Initial Environmental Examination

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IND: Madhya Pradesh Urban Services Improvement Project – Water Supply Improvement Subproject in Sagar and Makronia

Package No.: MPUSIP – 6B

Prepared by Project Management Unit, Madhya Pradesh Urban Development Company, Government of Madhya Pradesh for the Asian Development Bank.

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CURRENCY EQUIVALENTS

(as of 7 November 2016)

Currency Unit	–	Indian Rupees (INR)
INR1.00	–	$0.0149
$1.00	=	INR 66.766

ABBREVIATIONS

AC	–	Asbestos Cement
ADB	–	Asian Development Bank
ASO	–	Assistant Safeguards Officer
CFE	–	Consent for Establishment
CFO	–	Consent for Operation
CPCB		Central Pollution Control Board
EA	–	Executing Agency
EAC	–	Expert Appraisal Committee
EC	–	Environmental Clearance
EHS	–	Environmental Health & Safety
EIA	–	Environmental Impact Assessment
EMP	–	Environmental Management Plan;
ESR	–	Elevated Service Reservoir
GOI	–	Government of India
GOMP	–	Government of Madhya Pradesh
IA	–	Implementing Agency
IEE	–	Initial Environmental Examination;
SMP	–	Sagar Municipal Corporation
LPCD	–	Liters per Capita per Day
MLD	–	Million Litres per Day
MOEF	–	Ministry of Environment and Forest
MPPCB	–	Madhya Pradesh Pollution Control Board
MPUDC	–	Madhya Pradesh Urban Development Company
MNP	–	Makronia Nagar Parishad
NOC	–	No Objection Certificate
PMC	–	Project Management Consultant
PHED	–	Public Health Engineering Department
PIU	–	Project Implementation Unit;
PMU	–	Project Management Unit
PO	–	Project Officer
PWD	–	Public Works Department
REA	–	Rapid Environmental Assessment Checklist
RoW	–	Right of Way
SEIAA	–	State Environmental Impact Assessment Authority
SPS	–	Safeguard Policy Statement, 2009
SMC	–	Sagar Municipal Corporation
UDED	–	Urban Development & Environment Department
ULB	–	Urban Local Body
WSS	–	Water Supply Scheme
WTP	–	Water Treatment Plant

WEIGHTS AND MEASURES

C	Degree Celsius
km	kilometer
lpcd	litres per capita per day
mm	milli meter
m	meter
mld	million litres per day
mm	millimeter
Nos	Numbers
sq.km	Square Kilometer

NOTES

(i) The fiscal year (FY) of the Government of India and its agencies ends on 31 March.
(ii) In this report, "$" refers to US dollars.

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EXECUTIVE SUMMARY

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

2. The Project outputs are as follows:

(i) **Output 1: Improved water supply infrastructure in all project towns and integrated storm water and sewage infrastructure in two towns.** This will include (i) construction of water supply facilities, using DBO model, in all project towns (the facilities will include raw water intakes, water treatment plants, overhead tanks, and distribution networks including the metered household connections); (ii) construction of sewage and storm water management systems in two national heritage tourist towns (Khajuraho and Rajnagar); and (iii) the project implementation capacity strengthening. Based on the geographic location and the size, subprojects in project towns have been grouped into 23 procurement packages to achieve the economies of scale for the contract purposes. Surface water is the source in 60 towns, while groundwater is the source in the remaining four towns. In the four towns dependent on groundwater, the Project will support recharge of groundwater and monitor sustainable use of groundwater.

(ii) **Output 2: Sustained urban infrastructure operation and management in all project towns.** This will include engagement of operators on performance-based, long-term O&M contracts and the monitoring and auditing of the service. After the construction (expected to be completed in 2 years), the contractors of the civil works packages will continue to operate and provide continuous water supply service for project towns for a period of 10 years (storm water drainage and sewage infrastructure in two towns will be managed by the respective ULBs). ADB will partially finance the O&M cost during the project period. MPUDC will pay the contractors the O&M cost on a monthly basis in both fixed fee and performance-linked variable fees according to the contract agreement. The contractor will ensure proper metering and billing, ensure adequate water pressure is maintained, and ensure supplied water complies with national standards for drinking water. The operator will also ensure that the services are responsive and ensure high customer satisfaction. The ULB's obligations include timely setting and adjusting the tariffs, collection of revenue, and managing the defaulters for ensuring cost recovery and fund management for ensuring timely payments to the contractors by MPUDC. After the O&M period of 10 years is completed, the water supply asset will be handed over to the ULBs. The contractor will also train the ULB staff so that adequate capacities are built in the ULBs to operate the transferred assets.

