	200	On hill	1968	Require roof repairing, and may be used after that.
8	Ghati-II (existing zone-8)	GLSR	454	On hill	1988	Damaged, not proposed to keep continue.
9	City (existing zone-9) H/Ws at Aen office campus.	(a). RCC CWR (act as GLSR)	100	At bottom of hill	1985	Cannot work as SR, it is situated at the lower level and cannot serve the terminal head as required.
		(b) Masonry. GLSR	168	On hill	1968	OK, at present in use may be used under this project after some refurbishment.
10	New Abadi +Shastri Nagar (existing zone-10)	(a) RCC GLSR at AEN office campus hill.	450	On hill	1988	OK, may be kept continue for this project
		(b)RCC ESR	100	15	2007	OK, may be kept continue for this project
11	Sindhi Colony existing zone-11	RCC ESR	325	18	2007	OK, may be kept continue for this project
12	Pratap Nagar (existing zone-12)	RCC ESR	75	15	2007	OK, may be kept continue for this project
13	Indira Colony +Laxmi nagar (existing zone-13)	RCC ESR	227	15	1996	Top dome leakage, bracings, columns damaged, and not repairable, required replacement.

Sl. No.	Location	Type of service Reservoir	Capacity of OHRs in KL	Staging in m	Year of construction	Condition (Based on Preliminary Inspection) & utility for this project.
14	Old RHB (existing zone-14)	RCC ESR	272	15	1986	Top dome leakage, bracings, columns damaged, and not repairable, required replacement.
15	New RHB (existing zone-15) Shivaji Nagar	RCC ESR	100	15	2001	OK, may be kept continue for this project if required.
16	Patrakar Colony (existing zone-16)	RCC ESR	140	18	2007	OK, may be kept continue for this project
17	Hospital (existing zone-17)	RCC ESR	50	12	2001	Not feasible for this project as capacity & staging of the ESR is very less
18	Sabela (existing zone-18)	RCC ESR	50	12	2001	Not feasible for this project as capacity & staging of the ESR is very less
19	Modern School	RCC ESR	210	18	2013	OK, may be kept continue for this project
20	Ashok Nagar	RCC ESR	113	18	2013	OK, may be kept continue for this project
	TOTAL		**4484**			

Figure 11 : Existing ESR at Navadera (325 KL)

Figure 12 : Masonry GLSR for Ghati-I at hill near AEN office (200 KL)

Figure 13 : RCC CWR (Act as GLSR at AEN office capus)

Figure 14 : Masonry GLSR on hill at AEN office for city zone

Figure 15 : RCC GLSR on hill near AEN office for new abadi zone

Figure C-16 : Indra colony ESR- 227 KL

Figure 17 : Old RHB ESR- 272 KL

11 Existing pump houses

Table C–7 : Details of existing pump houses

S. No	Location	Size of PH (m x m)	Construction year	Utility for this project
1	Vijay Chakra Sagar (Dimiya) PH-2 for Raw water	5 X 4	2007	OK, may be keep continue for this project.
2	Mandwa Anicut PH- for Raw water	3 X 3	2007	No utility of these pumps for this project, as the duty conditions of these pumps do not suit for this project as per present design requirement.
3	Taraghati PH-1	3 X 5	1996	Not required as this intermediate pumping station has been proposed to be curtailed. Raw water from Dimiya shall directly be carried out to WTP at Udaivilas.
4	Taraghati PH-2	3 X 5	2007	

S. No	Location	Size of PH (m x m)	Construction year	Utility for this project
5	Udaivilas RGF PH-(I)	7 X 8	1990	Not proposed to keep continue, as this is not able to create a positive suction, therefore a new pump house of required dimensions is being proposed. This may be used to store the material.
6	Udaivilas RGF PH-(II)	3 X 3	2002	Not required to keep continue, as of very small size, may be used as a store room.
7	Main pump house	5 X 7	1960	The PH at present in ruined & unusable condition therefore proposed to be demolished and to construct new PH against this.
8	Chandpole pump house	5 X 7	1960	Not proposed to keep continue, as this is not able to create a positive suction, therefore a new pump house of required dimensions is being proposed. This may be used to store the material.
9	Bori RGF (I)	4 X 5	2002	Require repair and may be used after that
10	Bori RGF (II)	4 X 5	2007	Require some minor repair and may be used after that.
11	Nai Abadi GLR-1	5X10	1960	Require repair and may be used after that.
12	Nai Abadi GLR-1	3 X 3	2007	Not required to keep continue for this project as P/H-1 is of adequate size.

Figure -18 : PH at vijay chakra sagar dam

Figure 19 : PH at Udaivilas

Figure 20 : PH at Bori

Figure -21 : Clear water PH at Bori

Figure 22 : AEN Office PH

Figure -23 : Nai Abadi PH

12 Existing pumping machinery

The details of pumping sets installed at various pumping stations / HWs and tube wells / open wells are as follows:

Table C–8 : Details of existing P&M

S. No	Location	Type	Nos	Discharging Capacity in LPS	Head IN M	Utility for this project
1	For tube wells/OWs	Submersible	13	2.5 to 7.00 lps	90 to 140	No utility of these pumps for this project, as these sources are not being proposed to be continue for this project.
2	Vijay Chakra Sagar (Dimiya) PH for Raw water to Taraghati	centrifugal pump sets	2	39.45	55	No utility of these pumps for this project, as it is proposed to curtail this intermediate PH at Taraghati pump house. Raw water is proposed to be carried out directly to the WTP at Udaivilas.
3	Taraghati PH-1	centrifugal pump sets	2	24.72	40	No utility of these pumps for this project, as the raw water is proposed to be carried out directly to the WTP at Udaivilas from Vijay chakra Sagar Dam.
4	Udaivilas H/Ws (I)	Submersible				no utility of these pumps for this project as duty conditions do not match with the project requirement
5	Udaivilas H/Ws (II)	centrifugal pump sets	2	60	20	
		centrifugal pump sets	2	4.72	85	

S. No	Location	Type	Nos	Discharging Capacity in LPS	Head IN M	Utility for this project
		centrifugal pump sets	2	38.74	85	
		centrifugal pump sets	2	22.15	30	
6	Main pump house	centrifugal pump sets	2	15.33	65	no utility of these pumps for this project as duty conditions do not match with the project requirement
7	Bori RGF (I) for RWR	centrifugal pump sets	2	23.62	50	no utility of these pumps for this project as duty conditions do not match with the project requirement
8	Bori RGF (II) for CWR	centrifugal pump sets	2	23.08	60	no utility of these pumps for this project as duty conditions do not match with the project requirement
		centrifugal pump sets	2	13.92	95	
		centrifugal pump sets	2	23.71	105	
9	Nai Abadi GLR (CWR)	centrifugal pump sets	2	19.4	55	no utility of these pumps for this project as duty conditions do not match with the project requirement
		centrifugal pump sets	2	16.5	50	
		centrifugal pump sets	4	10.12	45	

13 Existing rising main

Table C–9 : Details of existing rising main

Size in mm	Type of pipe and length in Meter					Remark
	GI	DI	CI	AC	Total	
50	30				30	
65	60				60	
80			30	700	730	
100		1010	90	90	12550	
150		860	2250	18500	25900	
200		10500	1500	5500	26800	
350		7510			7510	
400		1490			1490	
TOTAL	**90**	**21370**	**3870**	**24790**	**50120**	

14 Existing distribution system

The distribution system has been laid of CI-LA / DI K-7 / AC-10 and AC-15 pipes. The size & material wise length of pipe lines are given in the table below.

Table C–10 : Details of existing distribution system

Size in mm	Type of pipe and length in M					Remark
	CI -LA	DI	AC-10	AC-15	Total	
50	50				50	
80	8375		34410		42785	
100	6090	12400	18465	26500	63455	
125			2200		2200	
150	4010	4800	6100	6030	20940	
200	1450	1420		300	3170	
250		700			700	
300		0			0	
TOTAL	**19975**	**19320**	**61175**	**32830**	**133300**	

As the existing AC pipes and CI pipes are so old and in damaged condition so to reduce the NRW existing AC and CI pipelines are not proposed to use only existing DI pipeline is proposed to be use.

15 Existing house connections

Table C–11 : Details of present house connections

S.No.	Category	Metered	Flat Rate	Total
1	Domestic	8352	287	8639
2	Commercial	122	0	122
3	Industrial	0	0	0
4	Govt.	89	0	89
5	ULB	188	0	188
	Total	**8751**	**287**	**9038**

REFERBISHMENT OF EXISTING INFRASTRUCTURE

16 Existing pump house and CWRs

At present, 12 pump houses (details mentioned in chapter-4, Section- 4.9) in 8 HWs are available with the system out of these 6 pump houses are using to carry the raw water obtained from sources to respective RGF and other PHs are used to transfer the clear water to service reservoirs Pump houses available in these H/Ws are at present in working condition. The pumps already installed in these pump houses would not be useful for this project as the duty conditions of the pump shall not be matched with the design parameters of the proposed pumps. Out of these, the details of pump houses require refurbishment are given below:

Table 0–1 : Details of existing PHs

S. No	Location	Size of PH MxM	Year of construction	Condition (Based on Preliminary Inspection) and feasibility for reuse in this project.
1	Vijay Chakra Sagar (Dimiya) PH-1 for Raw water	4 x 5	1996	Require repair and may be used after that.
2	Udaivilas RGF (I)	7 X 8	1990	Require repair and may be used after that.

S. No	Location	Size of PH MxM	Year of construction	Condition (Based on Preliminary Inspection) and feasibility for reuse in this project.
3	Bori RGF (I)	4 X 5	2002	Require repair and may be used after that.
4	Bori RGF (II)	4 X 5	2007	Require some minor repair and may be used after that.
5	Nai Abadi CWR-PH-1	5 X 10	2007	Require repair and may be used after that.
6	Main pump house at AEn PHED office	5 x 7	1960	Proposed to be demolished, as in ruined condition.
7	Chandpole pump house	5 x 7	1960	Proposed to be demolished as in ruined condition.

17 **Existing raw water storage**

There are 4 raw water Reservoirs (details mentioned in chapter-3) to collect the raw water 2 at Bori and 2 at Taraghati. Out of these, the details of reservoirs require refurbishment are given below:

Table 0–2 : Status of existing raw water storage

S. No.	Location	Nos	Capacity of RWRs in ML	Year of construction	Utility for this project
1	At Bori (Masonry)	1	350	1980	Not Useful, heavy leakages at bottom & walls, there for Proposed to be demolished,

18 **Status of existing clear water storage reservoirs**

There are 6 CWRs (details mentioned in chapter-4) to collect the clear water. Out of these, the details of reservoirs require refurbishment are given below:

Table 0–3 : Status of existing CWRs

S.no	Location of Head Works	Type of CWR	Capacity of existing CWR (kl)	Year of construction	Condition (Based on Preliminary Inspection) and feasibility for reuse in this project.
1	Udaivilas	2. RCC CWR-2	325	2007	Useful, recommended to be kept continue for this project after some minor repairing & painting work.
2	Bori	RCC CWR	325	2007	Useful, recommended to be kept continue for this project after some minor repairing & painting work.
3	Chandpole	Masonry CWR-	500	1960	Ruined & unusable condition therefore proposed to be demolished.

S.no	Location of Head Works	Type of CWR	Capacity of existing CWR (kl)	Year of construction	Condition (Based on Preliminary Inspection) and feasibility for reuse in this project.
4	Aen Office	Masonry CWR	263	1985	Useful, recommended to be kept continue for this project.
5	New colony / Nai Abadi	RCC CWR	272	1980	Useful, recommended to be kept continue for this project after some minor repairing & painting work.

19 **Status of existing SRs (ESRs & GLSRs)**

At present there are 23 Service Reservoirs (13 ESRs and 10 GLSRs) of various capacities are available in the various locations (details mentioned in chapter-4). Out of these, the details of reservoirs require refurbishment are given below:

Table 0–4 : Status of existing CWRs

Sl. No.	Location	Type of service Reservoir	Capacity of OHRs in KL	Staging in m	Year of construction as informed by local PHED official	Condition (Based on Preliminary Inspection) & utility for this project.
1	Navadera (existing zone-2)	RCC ESR	325	15	2009	Full capacity could not be utilized due to new population residing on higher sides of hill, hence addition OHSR proposed.
2	Chand pole (existing zone-3)	Masonry GLSR	200	On hill	1968	Not Useful, heavy leakages at bottom & walls, hence new RCC OHSR proposed.
3	Meera Dungari (existing zone-4)	RCC GLSR	225	On hill	2009	OK, may be kept continue after painting work.
4	Mahakaleshwar (existing zone-6)	RCC GLSR	75	On hill	2009	Very less capacity and not suitable as SR due to new locality residing on higher sides of hills, hence new OHSR proposed
5	Ghati-I (existing zone-7)	Masonry GLSR at AEn office campus.	200	On hill	1970	Require roof repairing, and may be used after that.
6	AEN office campus hill.	RCC GLSR at AEn office campus hill.	450	On hill	1990	OK, may be kept continue after some minor repairing work & painting work
7	AEN office campus hill.	Masonry GLSR at AEn office campus hill.	168	On hill	1968	OK, at present in use & may be kept continue after some minor repairing work & painting work
8	Shastri colony	RCC ESR	100	15	2009	OK, may be kept continue after painting work.

Sl. No.	Location	Type of service Reservoir	Capacity of OHRs in KL	Staging in m	Year of construction as informed by local PHED official	Condition (Based on Preliminary Inspection) & utility for this project.
9	Sindhi Colony) existing zone-11	RCC ESR	325	18	2009	OK, may be kept continue after painting work.
10	Pratap Nagar (existing zone-12)	RCC ESR	75	15	2009	OK, may be kept continue after painting work.
11	Indira Colony +Laxmi nagar (existing zone-13)	RCC ESR	227	15	1996	Top dome leakage, require and not usable require replacement.
12	Old RHB (existing zone-14)	RCC ESR	272	15	1990	Top dome leakage, bracings, columns damaged, and not repairable, required replacement.
13	Patrakar Colony (existing zone-16)	RCC ESR	140	18	2009	OK, may be kept continue after painting work.
14	Modern School	RCC ESR	210	18	2013	OK, may be kept continue after painting work.
15	Ashok Nagar	RCC ESR	113	18	2013	OK, may be kept continue after painting work.

20 **Status of existing Distribution system**

Present distribution system is very old of AC/PVC pipes of undersize. There often happen leakages in the lines increasing quantity of NRW in the system. The whole system is required to be replaced by HDPE pipelines. After laying the lines, the provision of road repairs has also been proposed in the project.

21 **Status of existing rising mains**

All the AC / old CI pipe lines laid for rising mains are to be replaced by DI K-7 pipes as per policy of the RUIDP, therefore the provision of new DI K-7 pipelines have been taken wherever required as per design.

22 **Existing water treatment plant**

There are two rapid gravity water treatment plants of capacity of 4.54 MLD and 3.25 MLD with the existing system. Thus, there is a total capacity of WTP is 7.79 MLD. The details are as follows:

Table 0–5 : Details of RWRs

S.No.	Location	Type of WTP	Capacity MLD	Year of construction	Remark/ Utility for this project
1	RGF at Udaivilas	RGF	4.50	1987-88	Useful, recommended to be kept continue for this project after some minor repairing
2	Bori RGF	RGF	3.25	2007-08	Useful, recommended to be kept continue for this project after some minor repairing.
	Total	**-**	**7.79**	**-**	**-**

Figure 1 : Udai vilas RGF

Figure 2 : Udai vilas clarifloculator

Figure 3 : Bori clarifloculator

Figure 4 : Bori RGF

Environment Audit of Existing WTP at Bori

Introduction

Under the ADB funded Rajasthan Secondary Towns Development Sector Project (RSTDSP), it is proposed to water supply and sewerage project in Dungarpur Town. Since adequate capacity treatment facility is already in Bori WTP 3.25 MLD and Uday Vilash WTP 4.45 MLD, no new WTPs is proposed for this Project. Sustainability of new water supply infrastructure and realisation of intended purpose. The existing WTP at Bori is an associated facility as per the ADB Safeguard Policy Statement 2009. Compliance with the environmental safeguards will ensure the subproject sustainability.

The objectives of this study is to (i) assess the compliance of the water treatment plant (WTP) with country's environmental regulatory framework; (ii) improve environmental performance, as required, through monitoring the effectiveness of the management system; and (iii) increase the RSTDSP's knowledge of its activities, thus increasing its ability to continually improve and minimize future potential liabilities. The details of existing plant, process and used technology are given below:

<table>
<tr><td>Name</td><td>WTP at Bori Head Works</td></tr>
<tr><td>1. Location of Plant:</td><td>In the Campus of Bori Head Works</td></tr>
<tr><td>2. Capacity (MLD):</td><td>3.25 MLD</td></tr>
<tr><td>3. Technology:</td><td>Rapid Gravity Filter</td></tr>
<tr><td>4. Executing agency:</td><td>PHED</td></tr>
<tr><td>5. Implementing agency:</td><td>PHED</td></tr>
<tr><td>6. Asset Owner:</td><td>PHED</td></tr>
<tr><td>7. Date of completion of construction works of WTP:</td><td>A. RGF-1: 2002
B. RGF-2: 2007</td></tr>
<tr><td>8. Status of work progress of WTP: (completed/uncompleted components with %)</td><td>completed/</td></tr>
<tr><td>9. Nos., locations and capacities of Pumping Stations:</td><td>
<table>
<tr><th>S. N</th><th>Location</th><th>Size of PH (m x m)</th><th>Const. year</th></tr>
<tr><td>3</td><td>Bori RGF (I)</td><td>4 X 5</td><td>2002</td></tr>
<tr><td>4</td><td>Bori RGF (II)</td><td>4 X 5</td><td>2007</td></tr>
</table>
</td></tr>
<tr><td>10. Land ownership details</td><td>PHED</td></tr>
<tr><td>11. Status of Consent to Establish (CTE) from Pollution Control Board: obtained/not obtained</td><td>To till date not taken</td></tr>
<tr><td>12. Status of Consent to Operate (CTO) from Pollution Control Board: obtained/not obtained</td><td>To till date not taken</td></tr>
<tr><td>13. Details of water supplied areas with WTP: (ward nos./localities)</td><td>Rajpura, Navadera, Chanpole, Meeradungari, Khantwara, (Zone 1 to 5)</td></tr>
<tr><td>14. Total Population covered (number and %):</td><td></td></tr>
<tr><td>15. What are the parameters of treated water:</td><td>
<table>
<tr><th>Parameters</th><th>Value</th></tr>
<tr><td>PH</td><td>7.9</td></tr>
<tr><td>Turbidity (NTU)</td><td>0.2</td></tr>
<tr><td>Temperature (◦C)</td><td>None</td></tr>
<tr><td>Odour Colour (Hazen Units)</td><td>None</td></tr>
<tr><td>Residual Chloride (mg/l)</td><td>-</td></tr>
</table>
</td></tr>
</table>

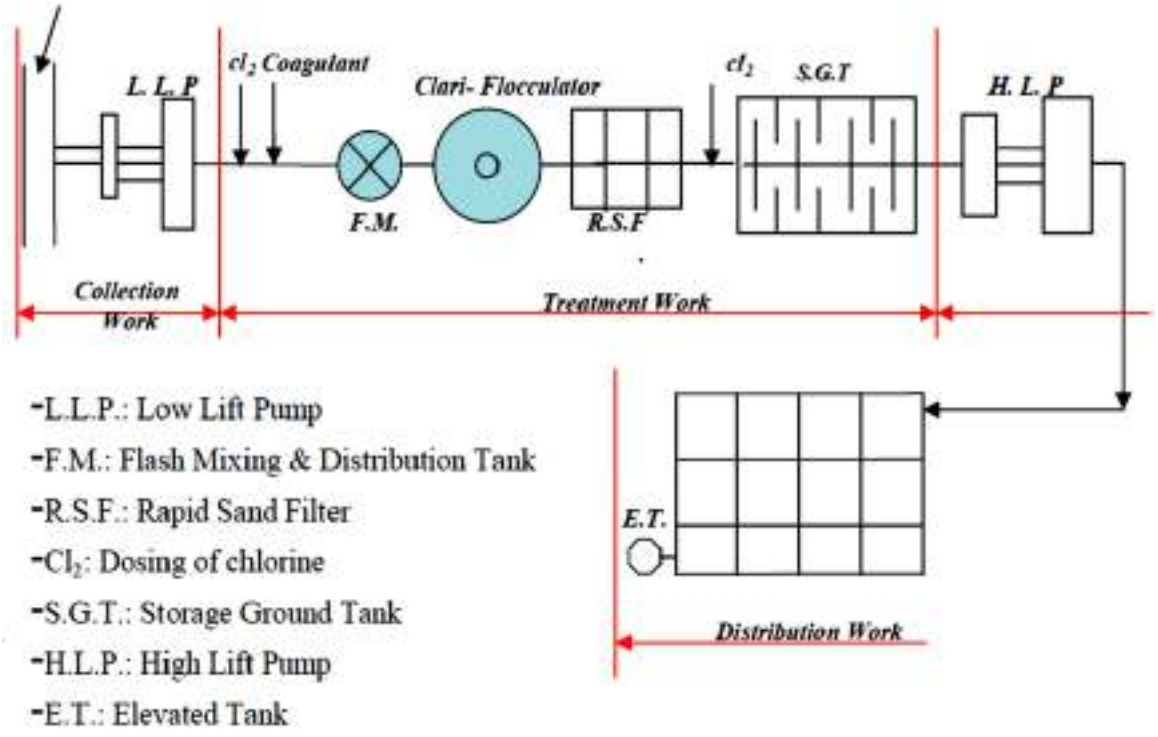
<table>
<tr><td></td><td>
<table>
<tr><td>Chloride (mg/l)</td><td>100</td></tr>
<tr><td>Fluoride (mg/l)</td><td>0.24</td></tr>
<tr><td>Nitrate (mg/l)</td><td>5</td></tr>
<tr><td>Total Alkinity (mg/l)</td><td>210</td></tr>
<tr><td>Total Hardness (mg/l)</td><td>230</td></tr>
<tr><td>Calcium Hardness (mg/l)</td><td>130</td></tr>
<tr><td>Magnesium Hardness(mg/l)</td><td>100</td></tr>
<tr><td>TDS (mg/l)</td><td>330</td></tr>
</table>
</td></tr>
<tr><td>16. Is there facility of laboratory for testing these parameters, if yes, give details</td><td>Yes in PHED Campus</td></tr>
<tr><td>17. Filter media replacement done if any:</td><td>No</td></tr>
<tr><td>18. How many times filter media replaced and last replacement detail:</td><td>NA</td></tr>
<tr><td>19. What are the proposals/methods for reuse/disposal of back wash water from WTP:</td><td>Nil</td></tr>
<tr><td>20. Quantity of Sludge generated from WTP:</td><td>400 kg/month</td></tr>
<tr><td>21. Sludge Dewatering and drying system:</td><td>By evaporation</td></tr>
<tr><td>22. What are the proposals/methods for reuse/disposal of generated sludge from WTP:</td><td>For the plantation in nurseries</td></tr>
<tr><td>23. Is this plant anywhere related/dependent on proposed WTP under RUIDP Phase- project:</td><td>Yes, This WTP will be used for proposed scheme</td></tr>
<tr><td>24. Status and type of electricity connection: (connection number and approved load, KW)</td><td>180 KW</td></tr>
<tr><td>25. Whether DG set installed, if yes give capacity and type of DG set:</td><td>100 KVA</td></tr>
<tr><td>26. Numbers of employees for operation of plant (designation wise numbers of employees):</td><td>11</td></tr>
<tr><td>27. WTP Process</td><td>Rapid gravity filters employing graded sand are washed by separate use of air and water through the bed by reverse flow and the used washwater is removed by a washwater collection channel. Combined air-water wash would intermix the media and result in loss of media. The first operation is to allow the filter to drain down until the water lies a few centimetres above the top of the bed. Air is then introduced through the collector system at a rate of about 6.5–7.5 mm/s. The air breaks up the surface scum and dirt is loosened from the surface of the sand grains. This is followed by an upward flow of water at a carefully selected velocity to expand and fluidise the bed. Under this condition the voids between grains of sands are increased and resulting rotation of grains and consequent attrition between grains produces a scouring action to remove attached deposits. The wash rate should be just sufficient to achieve fluidisation velocity (incipient fluidisation) with little bed expansion. Increasing the backwash rate beyond this state would be counter productive because as the distance between sand grains increases, the scouring action is reduced. High backwash rates may result in loss of sand and wastage of water and energy. The washwater collection channel cill is usually placed about 100–150 mm above the sand.