(iii) **Output 3: Improved institutional effectiveness and strengthened capacity in all project towns and Madhya Pradesh Urban Development Company Limited.** This will include (i) setting up of geographic information system (GIS)-based asset management and service delivery monitoring system; (ii) develop information technology systems in 15 ULB to assist them in the day-to-day

management; (iii) improvement of septage management in project towns through implementation of sanitation safety plans; (iv) capacity building of MPUDC and the project towns on managing the DBO contracts, and building up own operation capacity for managing the assets after the contract completion; and (v) conduct awareness-raising activities on water conservation, environmental protection, and hygiene in project towns.

3. The key outcome envisaged from the project is “effective urban water service delivery model rolled out in selective urban clusters of the State with the objective of achieving the following performance indicators by the year 2022.

4. **The Subproject.** An augmentation water supply scheme to the Sagar Municipal Corporation area and Makronia Nagar Palika has been prepared under ADB Programme for 685,000 souls anticipated in the year 2048. Improvement of water supply in Sagar and Makronia is one of the subprojects proposed under MPUSIP. The objective of the subproject is to achieve safe and sustainable water services both in terms of services to customers, cost recovery and conservation of precious water resources. The subproject envisages providing 100% coverage of population with continuous, pressurized and safe drinking water services and achieving progressively increasing cost recovery by expanding the coverage and increasing operating efficiency. The subproject includes civil works, project implementation and management, and non-physical investments.

5. The physical investments include the following: (i) rehabilitation of existing water treatment plant (WTP) 82.5 MLD capacity, (ii) construction of a new WTP of 5.4 MLD; (iii) new Break Pressure (BP) Tank of capacity 375 KL at Dugdugi hill (iv) Clear water gravity mains, 15.3 km (v) one ground lever service reservoir (GLSR) of capacity 3700 KL, (vi) two elevated service reservoirs (ESRs) of total capacity 3300 KL (vii) distribution network of total 255.163 km for Sagar town and 136.728 km for Makronia town, (viii) bulk flow meters, (ix) improvement of existing approach road to intake & WTP (1.2 km length) and (x) house service connections including consumer meters.

6. **Screening and assessment of potential impacts.** ADB requires the consideration of environmental issues in all aspects of the Bank’s operations, and the requirements for environmental assessment are described in ADB’s Safeguard Policy Statement (SPS), 2009. As per the GoI EIA Notification, 2006, this subproject does not require EIA study or environmental clearance. The potential environmental impacts of the subproject have been assessed using ADB Rapid Environmental Assessment Checklist for Water Supply. Then potential negative impacts were identified in relation to pre-construction, construction and operation of the improved infrastructure.

7. **Categorization.** Sagar and Makronia water supply sub project is classified as Environmental Category B as per the SPS as no significant impacts are envisaged. Accordingly, this Initial Environmental Examination (IEE) assesses the environmental impacts and provides mitigation and monitoring measures to ensure that there are no significant impacts as a result of the project.

8. **Implementation Arrangements**. Urban Development and Housing Department (UAHD) of Government of Madhya Pradesh will be the Executing Agency for the Program, responsible for management, coordination and execution of all activities funded under the loan. Implementing Agency will be the Madhya Pradesh Urban Development Company (MPUDC) of GoMP. MPUDC will implement this program via a Project Management Unit (PMU) and Project

Implementation Units (PIUs). PIUs will coordinate construction of projects. PMU and PIUs will be assisted by a Project Management Consultant (PDC). Project Officer (Environment) at PMU and Assistant Safeguard Officer (ASO) at each of the PIU will be responsible for environment management and monitoring activities, and will be supported by Environment Specialist (ES) of PMC Team. Contractor personnel will include an Environment, Health and Safety (EHS) supervisor. While the ES will be primarily responsible for preparation of safeguard documents and supervising the EMP implementation, the PO (Environment) will review, approve and oversee the compliance. At each PIU, ASO will oversee the safeguards implementation and report to PO (Environment). Specifically ASO will coordinate public consultation, information disclosure, regulatory clearances and approvals, EMP implementation and grievance redress. EHS supervisor of DBO Contractor will provide all necessary assistance to ES of PMC in updating IEEs and will supervise day-to-day EMP implementation.

9. **Description of the Environment.** Most of the project components are located in Sagar and Makronia towns and in their immediate surroundings which were converted into urban use for many years ago, and there is no natural habitat left at these sites. Existing Intake is located in Rajghat Dam, constructed across River Bebus, about 10 km south of Sagar. The existing WTP is near the dam on a government land, and the new WTP will also be located within the existing WTP campus. Site for the proposed break pressure tank is located adjacent to the existing tank on a hill (Dugdugi hill) covered thick vegetation (shrubs and bushes). All the pipelines will be located along the public roads. In the wider roads, pipelines will be laid in the earthen shoulder along the tarmac within the RoW, and in narrow roads in central town area, pipelines will be laid within the road tarmac. There are no forest areas within the towns. Many wide roads are lines with trees, which will not be removed for laying of pipelines. There are forest areas along the road leading to the dam from the town. These are hilly forest areas, however, none of the components are located in the forests, and the pipeline will be laid along the roads. Lakha Banjara Lake is a very large lake around which Sagar town is developed. This is the most famous and important water body in Sagar.

10. **Environmental Management.** An environmental management plan (EMP) is included as part of this IEE, which includes

(i) mitigation measures for environmental impacts during implementation; an environmental monitoring program, and the responsible entities for mitigating, monitoring, reporting;
(ii) public consultation and information disclosure;
(iii) a grievance redress mechanism.

11. Potential impacts were identified in relation to location, design, construction and operation of the improved infrastructure. The project do not involve any intervention or augmentation of water, as the water is sourced from the existing dam, which was built exclusively for Sagar water supply, and has adequate water storage to meet the project demand. So no source related impacts are envisaged. Existing WTP does not have proper wash water & sludge management and chlorine safety facilities, therefore these are included in the proposed project proposals. For the new WTP, these facilities are already included in the designs. Existing WTP also does not have the mandatory Consent For Operation (CFO) from the Madhya Pradesh Pollution Control Board (MPPCB), which needs to be obtained from the MPPCB for rehabilitation and further operation. During the construction phase, impacts mainly arise from the disturbance of residents, businesses, and traffic and from need to dispose of moderate quantities of waste soil. These are common temporary impacts of construction in urban areas, and there are well developed methods for their mitigation. Mitigation measures have been developed to reduce all negative impacts to acceptable levels.

12. Enhancement measures like wash water recovery, quick leak detection and rectification to save the resources, etc., are included. Construction related measures such as appropriate scheduling of works avoiding the peak hours of people movement/ gathering at important places and minimizing inconvenience by best construction methods will be employed. Traffic management plan will be prepared for pipe on busy roads. In the operational phase, all facilities and infrastructure will operate with routine maintenance, which should not affect the environment. Facilities will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only.

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

14. The stakeholders were involved in developing the IEE through discussions on-site and public consultation at several places in the city, after which views expressed were incorporated into the IEE and in the planning and development of the project. The IEE will be made available at public locations and will be disclosed to a wider audience via the ADB, MPUDC and PMU websites. The consultation process will be continued and expanded during project implementation to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation.

15. The citizens of the Sagar and Markonia towns will be the major beneficiaries of this project. With the improved water supply, they will be provided with a constant supply of better quality water, delivered at their homes with adequate pressure. The project will improve the over-all health condition of the city. People would spend less on healthcare and lose fewer working days due to illness, so their economic status should also improve, as well as their overall health.

16. **Consultation, Disclosure and Grievance Redress.** Public consultations were done in the preparation of the project and IEE. Consultations will continue throughout the project implementation period. A grievance redress mechanism is described within the IEE to ensure any public grievances are addressed quickly.

17. **Monitoring and Reporting.** The PMU and PDC will be responsible for monitoring. The PMDC will submit quarterly and semi-annual monitoring reports to PMU, and the PMU will review and send the semi-annual monitoring reports to ADB. ADB will post the environmental monitoring reports on its website.