Component of WTP

<table>
<tr><td>Component</td><td>Bori</td></tr>
<tr><td>Aeration Fountain</td><td>1</td></tr>
<tr><td>Flash Mixer</td><td>1</td></tr>
<tr><td>Flocculator</td><td>1</td></tr>
</table>
</td></tr>
</table>

	Clarifier -	1	
	Rapid Sand Filters and Filter House		
	Filter Sand	2	
	Wash Water Tank	1	
	Wash Water Pumps	2	
	Air Blower	2	
	Chemical House	1	
	Solution tanks	3	
	Pure Water Sump and Sump House		
	Capacity of sump – (CWR)	1	
	Pump House	1	
	Store House	1	
	Vacuum feed type Chlorinators	2	

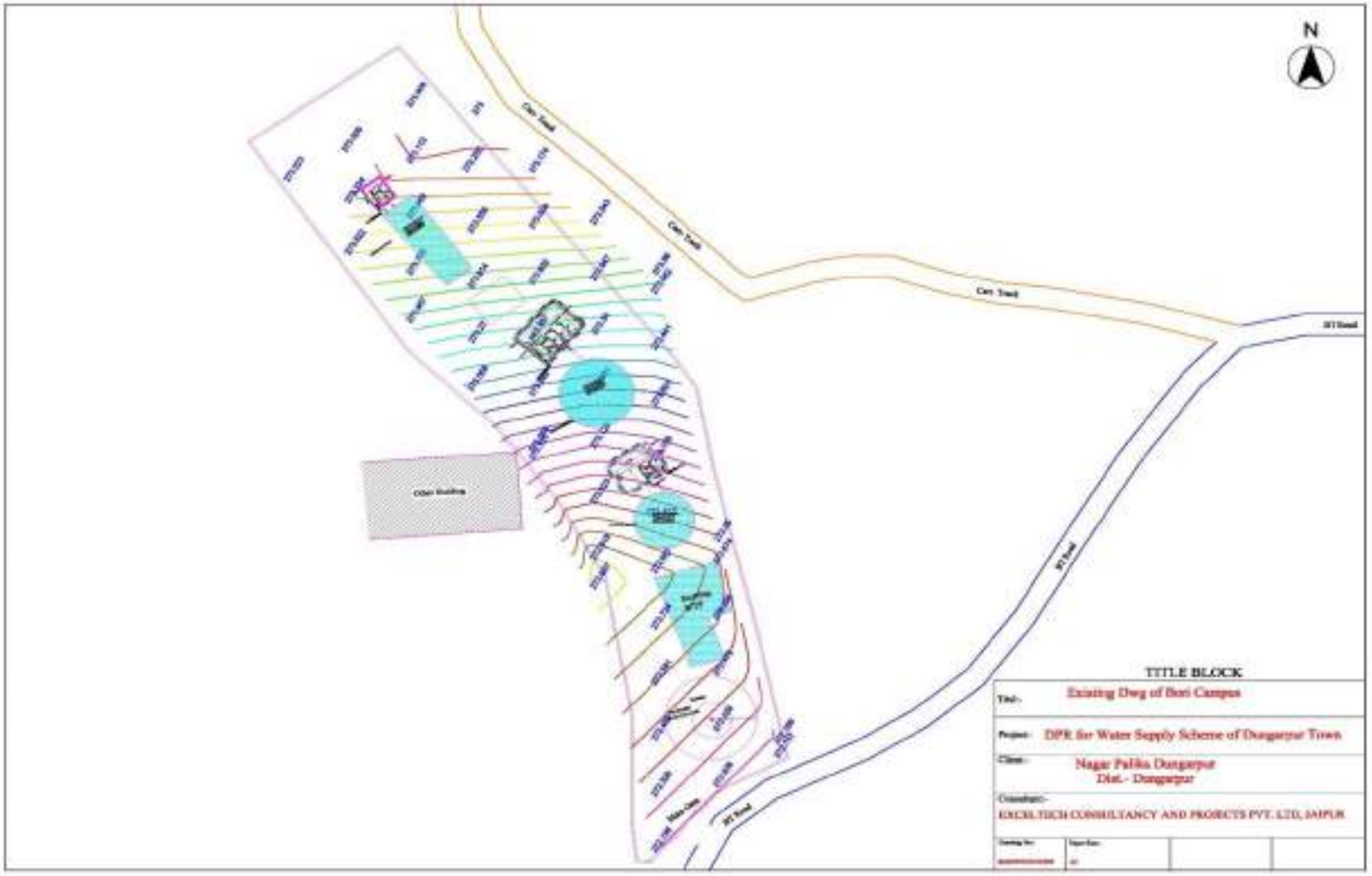
Process Flow Diagram of WTP at Bori



28.	

View of Bori WTP

Exiting WTP Plant Component Layout Diagram


N
Cart Track
Cart Track
Cart Track
RT Road
RT Road
TITLE BLOCK
Title:- Existing Dwg of Bori Campus
Project:- DPR for Water Supply Scheme of Dungarpur Town
Client:- Nagar Palika Dungarpur
Dist.- Dungarpur
Consultant:-
EXCELTECH CONSULTANCY AND PROJECTS PVT. LTD, JAIPUR

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

Law, Rules, and Regulations	Description and Requirement	WTP at Bori PHED Headworks
		Y = compliant (if applicable, specify expiration date of permit/clearance) N = non-compliant33 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 Storage of is always less 10 tons
Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments	Consents (CTE and CTO) from RSPCB	N Currently no CTE and CTO are applied for WTP, CTE will be applied and taken before start of construction works and CTO before start of operation with new components
Air (Prevention and Control of Pollution) Act of 1981, Rules of 1982 and amendments.	Consents (CTE and CTO) from RSPCB	N For DG set Consent will be applied and taken before start of works
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.	Y No source of waste except very quantity silt and clay.
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,	As per Rule 6, every user agency, who wants to use any	N/A

[33]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 Bori PHED Headworks
		Y = compliant (if applicable, specify expiration date of permit/clearance) N = non-compliant33 N/A = not applicable (state justification)
1980 and Forest Conservation Rules, 2003 as amended	forest land for non-forest purposes shall seek approval of the central government.	
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 WTP is operated by PHED staff. No children are engaged.

Corrective Action Plan

In the existing 3.25 MLD WTP unit at Bori PHED Headworks no CTE and CTO were taken for both WTP plant and DG set under Air and Water Act therefore consent to establish and consent to operate will be taken from RSPCB.

Repair works and improvement of electromechanical works will improve the treatment capacity of WTP.

Environment Audit of Existing WTP at Uday Vilas Headworks

Introduction

Under the ADB funded Rajasthan Secondary Towns Development Sector Project (RSTDSP), it is proposed to water supply and sewerage project in Dungarpur Town. Since adequate capacity treatment facility is already in Bori WTP 3.25 MLD and Uday Vilas WTP 4.45 MLD, no new WTPs is proposed for this Project. Sustainability of new water supply infrastructure and realisation of intended purpose. The existing WTP at Uday Vilas PHED Campus is an associated facility as per the ADB Safeguard Policy Statement 2009. Compliance with the environmental safeguards will ensure the subproject sustainability.

The objectives of this study is to (i) assess the compliance of the water treatment plant (WTP) with country's environmental regulatory framework; (ii) improve environmental performance, as required, through monitoring the effectiveness of the management system; and (iii)

increase the RSTDSP's knowledge of its activities, thus increasing its ability to continually improve and minimize future potential liabilities. The details of existing plant, process and used technology are given below:

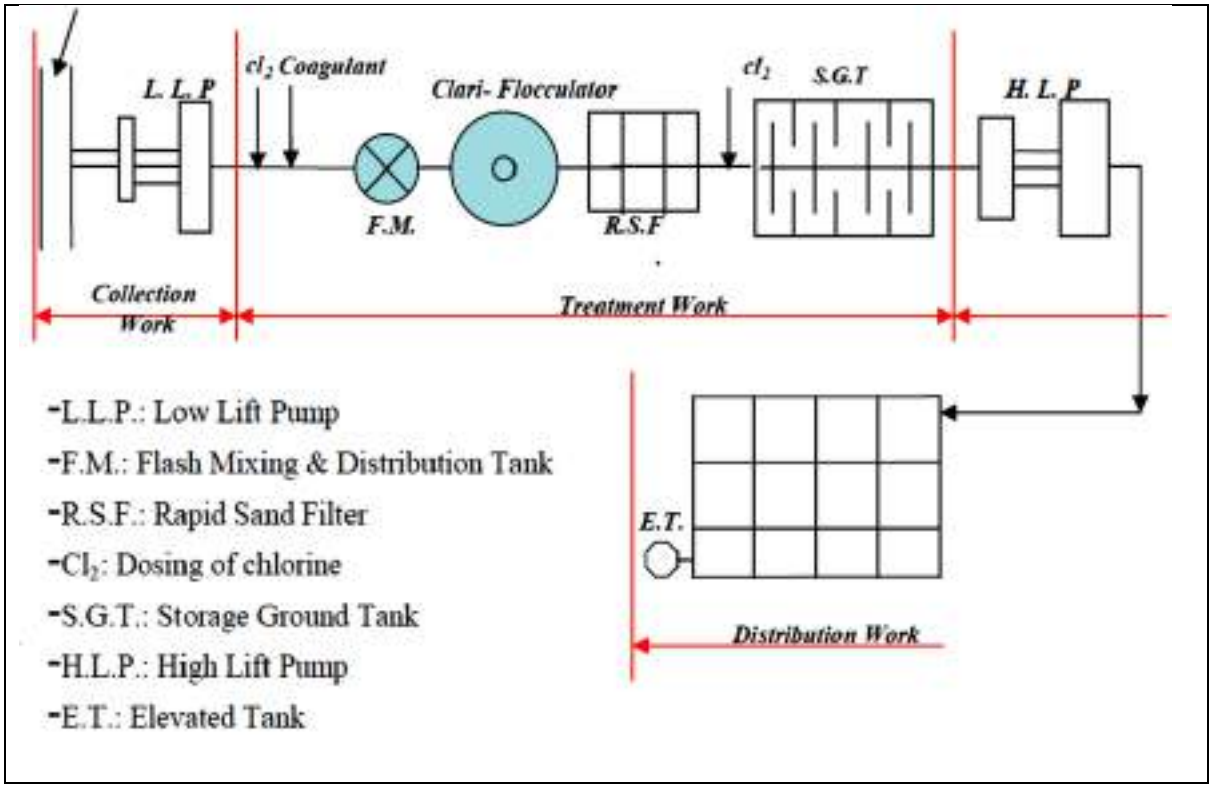
<table>
<tr><td colspan="2">WTP neat Uday Vilas</td></tr>
<tr><td>1. Location of Plant:</td><td>Near Uday Vilas Head Works near Uday Vilas Hotel</td></tr>
<tr><td>2. Capacity (MLD):</td><td>4.54 MLD</td></tr>
<tr><td>3. Technology:</td><td>Rapid Gravity Filter</td></tr>
<tr><td>4. Executing agency:</td><td>PHED</td></tr>
<tr><td>5. Implementing agency:</td><td>PHED</td></tr>
<tr><td>6. Asset Owner:</td><td>PHED</td></tr>
<tr><td>7. Date of completion of construction works of WTP:</td><td>1990</td></tr>
<tr><td>8. Status of work progress of WTP: (completed/uncompleted components with %)</td><td>completed/ Repair works are proposed in this subproject.</td></tr>
<tr><td>9. Nos., locations and capacities of Pumping Stations:</td><td>
<table>
<tr><th>S. N</th><th>Location</th><th>Size of PH (m x m)</th><th>Const. year</th></tr>
<tr><td>1</td><td>Udayvilas RGF PH-(I)</td><td>7 X 8</td><td>1990</td></tr>
<tr><td>2</td><td>Udayvilas RGF PH-(II)</td><td>3 X 3</td><td>2002</td></tr>
</table>
</td></tr>
<tr><td>10. Total Area of land used for WTP (sq.m.):</td><td>2800</td></tr>
<tr><td>11. Land ownership details: (khasra nos. and title)</td><td>PHED</td></tr>
<tr><td>12. Details of water supplied areas with WTP: (ward nos./localities)</td><td>Mahakaleshwar, Gati, Shastri Colony, Sindhi Colony, Pratap Nagar, Indira Colony, Morden School, Old RHP, Pratakar Colony and Ashok Nagar
(Zone-6 to 16)</td></tr>
<tr><td>13. What are the parameters of treated water:</td><td>
<table>
<tr><th>Parameters</th><th>Values</th></tr>
<tr><td>pH</td><td>7.5</td></tr>
<tr><td>Turbidity (NTU)</td><td>7.0</td></tr>
<tr><td>Temperature (◦C)</td><td>None</td></tr>
<tr><td>Odour Colour (Hazen Units)</td><td>None</td></tr>
<tr><td>Total Alkalinity (as $CaCO_3$)</td><td>N.O</td></tr>
<tr><td>Total Hardness (as $CaCO_3$)</td><td>110</td></tr>
<tr><td>Calcium Hardness (mg/l)</td><td>80</td></tr>
<tr><td>Magnesium Hardness (mg/l)</td><td>60</td></tr>
<tr><td>Chloride (as Cl^-) (mg/l)</td><td>60</td></tr>
<tr><td>Nitrates (as NO_3) (mg/l)</td><td>5</td></tr>
<tr><td>Fluoride (as F^-) (mg/l)</td><td>0.15</td></tr>
<tr><td>Total Dissolved Solids (mg/l)</td><td>340</td></tr>
</table>
</td></tr>
<tr><td>14. Is there facility of laboratory for testing these parameters, if yes, give details</td><td>Yes in PHED Campus</td></tr>
<tr><td>15. Quantity of Sludge generated from WTP:</td><td>300 kg/month</td></tr>
<tr><td>16. Sludge Dewatering and drying system:</td><td>By evaporation</td></tr>
<tr><td>17. What are the proposals/methods for reuse/disposal of generated sludge from WTP:</td><td>For the plantation in nurseries</td></tr>
<tr><td>18. Status and type of electricity connection: (connection number and approved load, KW)</td><td>115 KW</td></tr>
<tr><td>19. Whether DG set installed, if yes give capacity and type of DG set:</td><td>62.5 KVA</td></tr>
<tr><td>20. Numbers of employees for operation of plant (designation wise numbers of employees):</td><td>10</td></tr>
<tr><td>21. WTP Process</td><td>Rapid gravity filters employing graded sand are washed by separate use of air and water through the bed by reverse flow and the used wash water is removed by a wash water collection channel. Combined air-water wash would intermix the media and result in loss of media. The first</td></tr>
</table>

operation is to allow the filter to drain down until the water lies a few centimetres above the top of the bed. Air is then introduced through the collector system at a rate of about 6.5–7.5 mm/s. The air breaks up the surface scum and dirt is loosened from the surface of the sand grains. This is followed by an upward flow of water at a carefully selected velocity to expand and fluidise the bed. Under this condition the voids between grains of sands are increased and resulting rotation of grains and consequent attrition between grains produces a scouring action to remove attached deposits. The wash rate should be just sufficient to achieve fluidisation velocity (incipient fluidisation) with little bed expansion. Increasing the backwash rate beyond this state would be counter productive because as the distance between sand grains increases, the scouring action is reduced. High backwash rates may result in loss of sand and wastage of water and energy. The wash water collection channel cell is usually placed about 100–150 mm above the sand.

Component of WTP

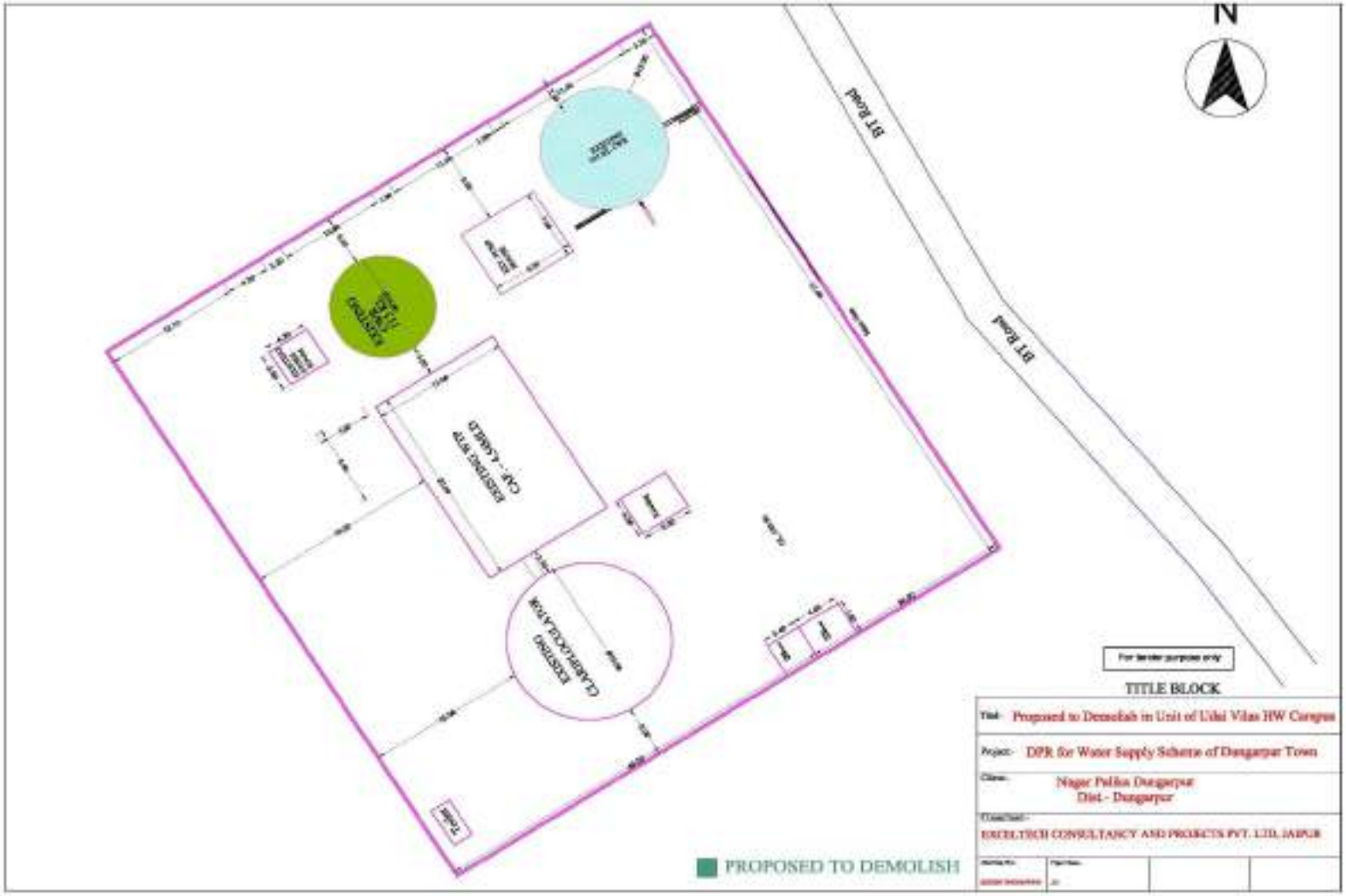
Component	Uday Vilash
Aeration Fountain	1
Flash Mixer	1
Flocculator	1
Clarifier -	1
Rapid Sand Filters and Filter House	
Filter Sand	2
Wash Water Tank	1
Wash Water Pumps	2
Air Blower	2
Chemical House	1
Solution tanks	3
Pure Water Sump and Sump House	
Capacity of sump – (CWR)	1
Pump House	1
Store House	1
Vacuum feed type Chlorinators	2

Process Flow Diagram of WTP at Uday Vilas PHED Headworks


L. L. P
cl2 Coagulant
Clari- Flocculator
cl2
S.G.T
H. L. P
F.M.
R.S.F
Collection Work
Treatment Work
E.T.
Distribution Work
-L.L.P.: Low Lift Pump
-F.M.: Flash Mixing & Distribution Tank
-R.S.F.: Rapid Sand Filter
-Cl2: Dosing of chlorine
-S.G.T.: Storage Ground Tank
-H.L.P.: High Lift Pump
-E.T.: Elevated Tank

View of Uday Vilas WTP

Exiting WTP Plant Component Layout Diagram


N
BT Road
BT Road
PROPOSED TO DEMOLISH
TITLE BLOCK
Proposed to Demolish in Unit of Udai Vilas HW Campus
DPR for Water Supply Scheme of Dungarpur Town
Nagar Palika Dungarpur
Dist - Dungarpur
EXCELTECH CONSULTANCY AND PROJECTS PVT. LTD, JAIPUR

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

Law, Rules, and Regulations	Description and Requirement	WTP at Uday Vilash PHED Headworks
		Y = compliant (if applicable, specify expiration date of permit/clearance) N = non-compliant34 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 Storage of is always less 10 tons
Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments	Consent to operate from RSPCB	N Currently no CTE and CTO are applied for WTP, CTE will be applied and taken before start of construction works and CTO before start of operation with new components
Air (Prevention and Control of Pollution) Act of 1981, Rules of 1982 and amendments.	Consent to operate from RSPCB	N For DG set Consent will be applied and taken before start of works
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.	No No source of waste except very quantity silt and clay.
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	No development activity is permitted in the "protected area," and all	N/A

[34]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 Uday Vilash PHED Headworks
		Y = compliant (if applicable, specify expiration date of permit/clearance) N = non-compliant34 N/A = not applicable (state justification)
Sites and Remains Rules of 1959	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.	
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 WTP is operated by PHED staff. No children are engaged.