18. **Conclusions and Recommendations.** The proposed project is therefore unlikely to cause significant adverse impacts. The potential impacts that are associated with design, construction and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures. Based on the findings of the IEE, there are no significant impacts and the classification of the project as Category “B” is confirmed. No further special study or detailed environmental impact assessment (EIA) needs to be undertaken to comply with ADB SPS (2009) or GoI EIA Notification (2006). A detailed audit of existing WTP will be conducted by the

DBO contractor during the detailed design state to check if any further strengthening of suggested measures is required to ensure the compliance with ADB SPS 2009 and government regulatory framework. Project will require consent for establishment and consent for operation for WTP from Madhya Pradesh Pollution Control Board. It will be obtained for both the existing and proposed WTPs.

I. INTRODUCTION

A. Background

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

2. The Project outputs are as follows:

(i) **Output 1: Improved water supply infrastructure in all project towns and integrated storm water and sewage infrastructure in two towns.** This will include (i) construction of water supply facilities, using DBO model, in all project towns (the facilities will include raw water intakes, water treatment plants, overhead tanks, and distribution networks including the metered household connections); (ii) construction of sewage and storm water management systems in two national heritage tourist towns (Khajuraho and Rajnagar); and (iii) the project implementation capacity strengthening. Based on the geographic location and the size, subprojects in project towns have been grouped into 23 procurement packages to achieve the economies of scale for the contract purposes. Surface water is the source in 60 towns, while groundwater is the source in the remaining four towns. In the four towns dependent on groundwater, the Project will support recharge of groundwater and monitor sustainable use of groundwater.

(ii) **Output 2: Sustained urban infrastructure operation and management in all project towns.** This will include engagement of operators on performance-based, long-term O&M contracts and the monitoring and auditing of the service. After the construction (expected to be completed in 2 years), the contractors of the civil works packages will continue to operate and provide continuous water supply service for project towns for a period of 10 years (storm water drainage and sewage infrastructure in two towns will be managed by the respective ULBs). ADB will partially finance the O&M cost during the project period. MPUDC will pay the contractors the O&M cost on a monthly basis in both fixed fee and performance-linked variable fees according to the contract agreement. The contractor will ensure proper metering and billing, ensure adequate water pressure is maintained, and ensure supplied water complies with national standards for drinking water. The operator will also ensure that the services are responsive and ensure high customer satisfaction. The ULB's obligations include timely setting and adjusting the tariffs, collection of revenue, and managing the defaulters for ensuring cost recovery and fund management for ensuring timely payments to the contractors by MPUDC. After the O&M period of 10 years is completed, the water supply asset will be handed over to the ULBs. The contractor will also train the ULB staff so that adequate capacities are built in the ULBs to operate the transferred assets.

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3. The key outcome envisaged from the project is "effective urban water service delivery model rolled out in selective urban clusters of the State with the objective of achieving the following performance indicators by the year 2022.

(i) Access to piped water supply coverage increased to 95% of the households from 33% in 2015 in 64 towns;
(ii) Women's drudgery for fetching water reduced by 80% (from spending an average of 55 minutes in 2015 to 10 minutes);
(iii) Coverage of households with access to improved sanitation systems increased to 80% from 30% in 2015;
(iv) Wastewater collection and/or safe sanitation service coverage increased to at least 80% of the households from 0% in 2015 in two towns;
(v) Incidence of water logging/flooding reduced to two incidents per annum in four towns; and
(vi) Women access to functioning sanitation systems increased to 95% from 25% in 2015 (in poor settlements) in four towns

B. Purpose of this IEE Report

4. ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguards Policy Statement (2009). Accordingly, this Initial Environmental Examination (IEE) has been conducted to assess the environmental impacts and provide mitigation and monitoring measures to ensure that there are no significant impacts as a result of the project.

5. This IEE is prepared for Sagar and Makronia water supply improvement project. The project includes civil works, project implementation and management, and nonphysical investments. A detailed description of the components is provided in Section III. This draft IEE is based on the detailed engineering report prepared by the Sagar Municipal Corporation and will be finalized during bidding stage to reflect any changes and latest project designs.

6. The environmental impacts of both the towns' water supply project have been identified and assessed as part of the planning and design process. An environmental assessment using ADB's Rapid Environmental Assessment Checklist for Water Supply (Appendix 2) was conducted, and results of the assessment show that the project 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.

7. The IEE was based mainly on secondary sources of information and field reconnaissance surveys; no field monitoring (environmental) survey was conducted. Stakeholder consultation was an integral part of the IEE.

C. Report Structure

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

II. DESCRIPTION OF THE PROJECT

A. Project Area

9. Project area comprises of the urban area and surroundings of the Sagar Municipal Boundary in Sagar District in Bundelkhand Region of Madhya Pradesh State. Population of Sagar is 2, 73,357 (2011 census). The developed area is only 928 hectare which is about 28%.

10. Makronia is Nagar Palika Parishad and developing town of the District Sagar. The town lies 5 km away from District head quarter Sagar. Makronia is newly constituted Nagar Palika Parishad in April 2015. The Nagar Parishad include Makronia and four other villages namely 1.) Badtuma 2.) Rajakhedi 3.) Gamaria 4.) Semarbag. Population of Makronia is 61,821 as per 2011 census (including four villages).

Figure 1: Location of Subproject Area

B. Existing Water Supply Situation

1. Sagar

11. Existing water supply system in Sagar is based on Rajghat dam, which was constructed across River Bebus, flowing in the south at about 10 km from the town. Existing water supply system in Sagar is based on Rajghat dam, which was constructed across River Bebus flowing in the south at about 10 km from the town. This was constructed in 1990's exclusively for the water supply of Sagar city. This is an earthen dam with a spill way.

12. There is an existing Intake Well of 12 m diameter 31 m height with 150 meter long RCC approach bridge. Water from the dam is pumped to the WTP constructed near the dam. The capacity of WTP is 82.5 MLD. Water from the WTP is pumped to the City for supply of water. Water is also supplied to Markonia town; at present 4.5 MLD water is supply to Makronia. A clear water pumping main of 1000 mm diameter and 8,100 meter long of MS pipe supplies water to the town from the WTP.

13. There are 5 elevated service reservoirs (ESRs) in the town. Existing distribution network consists of 150mm to 500mm diameter Asbestos Cement (AC) and cast iron (CI) pipes, and the total length of network in Sagar is 212 km. Present per capital supply is 55 LPCD

Table 1: Existing Distribution details of SMC

S.No.	Distribution	Length	Remarks
1.	Pipeline laid during 2003-2005 (i) CI pipe (ii) AC pipe	 40.315 km 33.285 km	 Available for reuse Leaking, and damaged, and to be discarded
	CI & AC pipe line laid as per old scheme of 1958	139 km	To be discarded Badly damaged
2.	Pipe available for reuse	40.315 km	

14. **Makronia:** Presently Makronia water supply is based on both the ground water and surface source (Rajghat dam). The water is extracted from ground through 3 tube wells located at different location in the town. Besides, there are 76 hand pumps exist in the town out of that at present only 22 are working. The tube wells water quality is deteriorated during summer due to over drawl water and its levels are going down during summer period resulting in poor yield. Town has one ESR of 450 KL, constructed in 2008. The Town is getting 4.5 MLD treated water daily from Rajghat WTP source through tapping point near Civil line (Junction A). The entire town presently is not getting adequate quantity of water as per the standard norms. Town is not fully covered by distribution of pipe line.

15. Overall, although Sagar and Makronia are blessed with good water source with adequate water to meet the demand including the treatment facilities, the water supply to the consumers is not satisfactory. The existing system is mainly suffering from the low coverage, old distribution system, inadequate storage infrastructure and heavy water losses.

C. Proposed Project

16. **Water Demand**. The total water demand of the Sagar Municipal Corporation and Makronia Nagar Parishad is as under. The ultimate demand is estimated as 92.9 MLD for the year 2048, which include 70 MLD for Sagar and rest 22.9 MLD for Makronia.

Table 2: Projected Population and Water Demand

	2018	**2033**	**2048**
Sagar			
Projected Population	300,863	362,848	428,986
Projected raw Water Demand (MLD)	49.10	59.20	70.00
Makronia			
Projected Population	75005	109513	147532
Projected raw Water Demand (MLD)	11.64	17.00	22.90
Total	**60.74**	**76.2**	**92.9**

D. Proposed Project

17. **Proposed project components**. As in the existing condition, it is proposed to continue the same combined bulk water system for both the downs from the Rajghat Dam and treatment at the existing WTP. Necessary rehabilitation works will be carried out at the existing WTP, and also a new WTP with 5.4 MLD capacity will be constructed to meet the ultimate demand. Treated water from the WTP will be pumped to clear water reservoir at Dudugi hill, where an additional reservoir will also be developed. There will be two off-take clear water mains from the Dugdugi hill storage reservoirs – one for Sagar and the other for Makronia. These off-takes will

convey water to the elevated service reservoirs in respective towns for distribution to consumers.