Corrective Action Plan

In the existing 4.53 MLD WTP unit at Uday Vilash PHED Headworks no CTE and CTO were taken for both WTP plant and DG set under Air and Water Act, Therefore consent to establish and consent to operate will be taken from RSPCB.

Repair works and improvement of electromechanical works will also improve the treatment capacity of WTP.

Appendix 4: Source Sustainability Report of Dhungarpur Water Supply Scheme

Selection of water source. An alternative source analysis has been conducted to select a feasible and sustainable source of water supply to meet the ultimate design demand of Dungarpur town. Four alternatives which were studied are: (i) SKA (Som Kamla Amba Project (ii) Vijay Chakra Sagar (Dimiya) Dam and (iii) Edward Sagar and (iv) Ground Water. A proposal of drawing a collective supply from all four is finalized based on the techno-economic and environment considerations as elucidated below, letter of allocation of the four dams is at Figure 1,2 and 3.

OFFICE OF EXECUTIVE ENGINEER PHED DIVISION DUNGARPUR

S. NO. /EE/DPR/2021-22/ 1596 Date: 12-09-2021

Commissioner
Nagar Parishad
Dungarpur

Subject: Regarding implementation of reorganization of UWSS Dungarpur to be implemented through RUIDP

Reference: EE PHED Project Division II Udaipur dated 12.08.2021

In continuation of above referred letter provision of transfer of water from SomKamla Amba dam to UWSS Dungarpur has been modified is retrofitting proposal of 151 Villages of Blocks Aspur, Dovra and Dungarpur of District Dungarpur,In view of utilization of existing WTP's and already laid pipelines so that increased demand of rural sector may be meet out without change in transmission system.Details of provision are as under:

S.No	Name of surface source	Transfer of water		Quantity in MLD	Remarks
		From	To		
1	Edward Samand Dam	Edward Samand Dam	Bori WTP RWR	4.54	Capacity of Edward Samand Dam is 1 137 Mcft and annual raw water requirement is only 61 Mcft.Existing gravity line upto Bori WTP and Bori WTP to udaivilas WTP will be sufficient to carry water
2		Bori WTP RWR	Bori WTP	3.25	
3		Bori WTP RWR	Udaivilas WTP	1.29	
4	Dimiya Dam	Dimiya Dam	Udaivilas WTP	3.1	Capacity of Dimiya Dam is 44.87 Mcft and annual raw water requirement is 58 Mcft.Provision of 1 raising of dimiya dam by 1 mtr will enhance 14 Mcftwater.Existing pipeline of 200 mm Dr K-9 will be sufficient to carry water
5	Ground water			1.5	During summer if any deficient due to reduction in ground water may be supplemented by SKA system
	Total			9.14	

Fig. 1 Letter of Allocation

Particulars	Year 2022	Year 2037	Year 2052
Design Demand of UWSS Dungarpur @135 LPCD/10% institutional demand and 15% transmission and distribution losses	9.73	11.6	13.50
Less	9.14	9.14	9.14
Transfer from SKA System	0.59	2.46	4.36

Looking to above modifications following provisions to be taken in DPR being prepared by RUIDP:

- Provision of suitable Pump Machinery and Electric equipments needs to be taken up at Bori Head Works.
- Construction of 450 KL capacity RCC RWR at Bori Head Works under the provisions to be taken.
- Renovation/Upgradation of both WTP's.
- To increase the water supply production from Vijay Chakra Sagar (Deemiya) Dam by 1.0 meter has been proposed as per discussions held with WRD Department and an Estimate for Raising the height of Vijay Chakhra Sagar Dam by 1.0 meter has been framed by WRD Dungarpur for an Approx. cost of Rs 9.50 Crores. This works may be proposed to be got Executed by WRD under the budget head available with project PHED.
- Presently the intake Pump House for Pumping Raw Water from Deemiya Dam is in the back water of dam and as the water recedes in the dam during summer season, water is to be brought near the existing Pump House to be Pumped by the Centrifugal Submersible Pumpsets installed there in an approach channel which usually got silted up every year after monsoon season, proposed to extend as per design the existing 200mm Diameter Di K-9 Rising Pipe line near Pump House for the length of 2.0 KM above HFL on the bank of Surface water Source along the nearby hilly alignment and provision for construction of a suitable RCC Intake near the spillway section is proposed to get the maximum benefit in pumping the raw water during severe drought conditions.
- CWR at Chandpole in G&R campus along with pumping machinery.
- Existing Ground Water Resources may also be got dsilted and deepened as per requirement to increase the ground water source production on this scheme upto 1.50 MLD and this work maybe got included in the DPR.

Fig. 2 Letter of Allocation

Therefore you are requested to take necessary provisions in reorganization schemes to be implemented through RUIDP ,If any query consultant may be asked to this office and project officers.

Executive Engineer
PHED Division Dungarpur (Raj)

S. NO. 1596 - 1600 Date: 12.08.2021

Copy forwarded to

(1.) The Additional C.E. Project PHED Udaipur/Region Udaipur
(2.) The Superintending Engineer project PHED Circle Banswara/Circle Dungarpur.
(3.) Executive Engineer.PHED,Project Division II Udaipur
(4.) Executive Engineer,RUIDP ,Jaipur

Executive Engineer
PHED Division Dungarpur (Raj)

Fig. 3 Letter of Allocation

i. **Som Kamla Amba Scheme:** This is a scheme under PHED which proposes to take water from Som Kamla Amba Dam and supplies water to 151 villages and Dungarpur town itself. This project is under construction and the tentative date of completion is in December 2022.

   a) **Location:** The rising main of this scheme has already been laid and will supply water proposed for Dungarpur town at Bhogilal Pandya Circle.

   b) **Details of Dam: -** As per the report published by World Bank for Dam Rehabilitation and Improvement Project (Drip II). The construction of Som Kamla Amba Project across Som river, a tributary of Mahi river was completed in the year 2000. The dam is located in Ashpur Tehsil of Dungarpur District, Rajasthan to provide the Irrigation cum drinking water facilities. This dam supplies drinking water to the town with the capacity of 8.1 MCM., besides irrigation supply to 26998.6 ha of Gross Command Area (GCA) and 19155.42 ha of Culturable Command Area (CCA). **Fig. 4**

   c) **Location:** The dam is located at the coordinate 23°58'11.05"N and 73°58'56.77"E on Moran River.

   d) **Sustainability and environmental considerations of Som Kamla Amba Project: -**It is proposed to fulfil 4.36 MLD in the year 2055 and as this project is designed to fulfil the requirement of Dungarpur hence is it sustainable. Water Quality of the Dam has been evaluated from reports in **Fig 5** published by World Bank for Dam Rehabilitation and Improvement Project **(Drip II). DPR report summary provided by Chief Engineer (SP) PHED (Jaipur) is given below**

OFFICE OF THE CHIEF ENGINEER (SPECIAL PROJECTS)
PUBLIC HEALTH ENGINEERING DEPARTMENT RAJASTHAN
F – 18, New Building, I Floor, 2, CIVIL LINES - JAIPUR - 302006
0141-2220553 Fax -0141-2222585 email: rj_cesp@nic.in

No.: CE (SP)/ PHED/Dungarpur/ DPR /2018-19/ 2630-2631 Dated: 26.07.2018

Chief Engineer,
RUIDP
Jaipur

Sub: Regarding preparation of DPR of water supply based on Som Kamla Amba Dam for Dungarpur Town.

Ref: Your letter no. 4371 dated 02.02.2018

In reference to above matter and your referred letter, Please find enclosed a copy of DPR of water supply project of 151 villages of Aspur Dovra and Dungarpur block and Dungarpur town District Dungarpur form Som Kamla Amba Dam estimated cost Rs. 365 Crore. Cost distribution in rural area and urban area (Dungarpur town) under the project is enclosed in the DPR.

(B. Krishnan)
Chief Engineer (SP)
PHED, Jaipur

No.: CE (SP)/ PHED/tender/ Udaipur /2018-19/ 2630-2631 Dated: 26.07.2018

Copy to following for information :

1. P.S. to Principal Secretary, Government of Rajasthan, PHED, Jaipur

Chief Engineer (SP)
PHED, Jaipur

5.2.1 Water Demand Assessment

There are urban and rural areas in the project area, therefore parameters applicable for urban and rural sector are considered. According to the guidelines issued by the Chief Engineer (HQ) PHED, water supply of 135 litres per capita per day (lpcd) for Dungarpur town and 55 litres per capita per day (lpcd) for rural habitations are adopted. In addition 10% Provision for institutional & other demand is also taken for rural area.

The following parameters are used, as agreed by the department, to work out design water demand of the project:

For Rural area:

- Water loss through Water Treatment Plant : 3.0 %
- Water loss through transmission and cluster Pumping mains : 5.0%
- Water loss through distribution system : 10.0%

For Urban area:

- Unaccounted for water : 15.0%
- Transmission loss : 5.0%

Water available from Edward Samand Dam and Vijay Chakra Sagar dam for Dungarpur town is 3400 KLD. Water demand for 151 villages and 1 town (Dungarpur) to be benefitted under Project is worked out for urban and rural areas and tabulated below:

Table 5-5: Projected Water Demand for Urban & Rural areas of Project

S. N.	Sector	Type of water	Water Demand in KLD for the year		
			2021	2036	2051
1	Urban	Clear Water	5357.04	6675.10	8191.76
		Raw Water	5522.72	6881.55	8445.11
2	Rural	Clear Water	10264	14620.8	20826.3
		Raw Water	10580.45	15071.5	21468.5
3	Total requirement from Som Kamla Dam	Clear Water	15621.02	21295.91	29018.04
		Raw Water	16103.17	21953.06	29913.57

Clear water demand shown above includes institutional and distribution & transmission losses. Raw water demand includes filtration losses over the clear water demand. Urban and Rural population projection and water demand for 151 villages with their other habitations and Dungarpur town to be benefitted in the project is given in Volume-II: Annexures.

CHAPTER 6.0 PROJECT COMPONENTS

6.1 Water Source

As discussed earlier Som Kamla Amba Dam located in Aspur Block of Dungarpur district is adopted source of water for this project. Capacity of dam at F.T.L. of 213.50 m is 172.75 MCM (6102 MCF) and live capacity is 160.30 MCM (5661 MCF). There is 93.75% dependability for 47.22 MCM quantities on the basis of past 15 years record of storage of Som Kamla Amba Dam.

Total raw water requirement for 151 villages & 1 town covering Aspur, Dovra, and enroute Dungarpur Blocks shall be as given below:

Table 6-1: Project Phase wise coverage of villages & Town

Project Source	Coverage	Population for year		Raw Water Requirement for year 2051	
		2011	2051	ML/day	MCM/yr
SKAD	1 Town	47706	69337	8.19	2.99
	151 villages	180038	462482	20.82	7.60
	TOTAL	227744	531819	29.01	10.59

For Dungarpur town, availability of 3400 KLD clear water is ensured from Edward Samand Dam & Vijai Chakra Sagar dam. Raw water requirement corresponding to 3400 KLD shall be about 1.24 MCM per year which is decucted from the total requirement to arrive at net requirement from Som Kamla Amba Dam. Against the net raw water requirement of about 10.92 MCM per year for the above mentioned Blocks, with 93.75% dependability, 47.22 MCM quantities in the dam is available. Therefore Department decided to use Som Kamla Amba dam as sustainable surface water source for water supply projects for 151 villages & 1 town (Dungarpur) of above mentionec Blocks of Dungarpur district.

6.2 Design periods for various Components of Project

Design period etc. for various component of project, giver in Table below, are adopted as per CPHEEO manual and PHED guide lines.

Table 6-2: Design Period for Project Components

S. No.	Particulars	Design Period
1	Pumping Station- Civil Works	30 years
2	Pumping Machinery and allied equipment	15 years
3	Raw water & clear Water pumping main	30 years
4	Village Cluster Distribution Pipe lines	30 years
5	Clear water reservoir	2 hour storage capacity For the demand of design year 2051
6	Over Head Service Reservoir	Half day demand of design year 2051
7	Pumping Hours	20 hours

CHAPTER 6.0 PROJECT COMPONENTS

6.1 Water Source

As discussed earlier Som Kamla Amba Dam located in Aspur Block of Dungarpur district is adopted source of water for this project. Capacity of dam at F.T.L. of 213.50 m is 172.75 MCM (6102 MCF) and live capacity is 160.30 MCM (5661 MCF). There is 93.75% dependability for 47.22 MCM quantities on the basis of past 15 years record of storage of Som Kamla Amba Dam.

Total raw water requirement for 151 villages & 1 town covering Aspur, Dovra, and enroute Dungarpur Blocks shall be as given below:

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6	Over Head Service Reservoir	Half day demand of design year 2051
7	Pumping Hours	20 hours

6.3 Proposed Components under the Project

On the basis of Draft Report of the project submitted earlier, the following components are included in the project:

- Intake structure at Som Kamla Amba Dam
- Raw Water Pumping Main
- Water Treatment plant
- Transfer Pumping Stations & Transfer Pumping Mains
- Cluster Pumping Stations & Cluster Pumping Mains
- Over Head Service Reservoirs & Cluster Distribution System
- Village Distribution System
- SCADA
- IEC activity

Under this project 151 villages with their 244 other habitations of three blocks and one town namely Dungarpur of Dungarpur district shall be benefitted. Block wise breakup is as given below:

Table 6-3: Block wise coverage of Main & Other Habitations

S.N.	Block	Main Habitations	Other Habitations
1	Aspur	47	44
2	Dovra	88	163
3	Dungarpur	16	37
	Total	151	244

6.3.1 Intake Structure

Intake structure shall be constructed on upstream of dam at a location so to draw water from dam from the lowest available level. On right side of dam, there exists sluice gate arrangement to take water in a canal constructed for irrigation purpose. As per data provided by WRD, sill level of sluice arrangement is 200.50 m and top bank Level (TBL) of dam is 217.50 m. However, as per contour plan of the upstream side of the dam provided by the department vide letter no. 687 dated 26.12.16, the lowest level is 193 m. Therefore as desired by the department lowest level of 193 m has been adopted for the purpose of design of pumps etc.

Looking to total water demand of project, it is considered appropriate to provide Jetty type intake structure in the reservoir of dam with suspended pump set. Drawing showing general arrangement of intake structure and raw water pump sets is enclosed. Following are the levels proposed for different stages of intake structure.

Table 6-4: Levels proposed for different stages of intake structure

1	Top Bank Level of Dam	217.50 m
2	F.T.L. of Dam	213.50 m
3	Sill level of Dam	200.50 m
4	Lowest level on upstream side of dam	193.00 m
5	Maximum Water Depth	20.50 m
6	Top level of Intake structure	217.50 m

6.3.2 Raw Water Pumps

Raw water pumps shall be installed at intake structure for water demand for 151 villages and one town. In this project, pumps are proposed for the demand of design year 2036 whereas electrical and instrumentation components are proposed for water demand for the year 2051. A transmission loss @ 5%, distribution losses @ 10%, institutional demand @ 10% has been added for working out clear water demand. For working out raw water requirement, filtration loss @ 3% has been included in clear water requirement and accordingly capacities of pumps for raw water pumping station are finalized. Clear & raw water demand for the year 2036 and 2051 are as given below:

Table 6-5: Clear & Raw Water Demand

Clear water demand (KLD)		Raw water Demand (KLD)	
2036	2051	2036	2051
21295.91	29018.04	21953.06	29913.57

There can be choice of three types of pumps for lifting raw water from dam i.e. HSC centrifugal (HSC) pump, Vertical Turbine (VT) pumps and Submerged Centrifugal (SubCF) pumps. For installation of HSC pumps, large and heavy structure below ground due to positive head requirement and to lift water from the lowest level shall be required therefore use of HSC pumps is ruled out. Comparison between VT and Submerged CF pumps is made below on the basis of available details:

Table 6-6: Comparison of VT and Sub CF pumps

S.N.	Particulars	VT Pump	Sub CF Pump
1	App. Cost of M/C with allied ancillaries	Rs 25000 - 27000 per HP	Rs 24500 - 27500 per HP
2	Required civil structure	Large & Heavy structure	Relatively light Structure
3	Reduction in efficiency	10 to 20% reduction in efficiency after 5 to10 years of operation	5 to 10% reduction in efficiency in 5 to 10 years of operation
4	Ease of repair within pump house	Possible but very time taking & cumbersome	Possible & less time taking
5	% reliability in operation	Moderate (85 to 90%)	High (95 to 99%)
6	Maintenance	Re-lubrication after 500-3000 running hrs, gland tighting & re-alignment is required	Only re-lubrication after 40000-75000 running hrs required

Looking to above comparison, it is proposed to install submerged centrifugal pumps. Two working pump sets and one standby pump set are proposed to be installed looking to quantity of water to be pumped. With 20 hrs of pumping in a day, sub CF pump sets each of 152.45 lps or 548.82 cum per hour at 33 m head for the design year 2036 are proposed.

6.3.3 Raw Water Pumping Main

The WTP shall be constructed at main Head Works, proposed to be developed behind existing treatment plant. Clear Water Reservoir and clear water pump station etc shall also be housed along with WTP at this Head Works. Raw water pipe line of 600 mm DI K-7 about 850 m in length from intake structure to WTP to meet the water demand for the design year 2051 is proposed to be laid.

6.3.4 Water Treatment Plant

Conventional type rapid gravity water treatment plant is proposed at main Head Works where land identified by PHED. The plant shall have modular design for future expansion. In this project, it is proposed to construct a treatment plant for the intermediate water demand of year 2036, which will be upgraded to the demand for the year 2051 with addition of clari-flocculator and filter beds. However, inlet channel and other civil works shall be constructed to meet water demand of year 2051. Clear water demand for the year 2036 & 2051 is given in table - 6.4

The filtration process will involve Pre-chlorination, Rapid Mixing of Chemicals, Clari-flocculation, Filtration and Post Chlorination. The power driven valves and the inlet gates are proposed to be operated from individual control consoles positioned adjacent to each filter house in the operation gallery with visibility to respective filter bed. There will be mimic & LED display system on the water treatment plant control panel indicating status of various motors, pumps, and compressors. The various system parameters e.g. levels, pressures, flow are also proposed to be displayed digitally on control panel.

For instrumentation, Ultrasonic Channel type flow meters are proposed in inlet channel & at outlet of each filter bed. Level switches for alarm for high head loss across filter & overflow conditions are proposed. Flow control system for chlorine is proposed as vacuum feed type, with vacuum chlorinator, Chlorine detection system and alarms are also proposed in chlorination chamber and chlorine yard.

Also, the provision for suitable water testing laboratory with adequate manpower is proposed to carry out daily testing for various parameters of treated water.

The plant will operate for 20 hours per day and will deliver required quality and quantity of treated water. Recirculation of back wash water has been proposed to reduce filtration losses. It is envisaged that treatment plant losses will be about 3%. Sludge disposal has been proposed either through sludge drying beds or sludge lagoons. The location of treatment plant shall be in the rural area; therefore disposal of sludge shall not be a problem and may be done in environment friendly manner.

In beginning WTP of 21.29 MLD is proposed to meet the water demand of year 2036. It shall be upgraded to 29.01 MLD in future. Since WTP shall run for 24 hours in a day therefore WTP shall be of 887.07 cum per hour capacity in the beginning and shall be upgraded to 1208.73 cum per hour capacity in future.

6.3.5 Transmission System

Under this project 151 villages of Aspur, Dovra and enroute Dungarpur block and Dungarpur town are envisaged to be benefitted from surface water of Som Kamla Amba Dam. Land required for construction of water treatment plant, pump station etc has been identified by PHED near existing headwork's which is about 850 m from the dam. After treatment of raw water, clear water shall be stored in clear water reservoir and then it shall be pumped to TPSs and CPSs through transfer mains.

Water from main Head Works shall be pumped from TPS-1 in two directions. Supply of water from TPS-1 shall be towards East side for 31 MHs and 28 OHs of Aspur Block (Zone-A) and towards West side for remaining villages of 50 clusters i.e. 120 MHs and 216 OHs (Zone-B). Area towards East is low lying area with respect to location of Main Head Works, housing WTP and TPS-1.

ZONE-A:

Looking to topography of Zone-A, two following alternatives of transmission system is considered:

Alternative-1:

In this alternative, water shall be transferred from TPS-1 to cluster pump stations namely CPS-1 (near Dhanela) and CPS-2 (near Punjpur). From CPS-1, water shall be pumped in to six OHSRs of clusters A/CL-02; A/CL-07; A/CL-08; A/CL-10; A/CL-13 & A/CL-15 to feed water to 17 MHs and 21 OHs of Aspur Block. From CPS-2, water shall be pumped to six OHSRs of clusters A/CL-01; A/CL-03; A/CL-11; A/CL-12; A/CL-16 & A/CL-18 to feed water to 14 MHs and 07 OHs of Aspur Block. Design of transfer and cluster pumping mains are given in Volume-II: Annexures. Schematic diagram for Alternative-1 is attached.

Alternative-2:

Looking to low lying area in this direction, it is proposed to pump water in to elevated balancing reservoir to be constructed on a nearby hillock adjacent to already existing balancing reservoir of a project benefitting 61 villages. From the balancing reservoir, OHSRs of all the 12 clusters as mentioned in Alternative-1, shall be fed under gravity. Design of transfer pumping main from TPS-1 to cluster balancing reservoir and design of gravity system are given in Volume-II: Annexures. Capacity of balancing reservoir is adopted as 4 hrs pumping for the the total water demand for the year 2051. Schematic diagram for Alternative-2 is attached.

Cost Comparision of Alternative-1 & 2:

Cost of both alternatives is compared as per details given below on the basis of Volume II: Annexures.

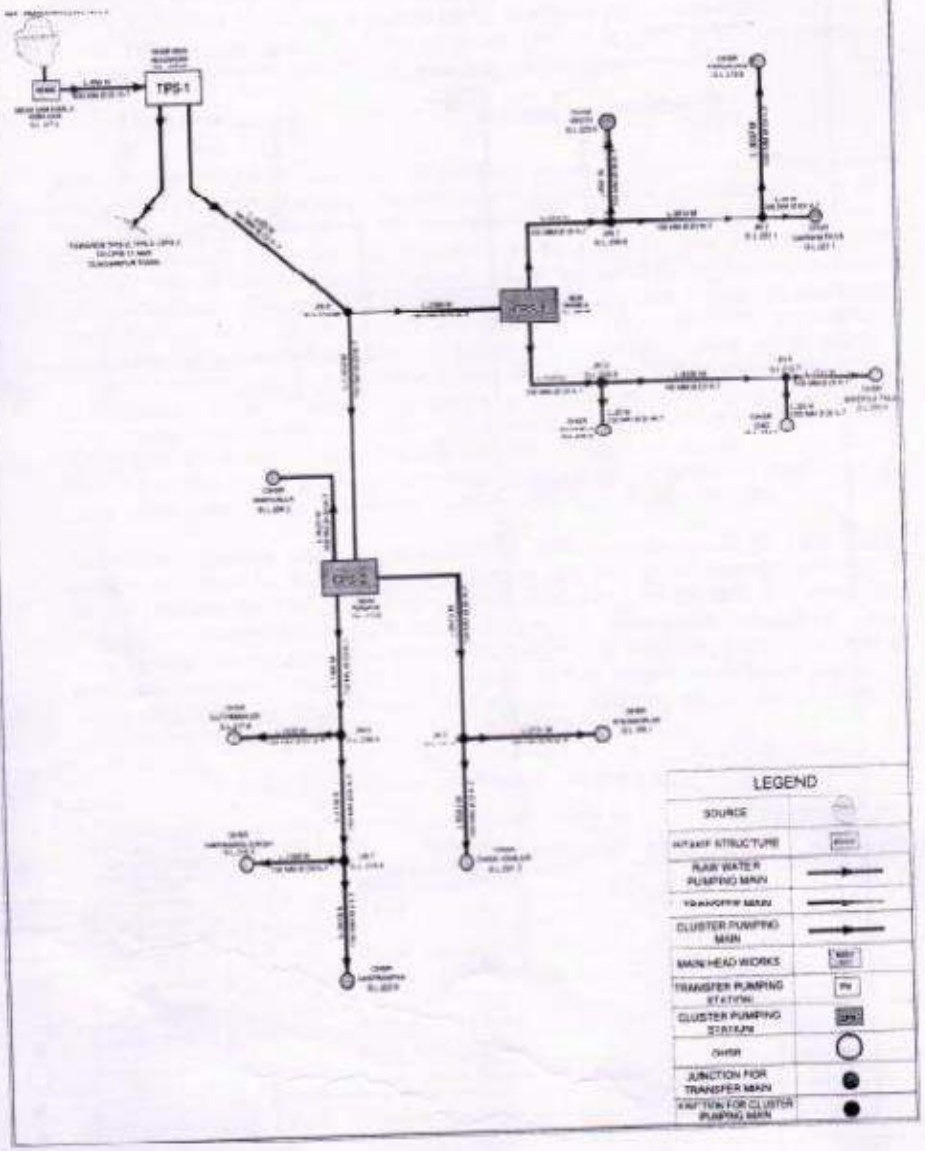
S.N.	Description	Cost in Rs. Crore for	
		Alternative-1	Alternative-2
1	Total length of Pipe Line (KM)	63.186 KM	58.838 KM
2	Cost of Pipes	8.79	9.07
3	Earthwork for laying of pipe lines	1.68	1.65

S.N.	Description	Cost in Rs. Crore for	
		Alternative-1	Alternative-2
4	Cost of civil works, EMI etc for TPS-1, CPS-1 & CPS-2	4.74	0.82
5	Cost of CWRs of 175 Kl & 125 Kl capacity for CPS-1 & CPS-2 resp.	0.15	0.00
6	Cost of elevated balancing reservoir of 600 KL with 18 m stagging	0.00	1.08
7	Cost of 11 KV power feeder line for CPS-1 & CPS-2	0.82	0.00
8	Capatalized Energy Charges	1.83	1.62
	TOTAL	**18.01**	**14.24**

It is evident from the total cost of alternatives that Alternative-2 i.e. feeding OHSRs for12 clusters of Zone-A through a balancing reservoir, is economical in comparision to Alternative-1 i.e. feeding 12 OHSRs through puming from CPS-1 & CPS-2. It is therefore proposed to adopt Alternative-2 for Zone-A.

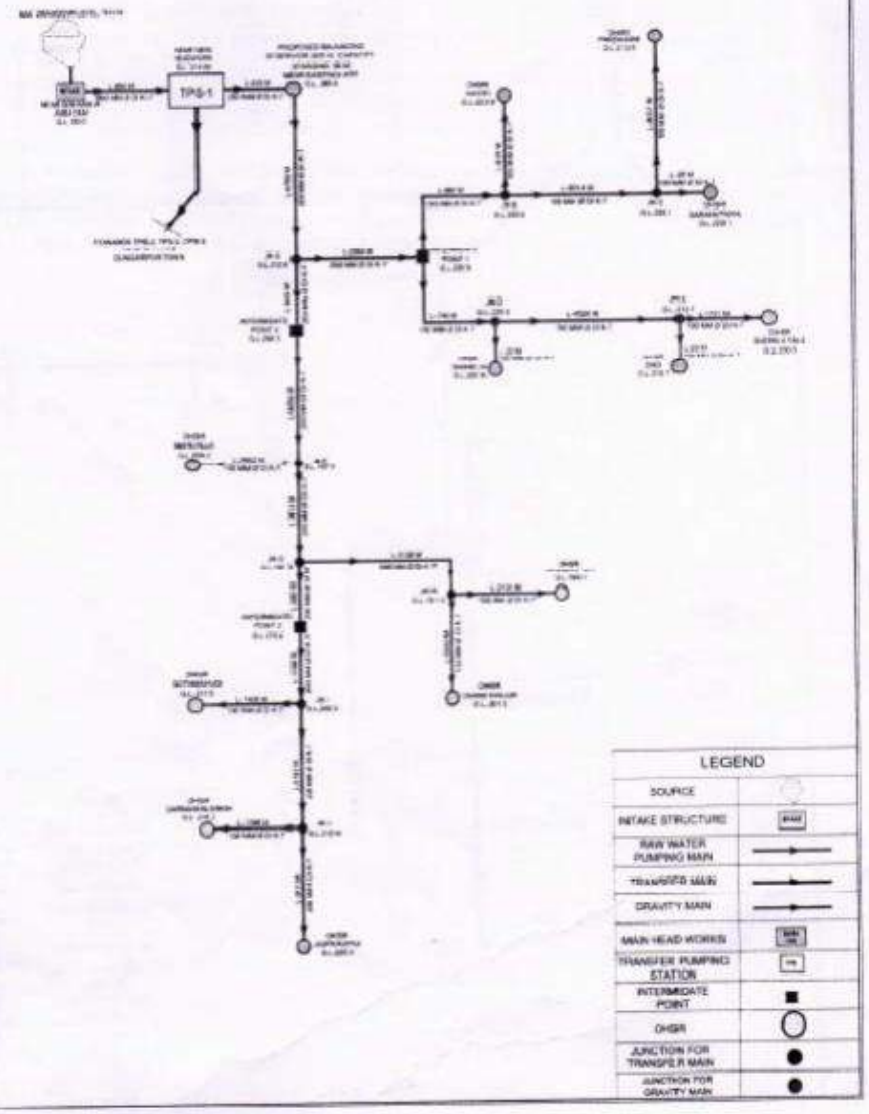
ALTERNATE – 1 : SCHEMATIC DIAGRAM FOR PUMPING THROUGH CPS-1 AND CPS-2

PLATE - 1



ALTERNATE - 2 : SCHEMATIC DIAGRAM FOR GRAVITY SYSTEM IN PLACE OF CPS-1 & CPS-2

PLATE - 2



ZONE-B:
From TPS-1, water shall be transferred for remaining part of project area and Dungarpur Town on West side under Zone-B. Water shall be pumped to TPS-2 near Bachariya village towards Dungarpur town with intermediate tapping near Dhatana village for CPS-3. The campus for TPS-2 is clubbed with CPS-4 and the water from TPS-2 is pumped to TPS-3 near Kherakhas with intermediate tappings for CPS-5, CPS-6, CPS-7 and CPS-8. Pump station CPS-9 is also located in the campus of TPS-3. From TPS-3 water shall be transferred to CPS-10 & CPS-11 and to CWRs of Chandpole P.S., New Colony P.S. & Main P.S. for Dungarpur town.

6.3.6 Clear Water Reservoirs

Clear water reservoirs shall be constructed at each transfer & cluster pump stations to facilitate pumping. Capacity of each reservoir is provided equal to two hours pumping as per norms of the deparment. Under this project there are in all 12 pump stations which includes 9 cluster pumping stations and 3 transfer pump stations. Out of these, TPS-2 and CPS-4 shall be combined pump stations and shall be located near village Bachariya. Similarly TPS-3 and CPS-9 shall be combined pump stations and shall be located near village Kherakhas. Normally two units of CWRs are provided to facilitate its cleaning without disturbing water supply. Therefore rectangular with partition / two circular (separate or concentric) CWRs are proposed at each transfer / cluster pump station. However size and shape etc may change as per availability of land for pump stations. At TPS-2 and TPS-3 where CPS-4 and CPS-9 shall also be housed, one unit of CWR for cluster pump stations shall be provided and piping arrangement shall be made in such a way so as to draw water from CWR of TPS during cleaning operation of CWR for CPS.

In general, separate CWRs for TPS and CPS shall be constructed for each pump station. Objective to propose separate CWR for CPS is to do chlorination if required before pumping into OHSRs whereas it is not needed in CWR for TPS. It is envisaged that before pumping water into OHSRs quantity of chlorination should be made good in water to required level if it is consumed while travelling from TPS. At first stage adequate chlorination shall be done at WTP located in Main Head Works. A detail of CWRs is given in Volume-II: Annexures. However capacities of CWRs is given below:

Table 6-7: Details of clear water reservoirs

S. No.	P.S.	Location	Type	Total Capacity (KL)
1	TPS-1	Main Head Works	Rectangular	3000
4	CPS-3	Near Dhatana	Circular	125
5	TPS-2	Near Bachariya	Rectangular	2500
6	CPS-4		Circular	150
7	CPS-5	Near Odwadiya	Circular	125
8	CPS-6	Near Phooti Talai	Circular concentric	300
9	CPS-7	Near Vada Punali	Circular	250
10	CPS-8	Near Madi Fala	Circular concentric	300
11	TPS-3	Near Kherakhas	Circular	1300
12	CPS-9		Circular	175
13	CPS-10	Near Teezwar	Circular	250
14	CPS-11	Near Toraniya	Circular	200
			TOTAL	**8675**

6.3.7 Pump Stations

Civil works and EMI except pump sets of pump stations will be constructed/ provided for the requirement of design year of 2051. Pump sets shall be installed for the demand of the year 2036 with 20 hours of pumping in a day. There are 3 transfer pump stations and 9 cluster pump stations proposed in this project. Pump details are given in Volume-II: Annexures; however brief details are given below:

Table 6-8: Pump Station wise Kilowatt requirement

S. N.	Pumping Station	No. of Pump Sets		Kilowatt Requirement	
		Working	Standby	Total Working	Total including Standby
1	Intake	2	2	150.0	300.0
2	TPS-1	3	3	301.0	602.0
3	TPS-2	2	2	264.0	528.0
4	TPS-3	2	2	180.00	360.00
5	CPS-3	2	2	16.5	33.0
6	CPS-4	1	1	18.5	37.0
7	CPS-5	2	2	22.5	45.0
8	CPS-6	2	2	33.5	67.0
9	CPS-7	3	3	29.5	59.0
10	CPS-8	3	3	31.5	63.0
11	CPS-9	2	2	27.5	55.0
12	CPS-10	2	2	20.5	41.0
13	CPS-11	2	2	24.0	48.0
	Total	**28**	**28**	**1119**	**2238**

6.3.8 Transfer Pumping Mains

Economical analysis of transfer pumping mains has been carried out with modified Hazen-Williams formula for 20 hour pumping based on consideration of annual energy charges and investment on capital charges with 10% interest rate on capital investment. MS/DI pipes have been adopted as per department policy of pipes for water supply projects.

Where sufficient ground slopes are available, pipe line has been designed as gravity transfer mains. A detail of transfer pumping / gravity mains is given below:

Table 6-9: Details of Transfer Pumping Mains

S. No.	Size (mm)	Length of pipeline (KM)		Total Length KM
		MS	DI K-7	
1	100	0	25.596	25.596
2	150	0	15.84	15.84
3	200	0	27.999	27.999
4	250	0	17.089	17.089
5	350	0	5.885	5.885
6	400	0	3.889	3.889
7	450	0	4.023	4.023
8	500	0	5.862	5.862
9	600	6.83	0	6.83
10	650	18.204	0	18.204

6.3.9 Cluster Pumping Mains

Economical analysis of cluster pumping mains has been carried out with modified Hazen-Williams formula for 20 hour pumping based on consideration of annual energy charges and investment on capital charges with 10% interest rate on capital investment. DI pipes have been adopted as per department policy of pipes for water supply projects.

Where sufficient ground slopes are available, pipe line has been designed as gravity transmission mains. A detail of Cluster pumping / gravity mains is given below:

Table 6-10: Details of Cluster Pumping Mains

S. No.	Size (mm)	Type of pipe	Length of DI pipe of class		Total Length in KM
			K-7	K-9	
1	100	DI	78.399	2.222	80.621
2	150	DI	67.857	1.036	68.893
3	200	DI	3.489	0	3.489
TOTAL			149.745	3.258	153.003

6.3.10 Village Clusters

151 villages along with their 244 other habitations of Aspur, Dovra and Dungarpur Blocks of Dungarpur district are envisaged to be benefitted under this project. On the basis of topography of the area, available route between villages, ground level etc., number of main & other habitations are clubbed into a group to form a cluster. It is proposed to construct one centrally located 'Over Head Service Reservoir' (OHSR) in a cluster as far as possible and to connect habitations of that cluster with OHSR through pipe lines. Efforts are made to keep all habitations of a Gram Panchayat in one cluster; however deviation is made where it is not techno-economically feasible to do so. A 'Village Transfer Chamber' (VTC) shall be constructed outside the habitation where a control valve and meter shall be installed. Efforts are made to provide one VTC for main & other habitations of a village however if it is not possible to do so due to layout of habitations, two or more VTCs are provided for one village & its other habitations. OHSRs of clusters shall be filled through cluster pumping mains from cluster pumping stations. Details of clusters are given in Volume-II; Annexures. There are 62 clusters covering 151 main habitations and 244 other habitations.

6.3.11 Cluster Distribution Mains

As per policy for selection of pipes for water asupply Schemes / projects of PHED Rajasthan issued vide circular: RWSSMB/2015-16/2 by Technical Member, RWSSMB, Jaipur, MS/DI pipes are recommended in rocky/non rocky strata for distribution mains of diameter more than 200 mm and for diameter up to 200 m, DI pipes are recommended in rocky strata and HDPE/DI pipes in non rocky strata. Pratapgarh, Arnod and Peepalkhoont Blocks of Pratapgarh district is a hilly area and strata in general are rocky. Selection of pipe for distribution mains in this area was discussed with project authorities of the department and they were of the view to adopt DI pipes looking to strata conditions in ongoing projects.Therefore DI pipes are adopted for distribution mains as per pipe policy of the department to connect

VTCs of habitations with respective OHSRs. Minimum size of DI pipe line is kept as 100 mm as per guide lines of the department. Pressure reducing valves/Orifice plates shall be installed at suitable locations to reduce pressure wherever residual pressures are more than 22 m. Cluster distribution pipe lines have been designed for the water demand of year 2051 including 10% distribution water loss. Total cluster distribution pipe lines proposed under this project are:

Table 6-11: Details of Cluster Distribution

S.No.	Nominal Dia of pipe(mm)	Cluster distribution DI K-7 pipe line (KM) for Total
1	100	263.565
2	150	62.994
3	200	0.957
4	250	1.835
Total		329.351

6.3.12 Over Head Service Reservoir

RCC OHSR for each cluster has been proposed at a location from where water can be supplied to all the habitations of that cluster up to VTC through cluster distribution pipe lines. Capacity of a service reservoir is proposed 50% of design water demand i.e. total design water demand for the year 2051 of all the villages of that cluster. Staging of OHSR is proposed to be kept minimum 18 m to obtain at least 7 m residual head at highest level of habitations. In all 62 clusters are proposed in the project area of this project. Generally one OHSR is proposed in one cluster but more than one may also be proposed looking to topography of area.

There shall be total 62 New OHSRs of the following capacity in this project.

Table-6-13: Details of Proposed Overhead Service Reservoirs

S.No.	Capacity (KL)	No. of OHSR of Stagging		
		18 m	20 m	22 m
1	100 KL	22	0	0
2	150 KL	9	1	1
3	200 KL	11	2	1
4	250 KL	9	0	2
5	300 KL	3	0	0
6	350 KL	0	0	0
7	400 KL	0	1	0
8	Balancing Reservoir of 600 KL	1	0	0
Total		55	4	4

6.3.13 Village Distribution

Habitations having population upto 4000 as per 2011 census shall be fed through Public Stand posts as per policy of the department. However as per scope of consultancy assignment village distribution design is required to be done for villages having population 3000 or more as per 2011 census. There are 8 villages having population of 3000 or more namely Vagdari, Falonj, Mandawa, Vallota, Pagara, Vassi Pal, Damdi & Pal Kolkhanda. Village distribution design has been done for these villages and appended with project.

For the purpose of quantity estimation for village distribution for the villages having population less than 3000, three habitations in each of two categories of population i.e. 0 to 1000 & 1001 to 2000 and only one available habitation in the category of population 2001 to 3000 were selected from 151 main habitations of Dungarpur district and village distribution designs are done to work out average quantity of pipes required in each category of population. According to these sample calculations, total quantity of pipes required for all habitations of this project has been assessed. In general in villages HDPE Grade 80 PN 6 pipes are proposed to be laid. Along the main road of other habitations DI pipes are being provided. PSPs and cattle water troughs (CWT) shall be placed at locations in consultation with the water health committees of the village. At each PSP a platform and a soak pit shall be constructed.

Dungarpur district being tribal area, provision of one public stand post for 100 persons and cattle water trough for 250 persons as per design population for the year 2036 has been taken for estimation purpose. Provision of pipelines made for village distribution is as given below:

Table 6-12: Details of Village distribution

S.No.	Dia. of HDPE Grade 80 PN 6 pipe (mm)	Pipe Length (KM) for		
		M.H	O.H.	Total
1	90	142.959	212.030	354.989
TOTAL		142.959	212.030	354.989
S.No.	Dia. of DI K-7	Pipe Length (KM) for		
1	100	52.117	65.851	117.968
2	150	0.315	0.315	0.630
		52.432	66.166	118.598

There are 8 villages having population of 3000 or more namely Vagdari, Falonj, Mandawa, Vallota, Pagara, Vassi Pal, Damdi & Pal Kolkhanda. It is estimated that about 40% of design population (for year 2036) may not afford to take house connections and may like to take water from PSPs for domestic purpose and use CWTs for their cattles and remaining 60% of design population may take house connections. Break-up of population and household connections for these eight villages is as given below:

Table 6-13: Details of PSPs & Connections in Habitations having 3000 plus Population

Habitation	Pop. As per census 2011			Design population of MH for yr. 2036 served with		No. of Household in Main Habitations for yr. 2011 as per Census		No. of Households in Main Habitations for design yr.2036 served with	
	MH	OH	Total	PSPs	Connections	Total	MH	PSPs	Connections
DAMDI	1780	2476	4256	1284	1926	862	361	13	390
FALONJ	1419	1865	3284	1024	1535	669	289	11	313
VAGDARI	2987	276	3263	2155	3232	618	566	22	612
MANDAWA	1509	1997	3506	1088	1633	660	284	11	307
KHANDA	1867	2916	4783	1347	2020	886	346	14	374
VALLOTA	960	2230	3190	692	1039	651	196	7	212
VASSI PAL	644	2483	3127	464	697	595	123	5	133
PAGARA	1486	1671	3157	1072	1608	623	293	11	317

Provision in the estimates of these eight villages has been taken for PSPs & CWTs and house connections. Provision for water meter for individual house is not taken in the estimate. VTC shall be provided at the entry point of habitations and VWSSC shall be responsible to make payment of water charges as meter installed in VTC.