18. **Water Source**: The proposed water supply project will utilize the existing Rajghat dam, which was an exclusive water supply source for Sagar (urban agglomeration), Makronia and Sagar Cant area. The dam is owned and operated by SMC. Salient features of the dam are given below. The storage is adequate to meet the projected water demand of the towns.

- Name - Rajghat Dam
- Source -- River Bebus
- Catchment area - 472 Sq. km
- Type of dam - Earthen dam
- Length of dam - 1680 meter
- Height of dam - 25.5 meter
- Water storage capacity - 62.7 MCM
- Dead storage - 16 MCM
- Balance Storage - 46.7 MCM
- Net Storage after seepage, evaporation losses & theft - 33.40 MCM

19. Following Table 3 shows the nature and size of the various components of the project. Location of project components and conceptual layout plans are shown in Figure 2 to Figure 7.

Table 3: Proposed Water Supply Scheme Components

Sr. No	Infrastructure	Function	Description	Location
1	Raw water pumps	To draw raw water from source for treatment	3 nos. vertical turbine pumps of 210 KW each; pump head 30 m	Pumps will be installed in the existing intake in Rajghat dam. Intake is approachable by a bridge connecting to the road and intake.
2	Clear water pumps	Transmission of clear water with adequate pressure	3 nos. centrifugal pumps of 720 KW each; pump head 108 m	Pumps will be installed at the existing clear water pumping station in the WTP campus near the dam. The site is owned by SMC
3	Rehabilitation & repairs of existing WTP	Treatment of raw water as per standard norms	To be provided during detailed design by DBO contractor.	Existing WTP is located near the dam. This is owned by SMC
4	Water treatment plant	Treatment of raw water as per standard norms,	WTP 5.4 MLD capacity • 1 Clarriflocculator • 2 Rapid sand Filter beds • Wash water recovery & sludge management systems • Water quality laboratory	This will be constructed adjacent to the existing WTP. Adequate land is available in the campus.
5	Rehabilitation of approach road to WTP and dam/intake well	To safe and easy access	Reconstruction of bituminous road: 1.2 km length	Road connecting from main road to dam/WTP; reconstruction will be within the right of way, owned by government

Sr. No	Infrastructure	Function	Description	Location
6	Reservoirs	To distribute clear water with standard pressure	• Break pressure tank - capacity 375 KL • 1 ground level service reservoir (GLSR) - 3700 KL • 2 ESRs- 900 KL & 2400 KL	On Dugdugi hill outside the town, and en route to Rajghat dam; land owned by Revenue Department Near Jhiriya mata temple within the town; land is vacant & owned by SMC At Shanichari ward and Pant nagar within in the town. Land is vacant & owned by SMC
7	Clear water mains	Transmit clear water from WTP to service reservoirs	Sagar: • 1.837 km length gravity main (DI pipe of 350 mm dia) • 0.199 km DI 300 mm dia to Moti Nagar ESR Makroniya: • 13.260 km length gravity Main DI pipe of dia 600 mm	Along the public roads within the right of way from civil line chauraha to Shanichari ESR, and to Moti Nagar ESR Along the public roads within the right of way from Dugdugi BPT to Exisiting OHT in Makroniya Town
8	Distribution network	To distribute potable water to the consumer	Sagar • 229.573 km;- 100 – 600 mm diameter DI pipes (90% are less than 200 mm diameter) • 25.59km; 100-360 mm diameter HDPE pipes (90% less than 200 mm) Markonia • 136.728 km; 90-700 mm DI & HDPE pipes (80% are less than 200 mm diameter)	Pipes will be laid underground along the public roads; this work will cover entire area of the towns; in narrow roads, where there is no place, the pipeline will be laid within the tarmac; where the roads are very wide (15m or more), the pipelines will be laid on both sides of the road
9	Bulk Water Meters	Monitor water flow in the improved network	To be provided during detailed design	Fixed at strategic locations at source, WTP, ESRs, DMA inlets etc., bulk meters will be fixed in pipe sections
10	Consumer connection with flow meters	Provide water to consumers and measure water usage	Consumer connection with meters • 60,173 nos. in Sagar • 15,001 nos. in Makronia	Water delivery pipe (MPDE of dia 20 - 25 mm) will be connected to distribution lines and meters will be attached to the delivery pipe at each house with a meter chamber

20. **Project benefits.** The subproject aims to achieve safe and sustainable water services both in terms of services to customers, cost recovery and conservation of precious water resources. The subproject will provide continuous, pressurized and safe drinking water services to entire population of the towns (100% coverage). Besides achieving progressively increasing

cost recovery by expanding the coverage and increasing operating efficiency, the subproject will improve the overall environmental quality of the town. It will reduce the reduced time and costs of households in accessing alternative sources of water, and will lead to better public health particularly reduction in waterborne and infectious diseases.