VWSSC shall make suitable arrangement for collection of water charges from habitants using PSPs and house connections.

Provision of one public stand post for 100 persons and cattle water trough for 250 persons as per design population for the year 2036 has been taken for estimation purpose. Total number of PSPs and CWTs so worked out for the project are as given below:

Table 6-14: Details of PSPs & CWTs

S.N.	Description	PSP	CWT
1	Main Habitations	1932	813
2	Other Habitations	1388	626
	Total	**3320**	**1439**

6.4 Soil Investigation

Soil investigation wok was awarded to M/s Hydrominiviron Consultancy (P) Ltd, Jaipur by the consultant as per provision in the agreement. 50 points were selected for borc log & soil resistivity upto a depth of 3.0 m along the alignment of main transmission pipe lines at an interval of about 5 KM.

On the basis of soil investigation report submitted by M/s Hydrominiviron Consultancy (P) Ltd, Jaipur, soil resitivity for 35 locations points is found more than 100 Ω-m, and for 9 locations points soil resistivity is found in the range of 50-100 Ω-m and remaining 6 locations points soil resistivity is found in the range of 20-50 Ω-m which is safe. On the basis of bore logs of different locations, selection of type of pipe for rocky & non rocky strata is made as pipe policy of the department.

Detailed soil investigation report is provided as Appendix-1.

6.5 Dedicated Power Feeder

To ensure regular and uninterrupted power supply, it is proposed to connect each pumping station with 11 KV dedicated power feeder from the nearest available 33/11 KV GSS. Direct Power Feeders of 11 KV are proposed from nearest 33/11 KV GSS or extension from existing 11 KV power lines for respective cluster pumping stations. The power availability has been taken as 20 hours for design of all the Operating Units.

Brief details are given below in a table.

Table 6-15: Details for Power Feeder

S. N.	PS Number	Location of PS	Nearest GSS	Approx. Distance	Type of Sub Station
1	TPS1	Main Headworks/ Aspur	Aspur	2.5 Km	33/11 KV
2	CPS3	Dhatana/Aspur	Indora	3 Km	33/11 KV
3	TPS2/CPS4	Bachariya/Dovra	Hathai	2 Km	33/11 KV
4	CPS5	Orwariya/Dovra	Vassi Pal	6.5 Km	33/11 KV
5	CPS6	Phootitalai/Dovra	Hathai	3 Km	33/11 KV
6	CPS7	Vada Punali/Dovra	Punali GSS	2 Km	33/11 KV
7	CPS8	Madifala/Dovra	Damri	5 Km	33/11 KV

e) **Distance from STP**

STP of 4 MLD is proposed at Do River, Udaipur Road which is 28 km away from Som kamla Amba Dam. MSL of Proposed STP site and Somkamla Amba Dam are 267m and 213 respectively.

Project	**Som Kamla Amba Project**
River	Som river, a tributary of Mahi
Lat/Long	23^0 58' 00"/ 74^0 02' 00"
GCA	26998.60 ha
CCA	19155.42 ha
Annual water supply	8.01 MCM
Catchment Area	5376 sq km
Main Dam	
Type	Earthen Dam
Length	620 m
Top elevation	217.50 m
Height of dam above lowest river bed level	27 m
Lowest river bed level	190.5 m
Spillway	
Type	Ogee spillway
Length	244 m
Location of spillway	Central spillway
Crest level	335.40 m
Number of bays	13
Discharge capacity at MWL	20045 cumec
Size of spillway gate	15 m wide and 12.885 m high
Reservoir	
Maximum water level	215.50 m
Full Reservoir Level	33.50 m
MDDL	200.50 m
Live storage	160.30 MCM
Gross storage	172.80 MCM
Reservoir spread area	36.18 sq km
Year of start of construction	1977
Date of completion	1992
Year of first impoundment	2004

Fig. 4 Details of Som Kamla Amba Dam

Ambient Air Quality and Noise

Site-specific data of ambient air quality and sound levels at project site is not available. However, general observation is made during site visit that area is free from air and noise pollution. This is substantiated by the fact that the dam is away from habitation, traffic and industries and that there are no anthropogenic sources of air/noise pollution in the vicinity. Therefore, ambient air is clean and sound levels are observed low. They are expected to be well within the prescribed limits.

Water Quality

Water quality data of Som Kamla Amba reservoir was taken from "Ecology and Fisheries of selected Reservoirs of Southern Rajasthan", a study by Sharma, V. K. and Kushal, D. K. of Central Inland Fisheries Research Institute (ICAR) Kolkata. Bull No. 138. Water in Som Kamla Amba reservoir remains clear imparting a greenish tinge. The water temperature varied from 17 in winter to 28°C in post-monsoon. The alkaline water (PH 7.4) is favorable for fish growth. Dissolved oxygen varied from 6.0 to 8.4 mg/l. Assessment of the productivity based on total alkalinity (122 mg/l) reflected the water body fairly productive. Calcium content of water ranged between 27 and 30 mg/l. Magnesium concentration was of high range (8.4-21.6 mg/l). Chloride values fluctuated from 10.0 to 18.0 mg/l. Higher values of specific conductance (601 µMho/cm) supported the eutrophic character of the reservoir. **Table 3.1** give water quality data.

Table 3.1: Water Quality of Som Kamla Amba Reservoir

Depth (in m)		Surface	2	4	6	8
Water Temperature (deg C)	Summer	25.5	-	-	-	-
	Post Monsoon	28	27.5	27	26.3	26
	Winter	17	16.5	16.4	16	-
pH	Summer	8.12	-	-	-	-
	Post Monsoon	7.69	830	735	7.94	7.95
	Winter	6.49	6.52	6.59	6.61	-
DO (ppm)	Summer	8	-	-	-	-
	Post Monsoon	8.4	8	6	5.6	5.2
	Winter	6	5.6	5.6	52	-
Total alkalinity (ppm)	Summer	205.8	-	-	-	-
	Post Monsoon	86	90	90	92	96
	Winter	95	1032	117.6	133.8	-
Conductivity (micro-mhos/cm)	Summer	881	-	-	-	-
	Post Monsoon	429	414	412	411	402
	Winter	494	495	502	505	-

Natural Hazards

Potential of natural hazards such as flooding and earthquake is not significant. Project is designed for a design flood value of 20500 cumec, revised design flood has been worked as 21767 cumec by CWC i.e. a nominal 6.18% increase. Project falls in earthquake zone II, there is no revision and dam design has taken care of this aspect as well. Bureau of Indian Standards [IS 1893 (Part I):2002], has grouped the country into four seismic zones, viz. Zone II, III, IV and V. Zone II is the least active and Zone V is the most active.

Source: World Bank for Dam Rehabilitation and Improvement Project (Drip II)

Fig 5: - Water Quality Report of Som Kamla Amba Reservoir

ii. Vijay Chakra Sagar Dam: Situated near Dimiya village, Dungarpur and this dam comes under control of WRD. This dam is used for raw water source for urban water supply in Dungarpur. The dam is not used of irrigation purposes at all.

d) **Location:** The dam is located at the coordinate 23°46'44.82"N and 73°46'5.69"E on Moran River.

e) **Selection of Site:** Presently the existing intake well for pumping raw water from Dimiya dam is in back water of dam, during the summer season water is to be brought near

existing pump house by the centrifugal submersible pumps. So in order to get the maximum benefit in pumping the raw water during severe drought conditions a new intake well is proposed near the spillway section of the Vijay Chakra Sagar dam (Dimiya dam).

f) **Gauge level of Dam**

Since the construction of the Dimiya dam PHED has continuously maintained the daily water level and storage capacity details of the same are as follows: -

Table-1 Gauge Details of VIJAY CHAKRA SAGAR (DIMIYA) DAM					
S.no.	Year	Gauge of Dam	Filling of Dam	Vol. of Dam	Remark
1	2010	29 Feet	29 Feet	40 McFt	Full
2	2011	29 Feet	29 Feet	40 McFt	Full
3	2012	29 Feet	29 Feet	40 McFt	Full
4	2013	29 Feet	29 Feet	40 McFt	Full
5	2014	29 Feet	29 Feet	40 McFt	Full
6	2015	29 Feet	29 Feet	40 McFt	Full
7	2016	29 Feet	29 Feet	40 McFt	Full
8	2017	29 Feet	29 Feet	40 McFt	Full
9	2018	29 Feet	29 Feet	40 McFt	Full
10	2019	29 Feet	29 Feet	40 McFt	Full
11	2020	29 Feet	29 Feet	40 McFt	Full
12	2021	29 Feet	29 Feet	40 McFt	Full

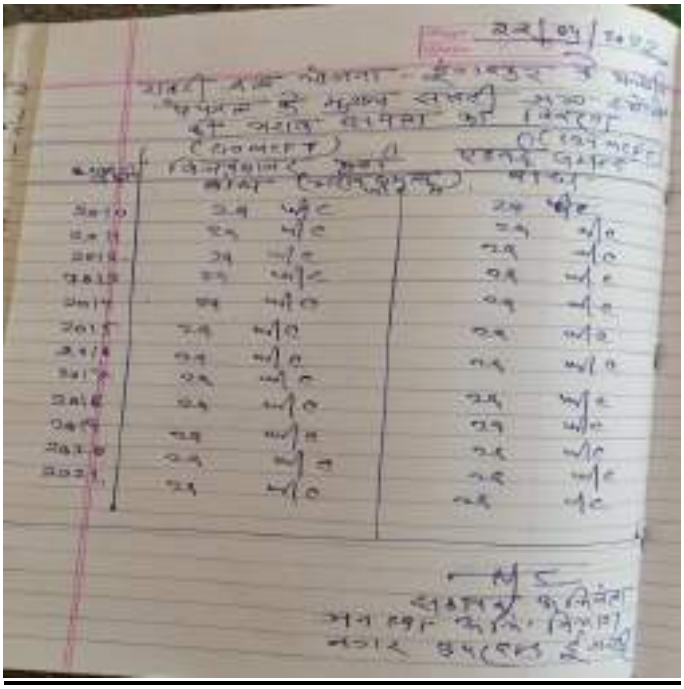


Fig. 6 Gauge Details of Vijay Chakra Sagar (Dimiya) Dam

g) **Distance from STP**

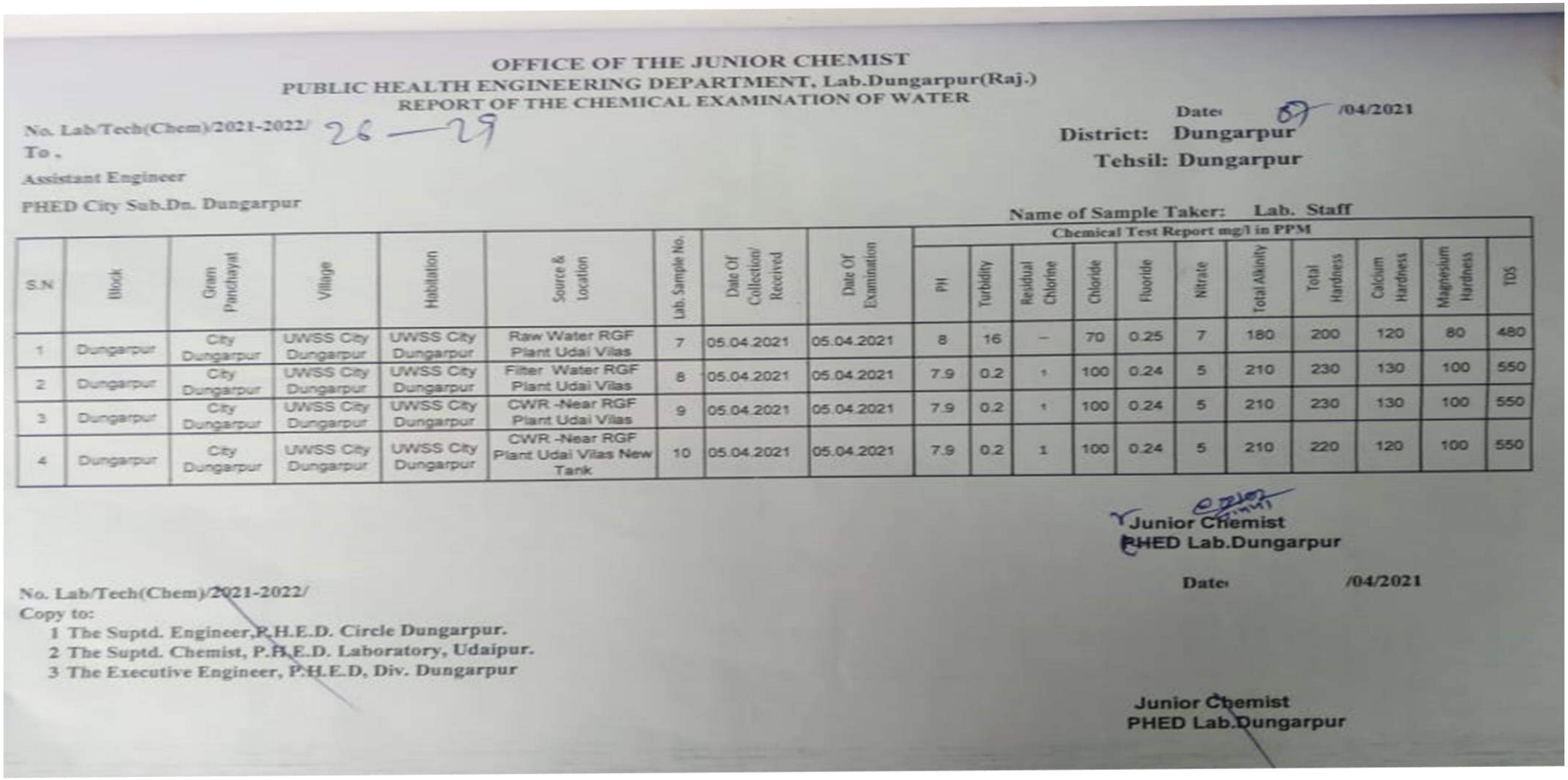
4 MLD STP is proposed at DO River, Udaipur Road (Dungarpur) which is 18.4 km away from Vijay Chakra Sagar Dam. The MSL of proposed STP site and Vijay Chara Sagar Dam are 267m and 251m respectively. No direct drain from STP site is connected with Vijay Chara Sagar Dam.

Fig. 7 Distance of STP from Dimiya Dam

Fig. 8 Existing Intake at Dimiya Dam

Fig. 9 Catchment of Vijay Chakra Sagar Dam

Sustainability and environmental considerations of Vijay Chakra Sagar Dam. The Vijay Chakra Sagar (Dimiya) dam has the capacity of 44.87 Mcft storage. For proposed water supply project only 3.1 MLD i.e. about 40 McFt water is allocated and proposed to be drawn from the source. Therefore, source is sustainable. Water Quality of the Dam has been evaluated from reports in Fig 10.



OFFICE OF THE JUNIOR CHEMIST
PUBLIC HEALTH ENGINEERING DEPARTMENT, Lab.Dungarpur(Raj.)
REPORT OF THE CHEMICAL EXAMINATION OF WATER

No. Lab/Tech(Chem)/2021-2022/ 26—29 Date: 07 /04/2021

To,
Assistant Engineer
PHED City Sub.Dn. Dungarpur

District: Dungarpur
Tehsil: Dungarpur

Name of Sample Taker: Lab. Staff

S.N	Block	Gram Panchayat	Village	Habitation	Source & Location	Lab. Sample No.	Date Of Collection/ Received	Date Of Examination	Chemical Test Report mg/l in PPM										
									PH	Turbidity	Residual Chlorine	Chloride	Fluoride	Nitrate	Total Alkinity	Total Hardness	Calcium Hardness	Magnesium Hardness	TDS
1	Dungarpur	City Dungarpur	UWSS City Dungarpur	UWSS City Dungarpur	Raw Water RGF Plant Udai Vilas	7	05.04.2021	05.04.2021	8	16	—	70	0.25	7	180	200	120	80	480
2	Dungarpur	City Dungarpur	UWSS City Dungarpur	UWSS City Dungarpur	Filter Water RGF Plant Udai Vilas	8	05.04.2021	05.04.2021	7.9	0.2	1	100	0.24	5	210	230	130	100	550
3	Dungarpur	City Dungarpur	UWSS City Dungarpur	UWSS City Dungarpur	CWR -Near RGF Plant Udai Vilas	9	05.04.2021	05.04.2021	7.9	0.2	1	100	0.24	5	210	230	130	100	550
4	Dungarpur	City Dungarpur	UWSS City Dungarpur	UWSS City Dungarpur	CWR -Near RGF Plant Udai Vilas New Tank	10	05.04.2021	05.04.2021	7.9	0.2	1	100	0.24	5	210	220	120	100	550

Junior Chemist
PHED Lab.Dungarpur

Date: /04/2021

No. Lab/Tech(Chem)/2021-2022/
Copy to:
1 The Suptd. Engineer,P.H.E.D. Circle Dungarpur.
2 The Suptd. Chemist, P.H.E.D. Laboratory, Udaipur.
3 The Executive Engineer, P.H.E.D, Div. Dungarpur

Junior Chemist
PHED Lab.Dungarpur

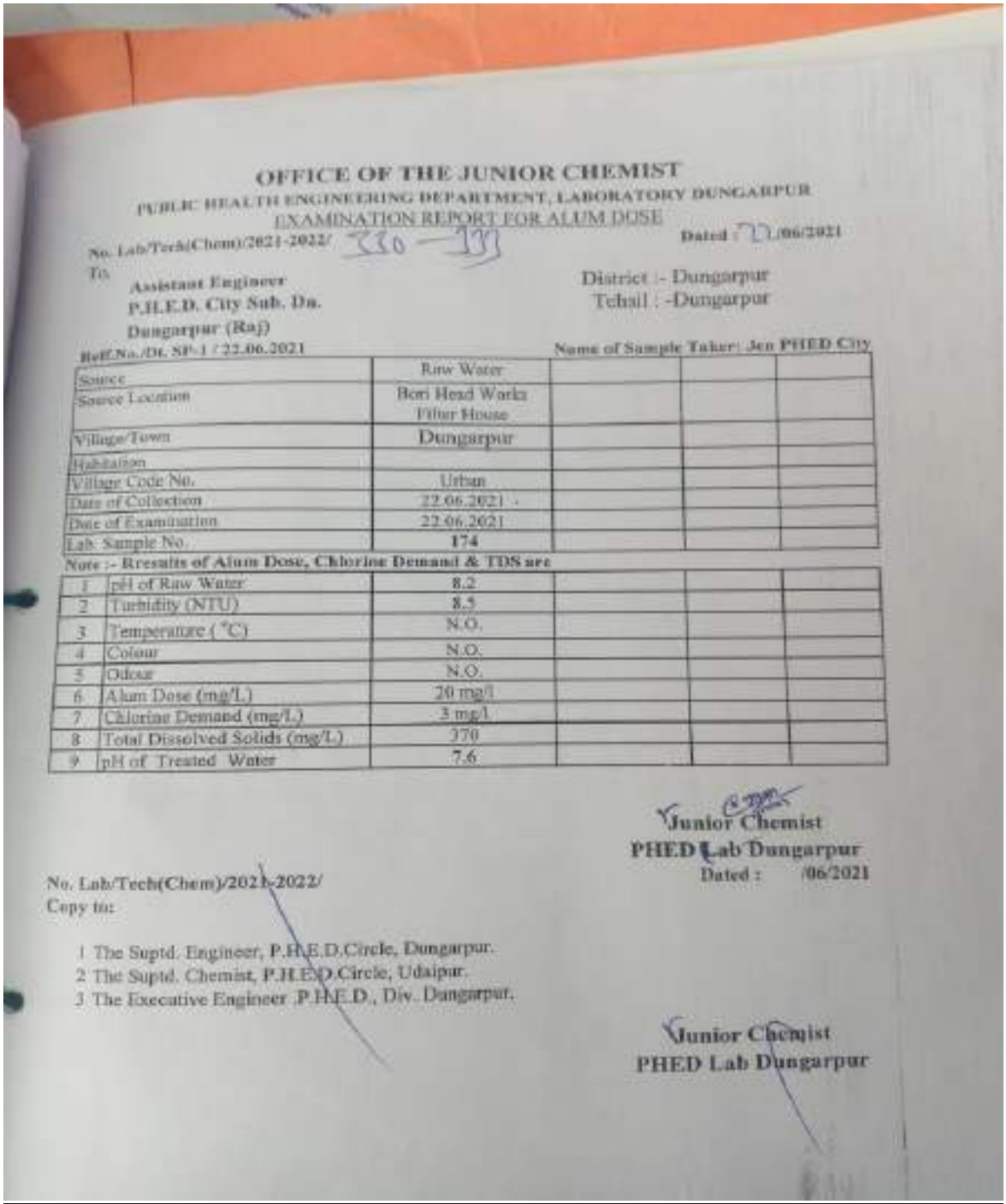
Fig. 10 Water Quality report of Vijay Chakra Sagar Dam

iii. **Edward Sagar Dam:** Since the construction of dam PHED has continuously maintained the daily water level and storage capacity of the Edward Sagar Dam. The Edward Sagar Dam has the total storage of 137 McFt excluding the dead storage of the dam. It is not used for irrigation purpose.

a. Location:-It is located at 23°47'19.78"N and 73°40'16.78”E.

Fig. 11 Intake as Edward Sagar Dam

Fig. 12 Catchment of Edward Sagar Dam



OFFICE OF THE JUNIOR CHEMIST

PUBLIC HEALTH ENGINEERING DEPARTMENT, LABORATORY DUNGARPUR

EXAMINATION REPORT FOR ALUM DOSE

No. Lab/Tech(Chem)/2021-2022/ 330 – 333 Dated : 22/06/2021

To,
Assistant Engineer
P.H.E.D. City Sub. Dn.
Dungarpur (Raj)

District :- Dungarpur
Tehsil : -Dungarpur

Ref.No./Dt. SP-1 / 22.06.2021 Name of Sample Taker: Jen PHED City

Source	Raw Water				
Source Location	Bori Head Works Filter House				
Village/Town	Dungarpur				
Habitation					
Village Code No.	Urban				
Date of Collection	22.06.2021				
Date of Examination	22.06.2021				
Lab. Sample No.	174				

Note :- Rresults of Alum Dose, Chlorine Demand & TDS are

1	pH of Raw Water	8.2			
2	Turbidity (NTU)	8.5			
3	Temperature (°C)	N.O.			
4	Colour	N.O.			
5	Odour	N.O.			
6	Alum Dose (mg/L)	20 mg/l			
7	Chlorine Demand (mg/L)	3 mg/l			
8	Total Dissolved Solids (mg/L)	370			
9	pH of Treated Water	7.6			

Junior Chemist
PHED Lab Dungarpur
Dated : /06/2021

No. Lab/Tech(Chem)/2021-2022/
Copy to:

1. The Suptd. Engineer, P.H.E.D.Circle, Dungarpur.
2. The Suptd. Chemist, P.H.E.D.Circle, Udaipur.
3. The Executive Engineer ,P.H.E.D., Div. Dungarpur.

Junior Chemist
PHED Lab Dungarpur

Fig 13 Water Quality Report of Edward Sagar Dam

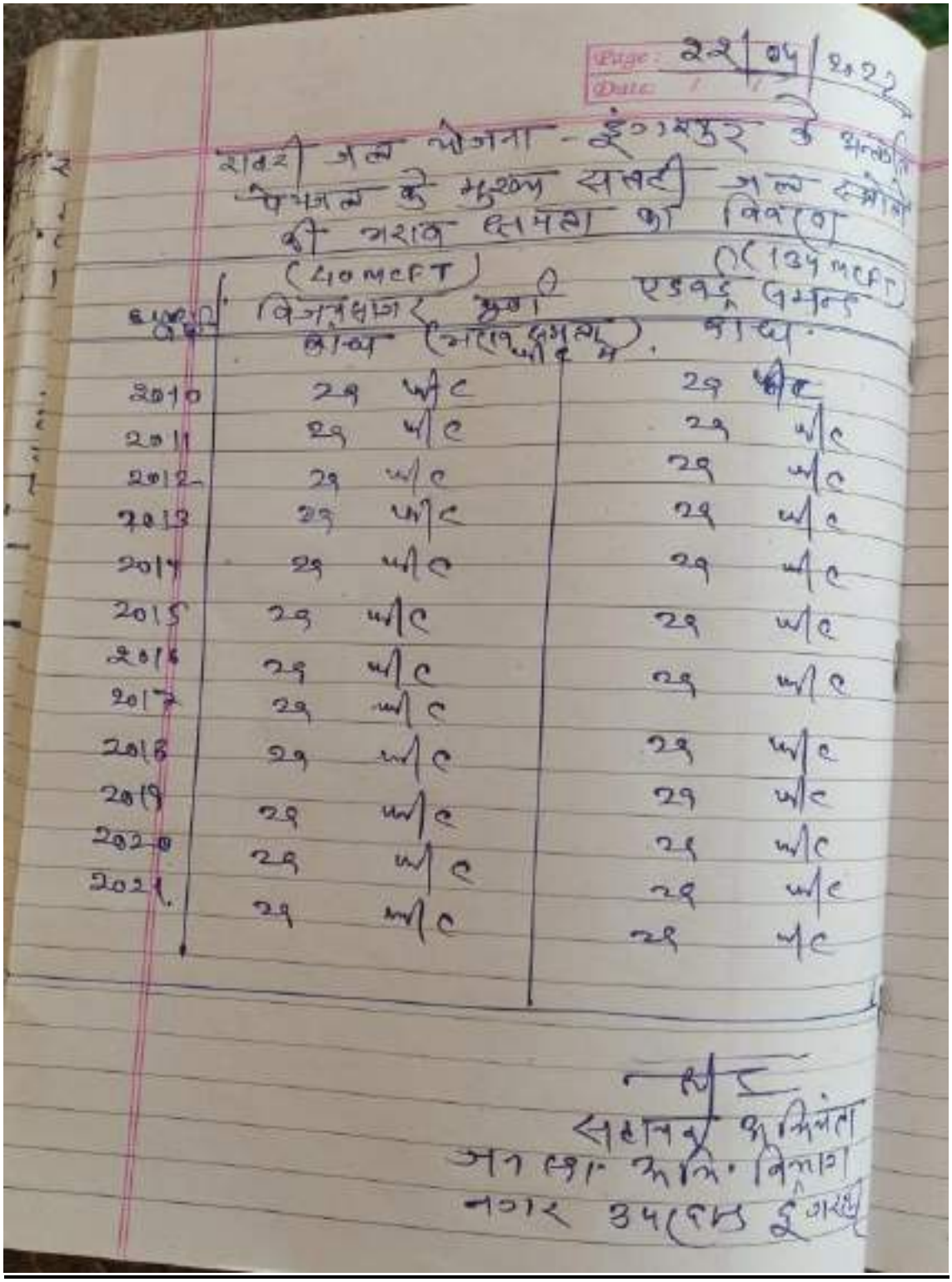


Fig 14 Gauge Details on Edward Sagar Dam

b. Distance from STP

STP of 4 MLD is proposed at Do River, Udaipur Road which is 13 km away from Edward Sagar Dam. MSL of Proposed STP site and Edward Sagar Dam are 267m and 312 respectively. Proposed STP site and Edward Sagar Dam are corrected through a drain but runoff discharge is from Edward Sagar Dam to STP site therefore no adverse impact of STP to Dam.

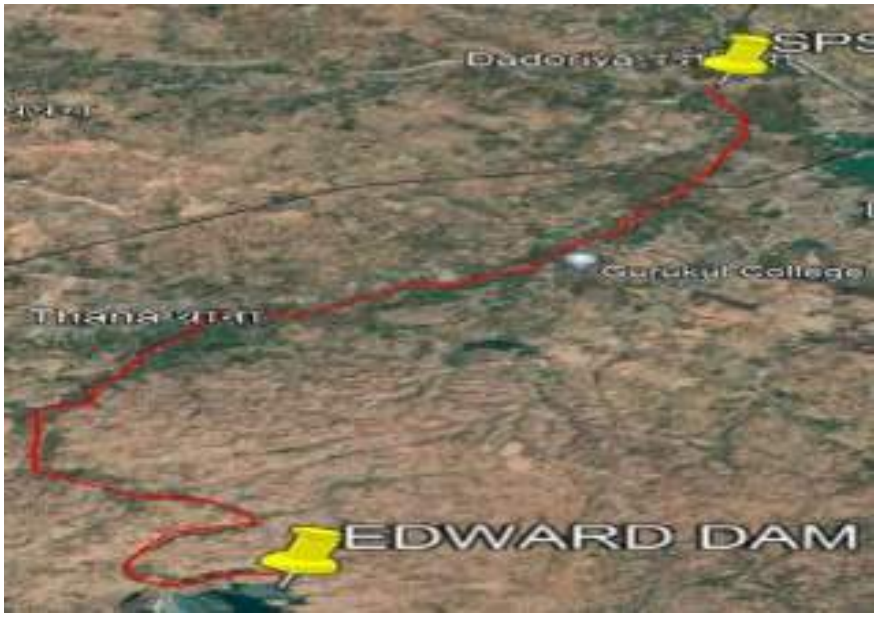


Fig 15 Distance between Dungarpur STP and Water supply source at Edward Sagar Dam

77. **Sustainability and environmental considerations of Edward Sagar Dam.** The Edward Samand dam has the total storage of 137 McFt excluding the dead storage of the dam. For proposed water supply project only 4.54 MLD i.e. about 61 McFt water is proposed to be drawn from the source. Therefore, source is sustainable.

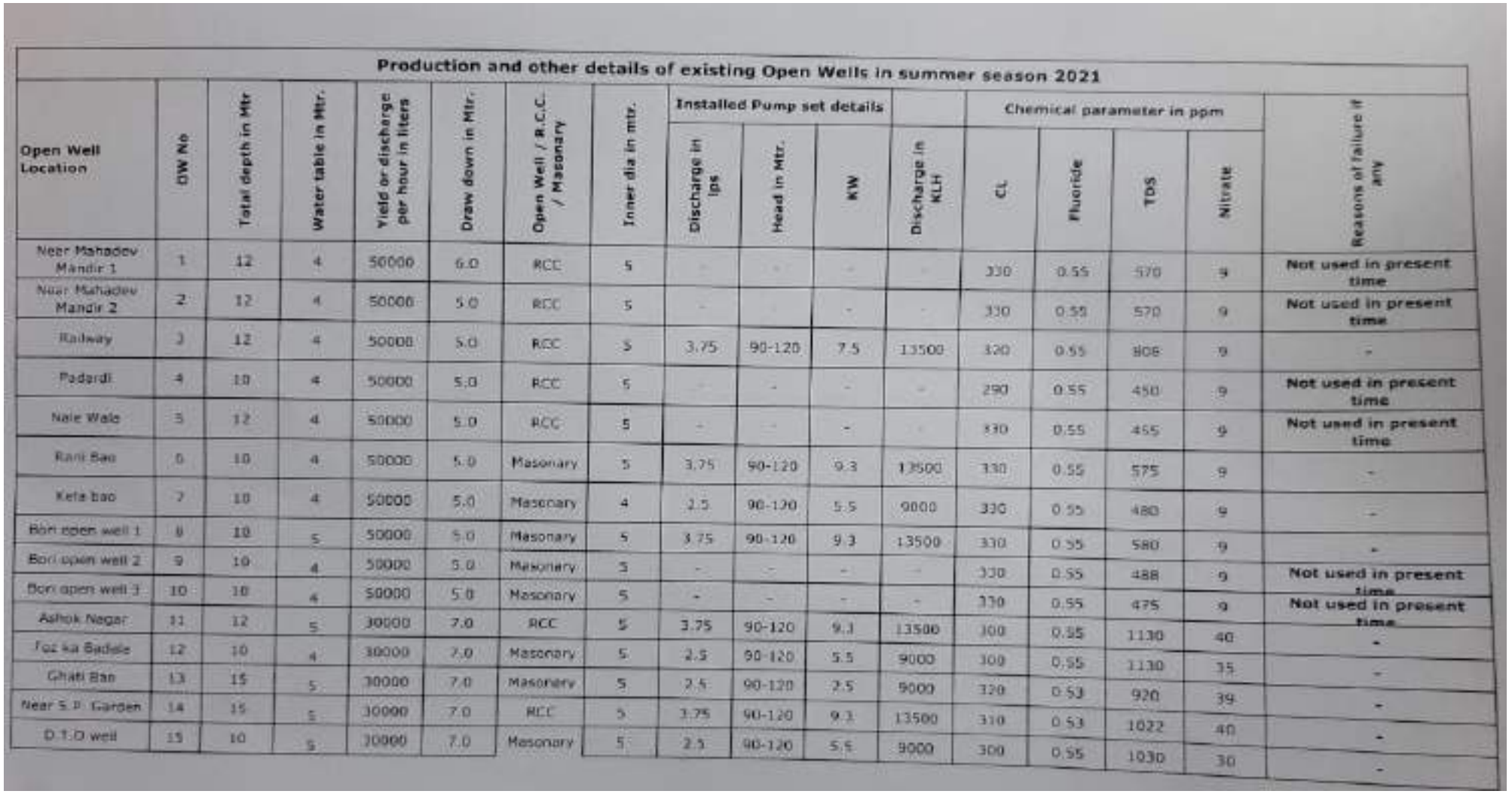
78. **Edward Sagar Dam Water quality.** Water Quality of the Dam has been evaluated from reports given in Fig 13.

iv. **Ground Water Source:** Presently Dungarpur town is partially dependent on ground water. Location and details of existing tube wells & open wells are as follows. -

S. No.	Location	Type	No.	Production Per Day (In KL)
Tube Wells				
3.	Patrakar colony TW	Tube well	1	500
4.	Darjiwada TW	Tube well	1	500
	Total		**2**	**1000**
Open Wells				
3.	Rani Bao OW	Open well	1	1000
4.	Kelabao OW	Open well	1	1000
	Total		**2**	**2000**

Based on the reports, it was finalized that out of the complete water requirement for the project only 1.5 MLD water will be taken from the ground water source. **Water quality of the underground water has been analyzed based on the reports in fig. 16 and 17.**

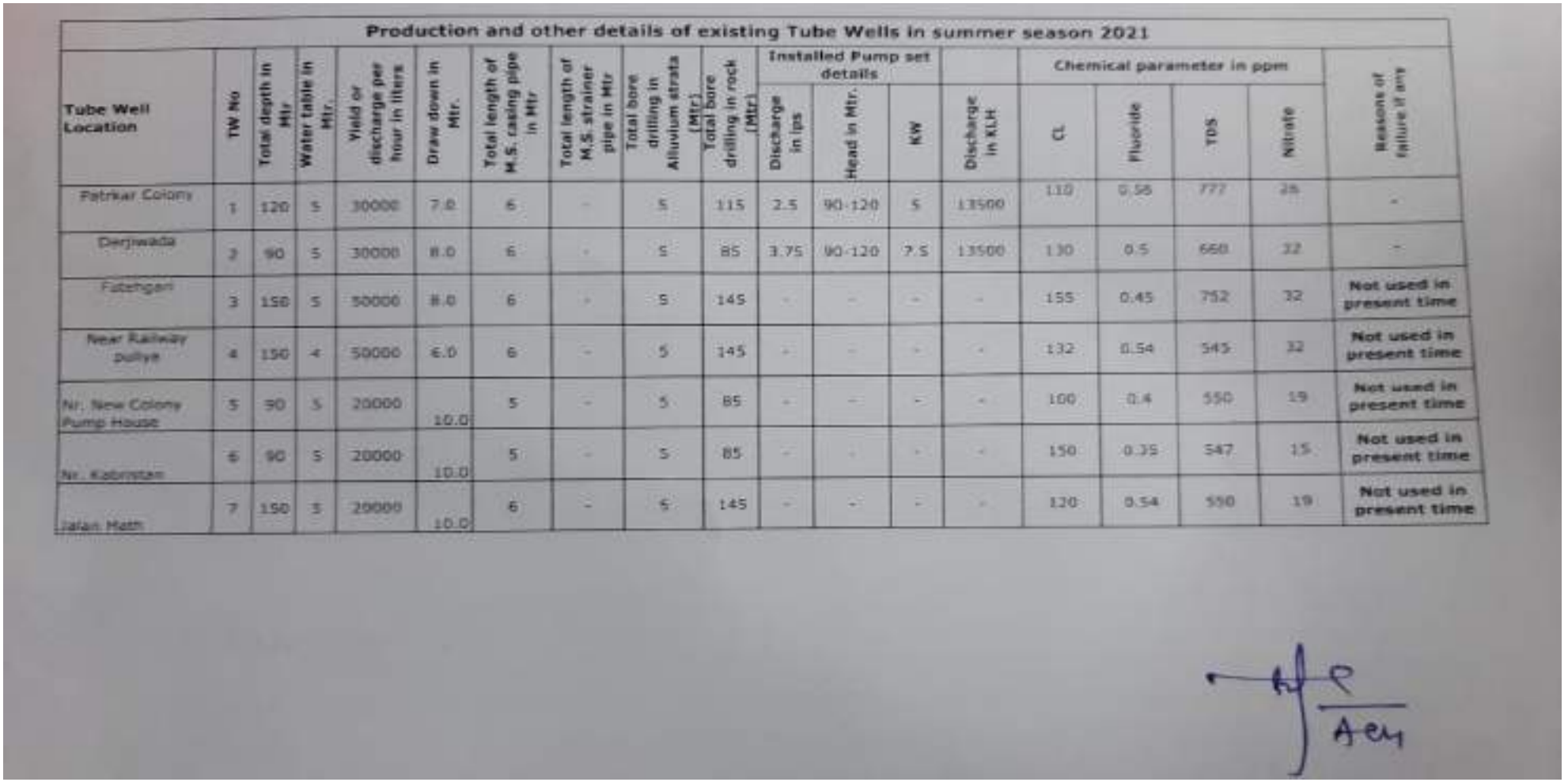
Sustainability and environmental considerations of Ground water sources. 1.5 MLD of the total requirement of the proposed project is planned to be taken from ground water sources. As per the data available, a total of 3 MLD water is available in the ground water sources. 2 Nos Tube wells and 2 Nos Open wells are proposed to be deepening and desalting, with re commissioning work.



Production and other details of existing Open Wells in summer season 2021

Open Well Location	OW No	Total depth in Mtr	Water table in Mtr.	Yield or discharge per hour in liters	Draw down in Mtr.	Open Well / R.C.C. / Masonary	Inner dia in mtr.	Installed Pump set details				Chemical parameter in ppm				Reasons of failure if any
								Discharge in lps	Head in Mtr.	KW	Discharge in KLH	CL	Fluoride	TDS	Nitrate	
Near Mahadev Mandir 1	1	12	4	50000	6.0	RCC	5	-	-	-	-	330	0.55	570	9	Not used in present time
Near Mahadev Mandir 2	2	12	4	50000	5.0	RCC	5	-	-	-	-	330	0.55	570	9	Not used in present time
Railway	3	12	4	50000	5.0	RCC	5	3.75	90-120	7.5	13500	320	0.55	808	9	-
Padardi	4	10	4	50000	5.0	RCC	5	-	-	-	-	290	0.55	450	9	Not used in present time
Nale Wale	5	12	4	50000	5.0	RCC	5	-	-	-	-	330	0.55	455	9	Not used in present time
Rani Bao	6	10	4	50000	5.0	Masonary	5	3.75	90-120	9.3	13500	330	0.55	575	9	-
Kela bao	7	10	4	50000	5.0	Masonary	4	2.5	90-120	5.5	9000	330	0.55	480	9	-
Bori open well 1	8	10	5	50000	5.0	Masonary	5	3.75	90-120	9.3	13500	330	0.55	580	9	-
Bori open well 2	9	10	4	50000	5.0	Masonary	5	-	-	-	-	330	0.55	488	9	Not used in present time
Bori open well 3	10	10	4	50000	5.0	Masonary	5	-	-	-	-	330	0.55	475	9	Not used in present time
Ashok Nagar	11	12	5	30000	7.0	RCC	5	3.75	90-120	9.3	13500	300	0.55	1130	40	-
Faz ka Badala	12	10	4	30000	7.0	Masonary	5	2.5	90-120	5.5	9000	300	0.55	1130	35	-
Ghati Bao	13	15	5	30000	7.0	Masonary	5	2.5	90-120	2.5	9000	320	0.53	920	39	-
Near S.P. Garden	14	15	5	30000	7.0	RCC	5	3.75	90-120	9.3	13500	310	0.53	1022	40	-
D.T.O well	15	10	5	30000	7.0	Masonary	5	2.5	90-120	5.5	9000	300	0.55	1030	30	-

Fig. 16 Details of Ground Water Source



Production and other details of existing Tube Wells in summer season 2021

Tube Well Location	TW No	Total depth in Mtr	Water table in Mtr.	Yield or discharge per hour in liters	Draw down in Mtr.	Total length of M.S. casing pipe in Mtr	Total length of M.S. strainer pipe in Mtr	Total bore drilling in Alluvium strata (Mtr.)	Total bore drilling in rock (Mtr.)	Installed Pump set details				Chemical parameter in ppm				Reasons of failure if any
										Discharge in lps	Head in Mtr.	KW	Discharge in KLH	CL	Fluoride	TDS	Nitrate	
Patrikar Colony	1	120	5	30000	7.0	6	-	5	115	2.5	90-120	5	13500	110	0.56	777	26	-
Derjwada	2	90	5	30000	8.0	6	-	5	85	3.75	90-120	7.5	13500	130	0.5	660	32	-
Fatehgari	3	150	5	50000	8.0	6	-	5	145	-	-	-	-	155	0.45	752	32	Not used in present time
Near Railway pulliya	4	150	4	50000	6.0	6	-	5	145	-	-	-	-	132	0.54	545	32	Not used in present time
Nr. New Colony Pump House	5	90	5	20000	10.0	5	-	5	85	-	-	-	-	100	0.4	550	19	Not used in present time
Nr. Kabristan	6	90	5	20000	10.0	5	-	5	85	-	-	-	-	150	0.35	547	15	Not used in present time
Jalan Math	7	150	5	20000	10.0	6	-	5	145	-	-	-	-	120	0.54	550	19	Not used in present time

Fig. 17 Details of Ground Water Source

Table 2. Rainfall Data of Dungarpur												
year	Jsn	Feb	March	April	May	june	july	aug	sep	oct	nov	dec
1980	0	0	0	0	0	372.8	214.8	137.2	86.5	0	0	0
1981	1.6	0	0	0	0	39.8	254.1	349.7	66.9	0	57.2	0
1982	6	0	0	50.6	87.8	51.5	408.7	139.8	21.7	4.5	182.2	10
1983	0	0	0	6.8	0	118	254.7	238.1	104.2	79.1	0	0
1984	0	0	0	0	0	19.2	303..0	489.2	66.6	0	0	0
1985	0	0	0	0	0	9.6	112	147.5	5.8	126.5	0	0
1986	0	0	0	0	0	61.2	278.4	112.1	14.4	40.8	0	0
1987	0	0	0	0	0	51.8	38.8	412	0	0	0	20
1988	0	0	0	0	0	30.3	232.4	379.5	65.6	0	0	0
1989	0	0	0	0	0	187.2	211.1	186.2	72.8	0	0	0
1990	0	0	0	0	14.2	24.2	262.8	215.7	123.8	9.1	5	0
1991	0	0	0	0	0	10	450	70.2	19.6	0	0	0
1992	0	0	0	0	14.2	24.2	262.8	215.7	123.8	9.1	5	0
1993	0	4	0	0	0	93.5	472.5	32	76	3	11	0
1994	7	0	0	0	0	220.5	329.7	366	311.9	0	4.8	0
1995	27	0	0	0	0	37.9	236.1	107.5	86.2	0	0	1
1996	3	0	0	0	3	99	282	265	128	14	0	0
1997	0	0	0	2	8	129	160	354	92	6	2	0
1998	0	0	0	0	0	78.8	167.2	121.5	303.5	43.5	0	0
1999	0	8	0	0	0	103	131	49	31	66	0	0
2000	0	0	0	0	0	39.7	247.3	162	36	0	0	0
2001	0	0	0	0	0	242	422	124	1	2	0	0
2002	0	2	0	0	0	126	3	129	103	6	0	0
2003	0	50	0	0	0	64	401	157	36	0	0	0
2004	0	0	0	0	9	108	129	373	56	0	0	0
2005	0	0	0	0	0	92	163	107	210	0	0	0

2006	0	0	0	0	0	199	237	917	258	0	0	0
2007	0	7	3	5	20	47	174	266	58	0	0	0
2008	0	0	0	4	7	8	95	108	85	0	9	3
2009	0	0	1	0	0	46	499	315	12	40	1	0
2010	0	0	0	0	0	35	227	262	154	0	81	1
2011	0	0	0	0	0	6	291	495	185	0	0	0
2012	0	0	0	0	0	19	359	458	342	0	0	0
2013	0	26	0	15	0	158	614	258	286	79	0	0
2014	40	15	0	1	25	4	358	126	306	0	0	0
2015	8	0	35	0	0	245	413	92	56	0	0	0
2016	0	0	0	0	0	34	482	433	24	28	0	0
2017	0	0	0	0	0	48	482	328	156	0	0	5
2018	0	0	0	0	0	284	263	165	98	0	0	0
2019	0	0	0	0	1	129	107	383	294	70	0	0
2020	0	0	2	0	0	3	146	308	64	0	0	0

Source: Annual Rainfall Data reports by Water Resource Department, Government of Rajasthan.

Particulars	Year 2025	Year 2040	Year 2055
Design Demand of clear water (In MLD)	9.28	10.28	10.99
Availability of clear water (In MLD)	**9.73**	**11.60**	**11.00**
Edward Samand Dam	4.54	4.54	4.54
Vijay Chak Sagar Dimiya Dam	3.1	3.1	3.1
Ground water	1.5	1.5	-
Transfer from SKA (Som Kamla Amba) system	0.59	2.46	4.36
Remark	Water availability is sufficient.	Water availability is sufficient.	Water availability is sufficient.

Fig 18 Demand V/S Availability analysis

Conclusion: On the basis of above techno-economic and environment considerations it is find out that all four source are sustainable.

Appendix 5: Letter for Allotment of Water for Dungarpur Town Water Supply Project of Dungarpur

OFFICE OF EXECUTIVE ENGINEER PHED DIVISION DUNGARPUR

S. NO. /EE/DPR/2021-22/ 1596

Date : 12-09-2021

Commissioner
Nagar Parishad
Dungarpur

Subject: Regarding implementation of reorganization of UWSS Dungarpur to be implemented through RUIDP

Reference: EE PHED Project Division II Udaipur dated 12.08.2021

In continuation of above referred letter provision of transfer of water from SomKamla Amba dam to UWSS Dungarpur has been modified in retrofitting proposal of 151 Villages of Blocks Aspur, Dovra and Dungarpur of District Dungarpur,In view of utilization of existing WTP's and already laid pipelines so that increased demand of rural sector may be meet out without change in transmission system.Details of provision are as under:

S.No	Name of surface source	Transfer of water		Quantity in MLD	Remarks
		From	To		
1	Edward Samand Dam	Edward Samand Dam	Bori WTP RWR	4.54	Capacity of Edward Samand Dam is 137 Mcft and annual raw water reqirement is only 61 Mcft.Existing gravity line uptoBori WTP and Bori WTP to udaivilas WTP will be sufficient to carry water
2		Bori WTP RWR	Bori WTP	3.25	
3		Bori WTP RWR	Udaivilas WTP	1.29	
4	Dimiya Dam	Dimiya Dam	Udaivilas WTP	3.1	Capacity of Dimiya Dam is 44.87 Mcft and annual raw water reqirement is 58 Mcft.Provision of raising of dimiya dam by 1 mtr will enhance 14 Mcftwater.Existing pipeline of 200 mm DI K-9 will be sufficient to carry water
5	Ground water			1.5	During summer if any deficient due to reduction in ground water may be supplemented by SKA system
	Total			9.14	

Particulars	Year 2022	Year 2037	Year 2052
Design Demand of UWSS Dungarpur @135 LPCD/10% institutional demand and 15% transmission and distribution losses	9.73	11.6	13.50
Less	9.14	9.14	9.14
Transfer from SKA system	0.59	2.46	4.36

Looking to above modifications following provisions to be taken in DPR being prepared by RUIDP:

- Provision of suitable Pump Machinery and Electric equipments needs to be taken up at Bori Head Works.
- Construction of 450 KL capacity RCC RWR at Bori Head Works under the provisions to be taken.
- Renovation/Upgradation of both WTP's.
- To increase the water supply production from Vijay Chakra Sagar (Deemiya) Dam by 1.0 meter has been proposed as per discussions held with WRD Department and an Estimate for Raising the height of Vijay Chakhra Sagar Dam by 1.0 meter has been framed by WRD Dungarpur for an Approx. cost of Rs 9.50 Crores.This works may be proposed to be got Executed by WRD under the budget head available with project PHED.
- Presently the intake Pump House for Pumping Raw Water from Deemiya Dam is in the back water of dam and as the water recedes in the dam during summer season, water is to be brought near the existing Pump House to be Pumped by the Centrifugal Submersible Pumpsets Installed there in an approach channel which usually got silted up every year after monsoon season. proposed to extend as per design the existing 200mm Diameter DI K-9 Rising Pipe line near Pump House for the length of 2.0 KM above HFL on the bank of Surface water Source along the nearby hilly alignment and provision for construction of a suitable RCC Intake near the spillway section is proposed to get the maximum benefit in pumping the raw water during severe drought conditions.
- CWR at chandpole in GLR campus along with pumping machinery.
- Existing Ground Water Resources may also be got disilted and deepened as per requirement to increase the ground water source production on this scheme upto 1.50 MLD and this work maybe got included in the DPR.

Therefore you are requested to take necessary provisions in reorganization schemes to be implemented through RUIDP ,if any query consultant may be asked to this office and project officers.

Executive Engineer
PHED Division Dungarpur (Raj)

S. NO. 1596 - 1600

Date: 12-08-2021

Copy forwarded to

(1.) The Additional C.E. Project PHED Udaipur/Region Udaipur
(2.) The Superintending Engineer project PHED Circle Banswara/Circle Dungarpur.
(3.) Executive Engineer.PHED,Project Division II Udaipur
(4.) Executive Engineer,RUIDP ,Jaipur

Executive Engineer
PHED Division Dungarpur (Raj)

Details of water supply scheme from Som Kamla Amba Dam

डुंगरपुर जिले में वृहद प्रगतिरत एवं प्रस्तावित पेयजल परियोजनाओं का संक्षिप्त विवरण

प्रगतिरत पेयजल परियोजना–

1. सोम कमला आम्बा बांध सतही स्त्रोत से जिला डुंगरपुर के पंचायत समिति आसपुर, दोवडा एवं डुंगरपुर के 151 ग्राम एवं 244 ढाणियों व डुंगरपुर शहर की पेयजल परियोजना–

डुंगरपुर जिले के विधानसभा क्षैत्र आसपुर के 135 ग्राम (पंचायत समिति आसपुर 47 ग्राम एवं दोवडा के 88 ग्राम) एवं विधानसभा क्षैत्र डूंगरपुर के 16 ग्राम (डूंगरपुर पंचायत समिति के 16 ग्राम) कुल 151 ग्राम एवं 244 ढाणियों तथा शहर डुंगरपुर को सतही स्त्रोत सोम कमला बांध से आधारित पेयजल परियोजना की घोषणा की अनुपालना में परियोजना की प्रशासनिक एवं वित्तीय स्वीकृति विभागीय वित्तसमिती की बैठक संख्या 745 में दिनाक 16–18.06.2018 को राशि रू. 365.00 करोड एवं विभागीय तकनिकी समिती की 666 वी बैठक दिनाक 16.07.2018 तकनिकी समिती द्वारा राशि रू. 295.93 करोड की तकनिकी स्वीकृति उपरान्त 20.09.2018 को रूपये 253.15 करोड का कार्यादेश मेसर्स एल.एण्ड.टी लिमिटेड चैन्नई को जारी कर दिया गया।

परियोजना में आसपुर,दोवडा एवं डुंगरपुर पंचायत समिति के ग्राम कमशः 47,88 एवं 16 व ढाणियाँ कमशः 44,163 एवं 37 (कुल 151 ग्राम एवं 244 ढाणियाँ) व शहर डुंगरपुर सम्मिलित है।

योजना पर निम्न कार्यों का प्रावधान लिया गया है–

उक्त परियोजना के अन्तर्गत प्रस्तावित कार्यों का विवरण निम्नानुसार है:–

• इन्टेकवेल एवं इन्टेक पम्पिंग स्टेशन	रू	1 नग
• पाईप लाईन	रू	100 मि0मी0 से 650 मि0मी0 व्यास, तथा 90एम.एम एचडीपी पाईप लाईन कुल लम्बाई 1088 कि0मी0
• जल शोधन संयंत्र	रू	21.29 एम0एल0डी0 क्षमता, वर्ष 2036 की मांग अनुसार
• पम्पिंग स्टेशन	रू	11(सम्मलित 1 इन्टेक पम्पिंग स्टेशन)
• उच्च जलाशयों की संख्या	रू	63(सम्मलित 01 न. 600 के.एल उच्च जलाशय)

भौतिक एवं वित्तीय प्रगति :–वर्तमान में योजना पर 70 प्रतिशत भौतिक प्रगति प्राप्त कर ली गई है एवं 1001.48 किलोमीटर के पाईप प्राप्त हो चुके है, जिसमें से 630 किलोमीटर पाईपलाईन डाली जा चुकी है एवं 475 किलोमीटर की टेस्टींग कर दी गई है, योजना पर जल शोधन संयत्र एवं इनटेक वेल का कार्य प्रगति पर है। योजना के अन्तर्गत 61 उच्च जलाशयो में से 36 उच्च जलाशयो का कार्य पूर्ण हो चुका है तथा 20 का कार्य प्रगतिरत है एवं 5 पर निर्माण कार्य शुरू किया जाना शेष है। परियोजना में अब तक कुल राशि रूपये 135.18 करोड़ व्यय किये जा चुके है। उक्त परियोजना का कार्य माह सितम्बर 2022 तक पूर्ण किया जाना सम्भावित है।

Approval of Water supply scheme under Jal Jivan Mission for Dungarpur town

OFFICE OF THE CHIEF ENGINEER (RURAL), PHED, RAJASTHAN
JAL BHAWAN, 2 CIVIL LINES, JACOB ROAD, JAIPUR
Phone: **0141-2222183,** e-mail: raj_ce@nic.in

No. F.2(11)PHED/CE(R)JJM/SLSSC-25th /2021-22/4411 – 83 Date: 16.07.2021

MINUTES OF 25th MEETING OF STATE LEVEL SCHEME SANCTIONING COMMITTEE (SLSSC) DATED 02.07.2021

The 25th meeting of State Level Scheme Sanctioning Committee (SLSSC) of PHED, Rajasthan (7th meeting under Jal Jeevan Mission) was held on 2nd July, 2021 under the Chairmanship of Additional Chief Secretary, PHED through Video Conferencing. The List of Participants is enclosed.

At the onset of the meeting, Chief Engineer (Rural) briefed about sanctions and progress so far under JJM as under:-

No.of FHTCs	Sanctions	TS issued	Tender invited	Work order issued /Work started
OTMP	28,97,912	23,31,358	20,76,743	5,38,471
MP	36,16,366	7,08,078	5,19,593	16,266
Total	65,14,278	30,39,436	25,96,336	5,54,737

It was also submitted that

- The work order for all small OTMP schemes will be issued by September, 2021 and for Major Projects by December, 2021.
- It is expected that good progress for FHTCs will start in October, 2021.
- ISAs finalized in 27 districts (ISAs for 6 districts are in in advance stage of finalization).
- SPMU started functioning from June, 2021.
- Tenders invited for DPMU & will be finalized in July, 2021.
- NABL Accreditation of 6 Districts Labs in 21-22 (Now 12 NABL out of 33. Applied for remaining). Tenders invited for the establishment of 102 BLL

Chairman SLSSC & ACS, PHED desired that in next meeting of SLSSC the gap between sanctions & work started should be much lesser than present position.

The following were considered:-

Agenda- 1 Confirmation of minutes of 24th SLSSC meeting held on 26.05.21 (Minutes issued vide no.1453-1529 dated 14.06.21

Chief Engineer (Rural) submitted that the minutes of 24th SLSSC meeting held on 26.05.21 was issued vide no. 1453-1529 dated 14.06.21. Minutes were issued incorporating the suggested modification conveyed from NJJM vide their letter dated 14.06.2021 on draft minutes send to them by email dated 28.05.21.

SLSSC was requested to confirm the same with amendment that in Additional Agenda-1, Name of Scheme at Proposal No.2 of Table 10 of Dist- Dholpur may be read as WSS Kasoti Khera & Khorpura in place of WSS Kasoti Khera & Khanpur.

Under Secretary to GoI, NJJM, New Delhi vide letter no. W-11011/5/2021-JJM.III-DDWS Dated 14.07.21 Conveyed comments on Agenda- 1 as under:

16/7/21

SLSSC 25th, Minutes issued 16/07/2021

Agenda- 20 Proposals for Revised A&F Sanction of "WSP for 151 villages of Aspur, Dovda and Dungarpur blocks and Dungarpur town from Som Kamala Dam, Dist Dungarpur " by SLSSC (Major Project)

Following Project was proposed for Revised A&F Sanction by SLSSC detailed as under:-

Sanctioned & Revised Proposal	Estimated Cost (Rs. in Crore)			No. of Villages Planned			No. of FHTCs Planned	Average Per FHTC Cost (in Rupees)
	Total	Central Share	State Share	Total	PWS	Non PWS		
Sanctioned in 20th SLSSC held on 11.02.21	401.93	167.40	234.53	151	143	8	32000	
Revised Proposed	159.79	73.90	85.89 (Include Urban Part- Rs. 10.86 Cr)	151	143	8	28299	52627/-
Net Increase /Decrease	-242.14	-93.50	-148.64	0	0	0	-3701	

The scheme / proposal wise details are available in prescribed Table-10. Chief Engineer (SP) submitted as under:-

1. In the original A&F Sanction estimated cost of original ongoing project having NWQSM share was also included along with retrofitting works for providing FHTCs in the project villages. The NWQSM share on this ongoing project has been fully utilized.
2. Now only retrofitting works for providing FHTCs in the project villages are proposed in JJM.
3. The Scrutiny of the projects has been made as per guidelines of JJM. The Project's DPR has been scrutinized as per general Comments regarding design & estimates of GoI conveyed vide letter dated 12.03.2021. This is final DPR based on actual survey.

Therefore, Revised A&F of above project was sought by CE (SP). SLSSC was requested to accord revised A&F sanction of above project with decreased cost Rs. 242.14 Cr.

It was decided to accord revised approval (revised A&F sanction) of the above project with revised cost Rs. 159.79 Cr as per funding pattern proposed. (Annexure of Agenda- 20).

[Action by CE(SP)]

Agenda- 21 Proposals for Approval (A&F Sanction) of "Strengthening & Rehabilitation of water supply system of Bhim Constituency of Dist Rajsamand from Chambal River & Retrofitting of Chambal Bhilwara Project" which was provisionally approved in 23rd SLSSC (Major Project)

Water Supply Project namely "Strengthening & Rehabilitation of water supply system of Bhim Constituency of Dist Rajsamand from Chambal River & Retrofitting of Chambal Bhilwara Project" was proposed for Approval (A&F Sanction) which was provisionally approved in 23rd SLSSC held on 25.03.21 at Additional Agenda-4 detailed as under:-

16/21

Revised. ASF 151 Villages. sent to SLSSC 25th.

Mail - 16/06/2021

Chapter-7 General Abstract of Cost

S.No	Particulars	Amount (Lacs.)
	Part-A (Rural Works): Work Proposed For Rural Areas Under JJM	
1	Clear Water Pump Machinery for Cluster ESR	110.30
2	Cluster Distribution	1731.42
3	Village Distribution	11288.17
4	Solar Based Tube Well with MS Supporting Structure for Elevated PE Tank	187.37
	Sub Total	**13217.12**
	Add 5% physical contingencies	784.80
	O&M cost for Ten years on item no.-7 &8	112.31
	TOTAL Part-A	**14114.23**
	PART B - HOUSE HOLD TAP CONNECTIONS	
5	Functional Household Tap Connection	778.56
	Total Part-B	**778.56**
	Part-C (Urban Works):Work Proposed For UWSS Dungarpur	
6	Pumping Machinery at Dhemya Dam	38.07
7	Pumping Machinery at Adwara Samand Dam	35.72
8	Raw Water Rising Main-Edwara Samand Dam	17.86
9	Electrical Connection	21.03
10	Miscellaneous Works	34.18
11	Provision for Raising of Dumya Dam	926.64
	Total Amount	1073.54
	Add 5% physical contingencies	7.14
	O&M cost for Ten years on item no.-1,2 &3	5.50
	TOTAL Part-C	**1086.38**
	Grand Total (Part- A+B+C)	**15979.16**
	In Cr.s	**159.79**

(Pradeep Kothari)
Executive Engineer
PHED Project Div. Udaipur-II

(K C Meena)
Superintending Engineer
PHED Project Circle Banswara

(S L Salvi)
Additional Chief Engineer
PHED Project Region Udaipur

Appendix 6: Stakeholders and Public Consultation Consultations Conducted During Project Preparation

A. Stakeholders Consultations in CLC:

City level Stakeholder Committee (CLC) Meeting (dtd. 09.06.2021)- A town-level stakeholder consultation meeting was conducted to discuss various issues like land availability, scope of works etc. under the chairmanship of District Collector in which representatives of primary and secondary stakeholders were invited. The feedback and concerns of the stakeholders have taken into consideration in detail designs of the project. City level Committee meeting was held on under the Chairmanship of District Collector, Dungarpur for finalization of works of Water Supply and Sewerage in Dungarpur town. Proposed works were approved by CLC members in this meeting. Minutes of Meeting of CLC vide dated are given below:

Minutes of CLC meeting with Outcomes

Government of Rajasthan
Office of the Executive Engineer, PIU,
Rajasthan Urban Sector Development Investment Program (RUSDIP), Udaipur

No./RUIDP/PIU/UDP/01/PH-IV/Dungarpur/2020-21/37-45 Date: 09/07/2021

A city level committee was held under the chairmanship of District Collector, Dungarpur at Collectorate, Dungarpur on 30.06.2021 to discuss the Water Supply & Sewerage Project proposed under RUIDP Phase IV for Dungarpur town. List of members/officials attended the meeting is at annexure-A.

1. It was appraised that the DPR of Water Supply & Sewerage Project is prepared by the Consultant M/S Exceltech Consultancy & Projects Pvt. Ltd., Jaipur engaged by Municipal Council, Dungarpur, which will be considered under RUIDP Phase IV. The suggestions from stake holders of city level committee will be considered in the project.
2. The basic scope of works & provision in DRSs were briefed to the committee by power point presentation. The estimated cost of DPR is about Rs. 137.33 Cr. (Capital Cost) for works proposed under Water Supply & Sewerage sector and Rs. 15.77 Cr. For 10 years O&M& Total Cost of Project is 153.10 Cr. The capital cost for execution of works will be borne by the State Government financed by ADB under RUIDP Phase IV. The O&M cost for water supply works is to be borne by PHED and for sewerage works (STP, SPS & Sewer line) by Municipal Council. The O&M cost for payment will be performance based under the contract. After completion of project works the whole town will be benefitted with water supply and sewerage facilities.
3. The brief scope of works are as follows:

   Water Supply Works: - The main source of treated water is SomKamla Amba Drinking Water Supply Project for 151 Villages and 1 town (Dungarpur) of District Dungarpur for which work order has been placed by PHED and work of this project has been started. Two existing surfaces namely Edward Samand and Vijay Chakra Sagar shall continue to provide water to the town. All these sources are capable to meet out the ultimate demand of the Dungarpur town. Under the project, 2 nos new CWRs capacity (300 KL) and all the old distribution pipe lines of AC & PVC pipes proposed to be replaced by DI K-7 pipe lines and also in the uncovered area within the municipal boundary limit of about 157 Kms. The entire area has been divided into 16 zones and 17 District Metering Area (DMA's) basis for non-revenue water (NRW) reduction. Provision of about 11614 Nos house service connections with domestic water meters for intermittent pressurized water supply is taken in the DPR. The entire system is proposed for automation on SCADA base for smooth O&M.

Sewerage Works: - There is no existing sewerage system in the town. The scope under the project to provide sewer network of about 60 km length, one Sewage Treatment Plant (STP) of 4.0 MLD& three sewage pumping stations (SPS) of 2.95 MLD, 2.60 MLD & 0.60 MLD respectively to pump sewage of low laying area to main sewer. STP 4.0 MLD is proposed to be constructed on identified land near Do River on Udaipur road. It was informed that STP is proposed on latest Sequential Batch Reactor (SBR) technology to meet out the latest effluent parameters. To reduce inconvenience to public deeper depth (3.5 mtr above) & Railway crossing & circles where traffic is more, 5.2 Km trenchless technology for laying of the sewer is proposed. Area of town which is on the outskirt and having less habitation and population density is low has been proposed with Faecal Sludge & Septage Management (FSSM).

4. District Collector Dungarpur directed that it is the important project for Dungarpur and RUIDP should follow all norms for the work to be executed for Water Supply and Sewerage project. It is also directed consultant to visit the site along with the local representatives of Nagar Parishad and take provisions in the DPR for redressal of water supply related problems in their area so that inconvenience to public should be minimized.
5. Hon'ble MP, Dungarpur welcome the project for Dungarpur town and requested that all the old distribution pipeline should be replaced by new HDPE and DI pipe line so that the water will available with required pressure. Chairman Nagar Parishad Dungarpur suggested that the availability of land first confirmed before finalization of project. It was agreed that consultant shall get all relevant land documents from municipality & will provide to RUIDP alcng with DPR and suggested to explore the possibility of use of treated effluent in gardens and fountains etc.
6. Municipal Board agreed to allot the land for construction of STP near DO River on Udaipur road, SPS-1 near Padambhusan Shri Bhogi Lal Pandya Circle, SPS-2 near Ashram Vatika& SPS-3 between RICCO & Gap Sagar.
7. EE, PHED also requested to take following provision vide letter number AA/vrat/Dungar/2021-22/691 dated 01.07.2021:-
   - Rising main pipeline from vijaysagar dam to udaivilas filter plant 200/250 mm DI K9
   - Pump machinery with pump house and J-2 type quarters at vijaysagar dam.
   - Replacement of rising main pipeline A.C. pressure to DI K9 150 mm dia New colony pumping station to new RHB OHSR.
   - New OHSR at Problematic Area
     - New Colony
     - Navadara
     - Vagadmagari
   - New GLR at Problematic Area

- Ghati

➢ Dismantling and construction of new OHSR
  - Old RHB :- 272 KL
  - Indira Colony :- 227 KL

➢ Dismantling of GLSR and construction of new OHSR at chandpole

➢ Construction of new RWR at bori filter plant.

➢ Construction of new CWR at :-
  - New Colony
  - Main pump house
  - Chandpole
  - Udaivilas filter plant campus

➢ Repairing and rejuvation of 2 nos. filter plant
  - Udaivilas filter plant :- 4.50 MLD
  - Bori Filter Plant :- 3.25 MLD

➢ Replacement and installation of existing pump machineries on various pump houses and filter plant.

➢ Construction of J-2 type quarters at :-
  - Main pump house
  - Bori filter plant
  - Udaivilas filter plant
  - Chandpole
  - New colony pump house campus

➢ JEN quarter at new colony pump house.

➢ Construction of circle office building and residence building of SE.

➢ Dismantling of Old RGF at main pump house.

➢ Repairing and rejuvenation of existing building and pump house.

➢ Repairing of west weir at adwardsamand dam (2 nos.)

8. It was also deliberated that for public complaint redressal provision to toll-free number along with provision for customer service centers will be taken under the contract. The O&M payment will be performance based under the contract.
9. The representative of the Municipal council suggested to take up the excavation of trenches for sewer work in such a way, that the trench excavated for laying sewer lines should not be laying longer without restoration.
10. It was assured that suggestions and directions of the city level committee will be incorporated in the proposed detailed project report.

After deliberation, the project was agreed by the committee for further course of action at RUIDP level. Meeting ended with vote of thanks to chair.

Executive Engineer
RUIDP (PIU) Banswara
(Member Secretary, CLC Dungarpur)

No./RUIDP/PIU/UDP/01/PH-IV/ Dungarpur/2020-21/ 37-45 Date: 09/07/2021

Copy to the following for information and necessary action please.

1. PA to Hon'ble MP, Dungarpur
2. PA to Hon'ble MLA, Dungarpur
3. PA to The Project Director, RUIDP, PMU, Jaipur
4. The District Collector, Dungarpur
5. The Chairman, Nagar Parishad, Dungarpur
6. The Commissioner, Nagar Parishad, Dungarpur
7. The Superintending Engineer, PWD/PHED/AVVNL/WRD, Dungarpur
8. The Superintending Engineer, RUIDP Phase IV/WW/WS, Jaipur
9. The Sr. Town Planner, Udaipur
10. Guard File

Executive Engineer
RUIDP (PIU) Banswara

B. 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-

Details of Public Consultations in Durgapur

A. Pubic Consultation with locality

Date & Area	Participants			Issues Discussed	Outcome	Photos
	Male	Female	Total			
March 12th, 2022 Near Bus Stand and Nagar Palika	08	04	12	Project components under RSTDSP and the benefits to the Community. Process of logging grievance and its mechanism under the project. Present status and access of Waste Water facilities in the town and other concerned issues and challenges. Presence of any forest, wild life or any sensitive/unique environmental components nearby the project, Presence of historical/ cultural/ religious sites nearby. Unfavourable climatic condition	Pipeline laying work for sewerage is proposed in the area and it was informed by nearby habitation that proper and structured sewerage facilities are not available in this part of the town and residenst have their own septic tanks and soak pits. Some people living in outskirts area are prone to practice open defecation. Process of grievance mechanism was also briefed with participants for lodging complaints. Participants are happy with proposed project in the town. There is not any forest, wildlife or any sensitive /unique environmental, component near the project area. Mt. Abu Wildlife sanctuary is quite remote from the project area. There are not any historical/cultural and religious sites in nearby the subproject area.	

March 13th, 2022 Old Bus Stand and Near Bus Stand	09	03	12	Project components under RSTDSP and the benefits to the Community. Process of logging grievance and its mechanism under the project. Present status and access of Waste Water facilities in the town and other concerned issues and challenges. 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. .	Pipeline laying work for sewerage is proposed in the area and it was informed by nearby habitation that proper and structured sewerage facilities are not available in this part of the town and residenst have their own septic tanks and soak pits. Some people living in outskirts area are prone to practice open defecation. Process of grievance mechanism was also briefed with participants for lodging complaints. Drinking water is providing by PHED, but the supply is intermittent on alternate days which is less than requirement of households. Participants are happy with proposed project in the town. Contractor should use modern machinery and water sprinkler to control dust and noise during construction phase. All the pollution control measures will be adopted at site to control the fugitive emission in the area and for control of noise, PPE's will be provided to workers such as ear muff etc. Plantation activities provide shade, shelter and enhance the local biodiversity in the area. 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.	

B. Public Consultations with ST Community

Date & Area	Participants			Issues Discussed	Outcome	Photos
	Male	Female	Total			
April 8th, 2022 Ward no-3 & 4, ST Community,, Dungarpur	00	04	04	Present water supply and sewerage condition, access to water supply, quality of water supply, project components and the benefits to the community, Project components under RSTDSP and the benefits to the community and Grievance redressal mechanism under the project. Presence of any forest, wild life or any sensitive/ unique environmental components nearby the project. Presence of historical/ cultural/religious sites nearby.	The consultation/s was conducted specifically with the scheduled tribe community. Some households do have individual water supply connection. Entire community could not afford domestic water supply connections due to (i) lack of funds to get the connection installed (ii) some households have constructed houses on land parcels without having land titles and hence not willing to take connections, (iii) have easy access to public water supply source and are not willing take individual connections. Willing to take new connections if 24*7 water supply is available which is of good quality. There is not any forest, wildlife or any sensitive /unique environmental, component near the project area. Mt. Abu Wildlife sanctuary is quite remote from the project area. There are not any historical/cultural and religious sites in nearby the subproject area.	

				Drainage and sewerage problem facing. Dust and noise pollution and disturbances during construction work. Public Health by proposed water supply & Sewerage subproject	Open defecation was/is practice due to lack of individual toilets. Many have constructed toilets in the recent past availing subsidised schemes from the Municipality.	
April 8th, 2022 2022 Ward no-9 & 10, ST Community,, Dungarpur	00	09	09	Present water supply and sewerage condition, access to water supply, quality of water supply, project components and the benefits to the community, Setting up worker camp site within the village/ project locality Plantation measures in nearby the area. Safety of residents during construction phase and applying of vehicle for	Some households do have individual water supply connection. Entire community could not afford domestic water supply connections. Women excited about the prospect of getting individual water connections. They opined that their energy, time and hard labour will be saved especially during summer months. Enquired if their area has been included under the project. Willing to take new connections if 24*7 water supply is available which is of good quality. There is enough space available nearby the project area to establish labour camp. People suggested to establish the worker camp away from the habitation so there is no conflict and disturbances.	

				construction activities. Requirement of enhancement of other facilities. Project components under RSTDSP and the benefits to the community and Grievance redressal mechanism under the project.	People want to plantation programme in the town and ensure the aftercare measures such as watering and manuring etc. The contractor should take care of the safety arrangement during construction phase and should provide traffic diversion routes to avoid the vehicle congestion.	
April 8th, 2022 Ward no-6 and nearby location, ST Community,, Dungarpur	03	08	11	Present water supply and sewerage condition, access to water supply, quality of water supply, project components and the benefits to the community, Presence of any forest, wild life or any sensitive/ unique environmental components nearby the project. Presence of historical/	The consultation/s was conducted specifically with the scheduled tribe community. Willing to take new connections if 24*7 water supply is available which is of good quality. There is not any forest, wildlife or any sensitive /unique environmental, component near the project area. Mt. Abu Wildlife sanctuary is quite remote from the project area. There are not any historical/cultural and religious sites in nearby the subproject area. . Open defecation was/is practiced due to lack of individual toilets. Many have constructed toilets in the	

				cultural/religious sites nearby. Unfavorable climatic condition. Occurrence of flood, earthquake etc. Project components under RSTDSP and the benefits to the community and Grievance redressal mechanism under the project.	recent past availing subsidised schemes from the Municipality. There are no natural disasters such as flood and earthquake occurred in recent past. The area is not prone for such incidences	

C. Consultations with stakeholders

Date & Area	Participants			Issues Discussed	Outcome	Photos
	Male	Female	Total			
April 8th, 2022 PHED,, Dungarpur	06	00	06	Proposed water supply works and availability of land, R&R issues etc.	Meeting with PHED and Nagar Palika officials and discussion were done about proposed project under phase-4. PHED and Nagar Palika officers assured of their full cooperation with RUIDP/RSTDSP during planning and implementation of the project.	
April 8th, 2022 Chairman Office Municipal Council, Dungarpur	10	02	12	Environments issues related to surface water bodies and solid waste disposal facilities in Dungarpur City	Meeting with Chairman and elected member of Municipal Council Dungarpur. Treated effluent of STP cam be used in agricultural fields in nearby location of Do river and proposed STP location and in a bird park which is located near the gap sagar SPS location. House Keeping facilities in Dungarpur is very good but there is no facilities of sewerage.	

April 8th, 2022 Incharge municipal waste storage yard, Dungarpur	04	00	04	Environments issues related to solid waste disposal facilities in Dungarpur City	In the Dungarpur city domestic solid waste is disposed on open land existed on Uday Vilas road.	

Consultation Attendance sheet

Rajasthan Secondary Towns Development Sector Project (RSTDSP)
RUIDP Phase-IV

Consultation Sheet

Place: Near Bus Stand and Nagar Palika Town: Dungarpur Date: 12/03/2022

Topic Discussed During Consultation:

1. Discussion with local Public for water Supply &
2. Sewerage facilities in the town.

S. No.	Name	Gender		Address	Contact No.	Signature
		Male	Female			
(1)	Hemlata		✓	Near Nagar Palika Area		
(2)	Vimla		✓	—"—		
(3)	Sarita		✓	—"—		
(4)	Raju	✓		—"—		
(5)	Suresh	✓		—"—		
(6)	Manohar	✓		Near Bus Stand Area		
(7)	Hamer Singh	✓		—"—		
(8)	Kanti Lal	✓		—"—		
(9)	Dilip Singh	✓		—"—		
(10)	Mukesh	✓		—"—		
(11)	Laxman	✓		—"—		
(12)	Saraj devri		✓	—"—		

Rajasthan Secondary Towns Development Sector Project (RSTDSP)
RUIDP Phase-IV

Consultation Sheet

Place: Near Bus Stand and Nagar Palika Town: Dungarpur Date: 12/03/2022

Topic Discussed During Consultation:

1. Discussion with local public for water supply &
2. Sewerage facilities in the town.

S. No.	Name	Gender		Address	Contact No.	Signature
		Male	Female			
1	Hemlata		✓	Near Nagar Palika Area		
2	Vimla		✓	—"—		
3	Sawita		✓	—"—		
4	Raju	✓		—"—		
5	Suresh	✓		—"—		
6	Manohar	✓		Near Bus Stand Area		
7	Hamer Singh	✓		—"—		
8	Kanti Lal	✓		—"—		
9	Dilip Singh	✓		—"—		
10	Mukesh	✓		—"—		
11	Laxman	✓		—"—		
12	Saroj devri		✓	—"—		

Rajasthan Secondary Towns Development Sector Project (RSTDSP)
RUIDP Phase-IV

Consultation Sheet

Place: Bus Stand Area Town: Dungarpur Date: 12/9/2022

Topic Discussed During Consultation:

1. Discussion with Local public and nearby households
2. regarding Water Supply & Sewerage facilities in town.

S. No.	Name	Gender Male	Gender Female	Address	Contact No.	Signature
1	Sundar Lal	✓		Near Bus Stand Area		Sundar Lal
2	Sangeeta		✓	—" —		
3	Ramji Lal	✓		—" —		रामजी लाल
4	Ishwer Lal	✓		—" —		Ishwar Lal
5	Vanita		✓	—" —		
6	Narayan	✓		Old Bus Stand		Narayan
7	Nirmala		✓	—" —		
8	Veer Singh	✓		—" —		
9	Chagan Lal	✓		—" —		Chagan Lal
10	Dilip Singh	✓		—" —		Dilip
11	Sabir Khan	✓		Bus Stand Road		
12	Jitendra Rawal	✓		—" —		जितेन्द्र रावल

Rajasthan Secondary Towns Development Sector Project (RSTDSP)

RUIDP Phase-IV

Consultation Sheet

Place: Wazal No. 3(Old)/1(New) Date: 08/04/2022

Topic/Issue: Woman Consultation with Scheduled Tribes for Sewerage and Water Supply Project in Dungarpur Town.

S.no	Name	Occupation	Mobile no.	Signature
1.	Ranjita Kamrakoted (Bhil)	Student	—	
2.	Vali Bai Kamrakoted (Bhil)	House wife	9119315120	वलिबाई
3.	Shushila Devi Bhil	House wife	-	
4.	Savita Devi Bhil	House wife	-	
5.				

Rajasthan Secondary Towns Development Sector Project (RSTDSP)

RUIDP Phase-IV

Consultation Sheet

Place Chairman Nagar Parishad Dungarpur Date 08/04/2022

Topic/Issue Meeting with Chairman Nagar Parishad Dungarpur

S.no	Name	Occupation	Mobile no.	Signature
1.	Amritlal Kalasua	Chairman Nagar Parishad	9950268111	
2.	Bhupesh Sharma	Elected Ward Parshad	9414347869	
3.	Babulal Sainal	"	9414104775	
4.	Naresh Yadav	"	7737203834	
5.	Pankaj Jain	"	9461577348	
6	Mst. Bhawna Kuwar	"	7073743099	
7	Heena Joshi	"	9828040095	
8	Surendra Singh	"	9414567897	
9.	Bhanuji Sevak.		9460092656	

Appendix 7: Integrated Biodiversity Assessment Tool World Bank Group Biodiversity Risk Screen DUNGARPUR_STP

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Integrated Biodiversity Assessment Tool

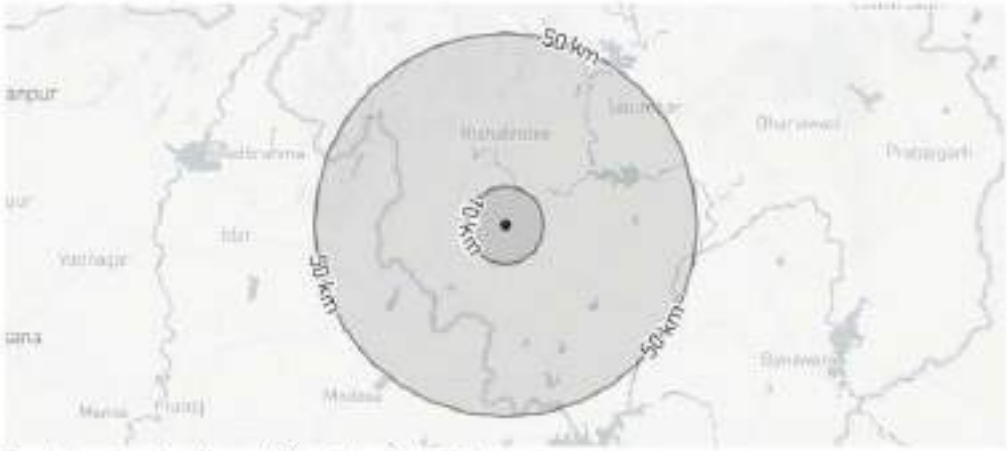
World Bank Group Biodiversity Risk Screen

DUNGARPUR_STP

- **Country:** India
- **Location:** [23.9, 73.7]
- **IUCN Red List Biomes:** Freshwater, Terrestrial
- **Created by:** Norma Wallcan

Overlaps with:

Protected Areas	1 km: 0	10 km: 0	50 km: 0	0
World Heritage (WH)	1 km: 0	10 km: 0	50 km: 0	0
Key Biodiversity Areas	1 km: 0	10 km: 0	50 km: 2	2
Alliance for Zero Extinction (AZE)	1 km: 0	10 km: 0	50 km: 0	0
IUCN Red List				14
Critical Habitat				Likely



Displaying project location and buffers: 1 km, 10 km, 50 km

This report is based on IFC Performance Standard 6 (PS6) but applies to World Bank Environmental and Social Standard 6 (ESS6)

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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
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
Sypheotides indicus	Lesser Florican	AVES	CR	Decreasing	Terrestrial
Vanellus gregarius	Sociable Lapwing	AVES	CR	Decreasing	Terrestrial

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Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
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
Ceropegia odorata		MAGNOLIOPSIDA	CR	Decreasing	Terrestrial
Manis crassicaudata	Indian Pangolin	MAMMALIA	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
Salvinia natans	Floating Fern	POLYPODIOPSIDA	LC:CR LR/LC	Decreasing	Freshwater
Dryas cametocus	Spotted Ricefish	ACTINOPTERYGII	LC:CR LR/LC	Unknown	Marine; Freshwater
Macrobrachium rosenbergii	Giant River Prawn	MALACOSTRACA	LC:CR 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
Jaisamand Lake and Wildlife Sanctuary	50 km	Yes	No	Assess for critical habitat
Phulwari Wildlife Sanctuary	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
AVES	319	20	5	7	8	14	280	0
REPTILIA	51	4	0	0	4	4	42	1
MAMMALIA	67	6	0	1	5	3	58	0
ACTINOPTERYGII	41	2	0	0	2	2	36	1
AMPHIBIA	9	0	0	0	0	0	9	0
INSECTA	45	0	0	0	0	0	44	1
GASTROPODA	24	0	0	0	0	0	24	0

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Area Taxonomic group	Total assessed species	Total (CR, EN & VU)	CR	EN	VU	NT	LC	DD
POLYPODIOPSIDA	3	0	0	0	0	0	3	0
MAGNOLIOPSIDA	40	1	1	0	0	0	39	1
LILIOPSIDA	48	1	0	0	1	0	45	2
BIVALVIA	10	0	0	0	0	0	10	0
MALACOSTRACA	3	0	0	0	0	0	3	0
ARACHNIDA	1	0	0	0	0	0	1	0
AGARICOMYCETES	1	0	0	0	0	0	1	0

Recommended citation

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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 8: Photographs of Proposed Component Locations and Existing components

Proposed Site-RWR-Bori HW

Proposed Site for CWR-Chand Pole HW

Proposed site for CWR-New Colony HW

Proposed site of STP- Near Do River, Udaipur Road

Proposed SPS site-Near Pandaya Circle

Proposed SPS site-Ashram Vatika

Proposed SPS site-Near Gap Sagar

Appendix 9: Water Test Report

OFFICE OF THE JUNIOR CHEMIST

PUBLIC HEALTH ENGINEERING DEPARTMENT, Lab.Dungarpur(Raj.)

REPORT OF THE CHEMICAL EXAMINATION OF WATER

Nil. Lab/Tech(Chem)/2018-2019/ 534 – 597 Dated : 20.08.2018

To, District: DPR

Tehsil: DPR

Assitt.Engineer

PHED City Sub Dn.Dungarpur

Reff.No./Date 1015/ 16.08.2018 Name of Sample Taker: Agn Staff

Source	Raw Water	Filter Water	Raw Water	Filter Water	
Source Location	Bari Head Works RGF	Bari Head Works RGF	Udai Villa RGF Plant	Udai Villa RGF Plant	
Village/Town/ City	Dungarpur	Dungarpur	Dungarpur	Dungarpur	
Habitation	Dungarpur	Dungarpur	Dungarpur	Dungarpur	
Village Code No.	Dungarpur	Dungarpur	Dungarpur	Dungarpur	
Date of Collection	16.08.2018	16.08.2018	16.08.2018	16.08.2018	
Date of Examination	16.08.2018	16.08.2018	16.08.2018	16.08.2018	
Lab. Sample No.	350	351	352	353	

Note :- All results Except pH are in mg/L

1	pH	7.4	7.3	7.6	7.4	
2	Turbidity (NTU)	5.0	0.3	7.0	0.2	
3	Temperature (°C)	None	None	None	None	
4	Colour (Hazen Units)	None	None	None	None	
5	Odour	N.O.	N.O.	N.O.	N.O.	
6	Total Alkalinity (as $CaCO_3$)	90	100	130	130	
7	Total Hardness (as $CaCO_3$)	100	120	140	150	
8	Calcium Hardness	60	60	80	90	
9	Magnesium Hardness	40	60	60	70	
10	Chloride (as Cl)	50	40	60	40	
11	Nitrates (as NO_3)	4	3	5	4	
12	Fluoride (as F)	0.15	0.12	0.15	0.10	
13	Total Dissolved Solids	250	280	340	350	