E. Implementation Schedule

21. After the approval of the detailed project report, bid will be prepared and tenders are likely to be invited by October 2016, and the contract will be awarded by April 2016. Construction is likely to start in March 2018, and will take about 24 months.

Figure 2: Schematic Detailed Map of Sagar WSS

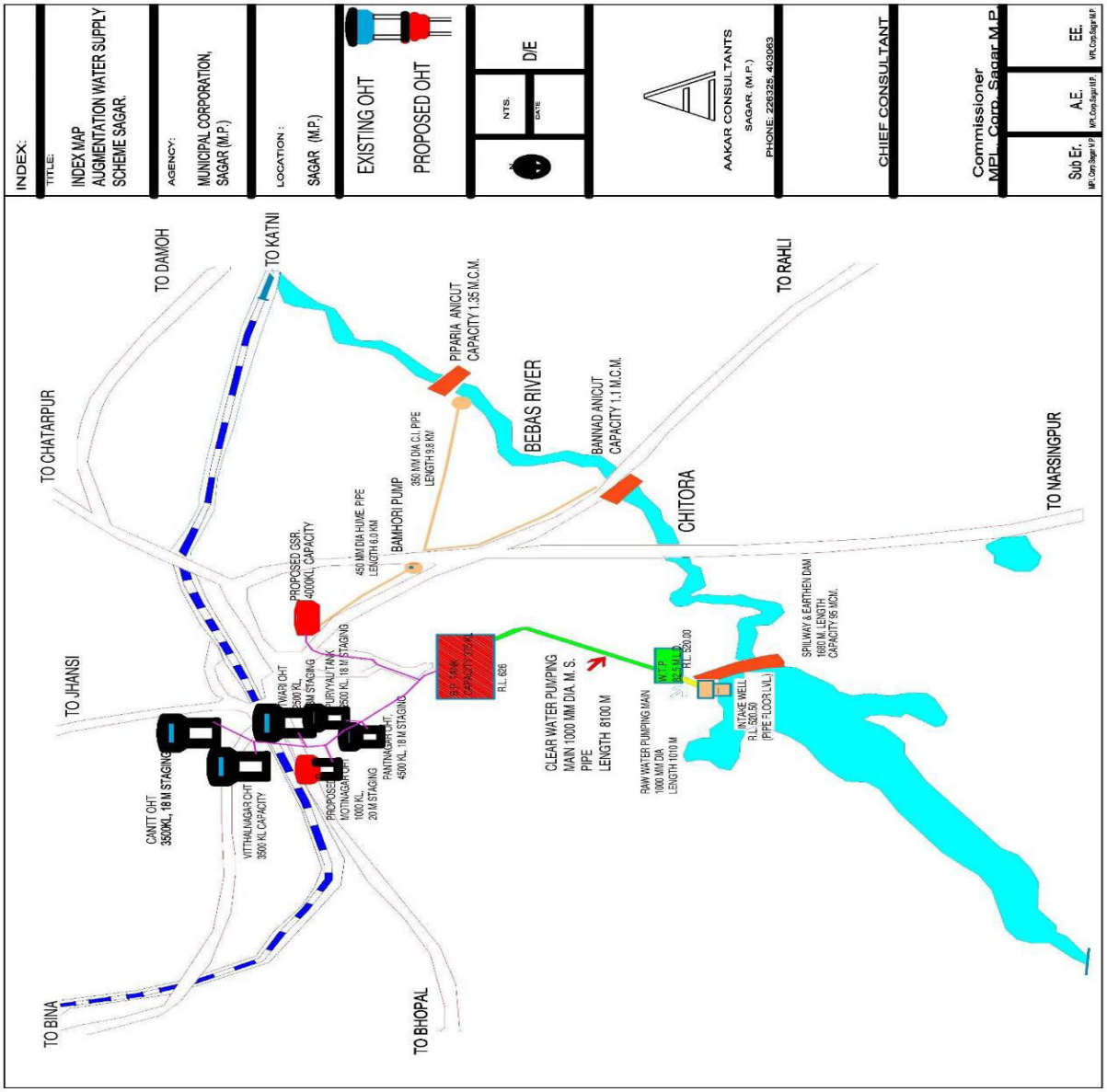


Figure 3: Proposed WTP site at Rajghat Dam

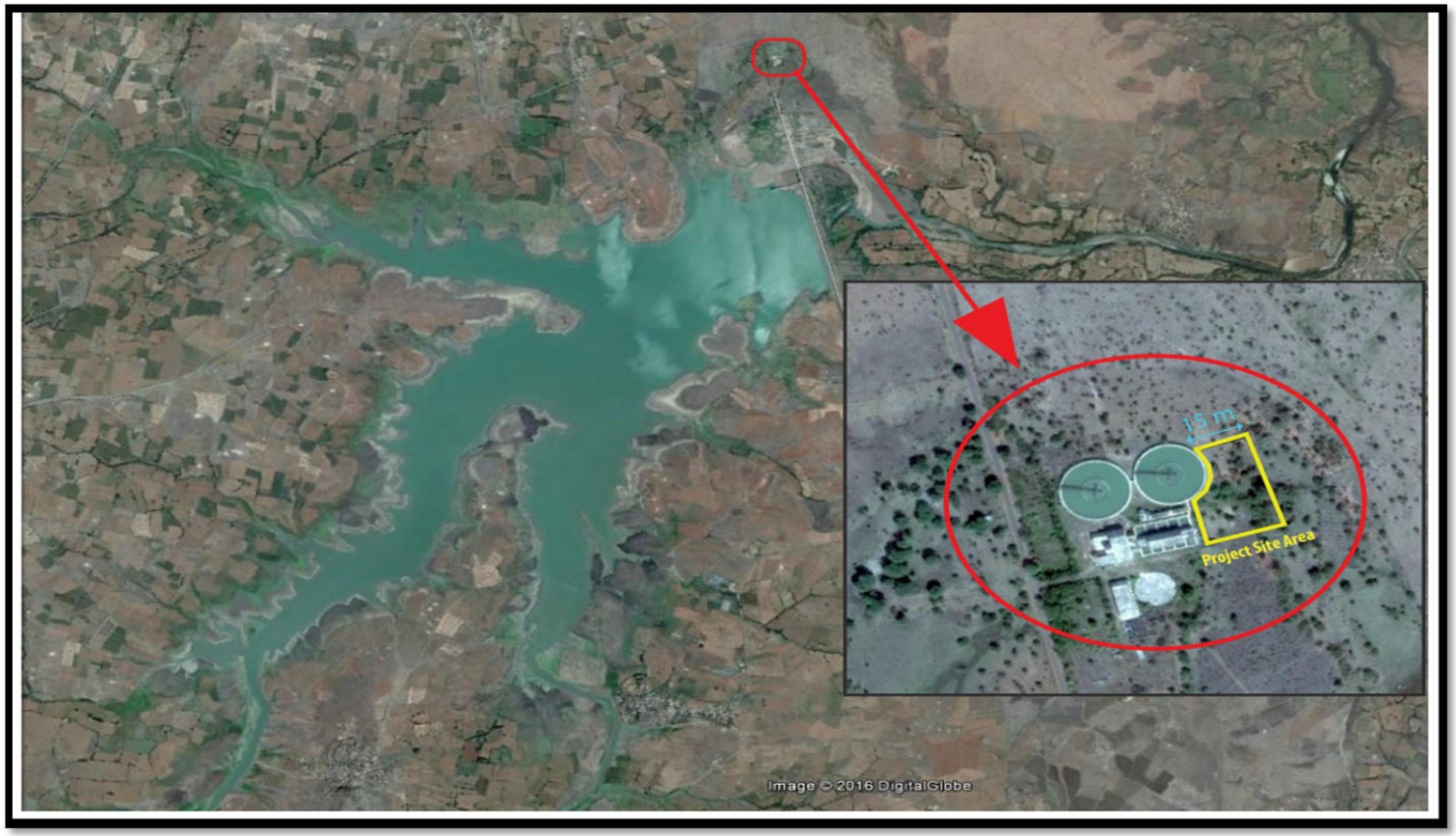


Figure 4: Proposed Transmission Network of Sagar WSS

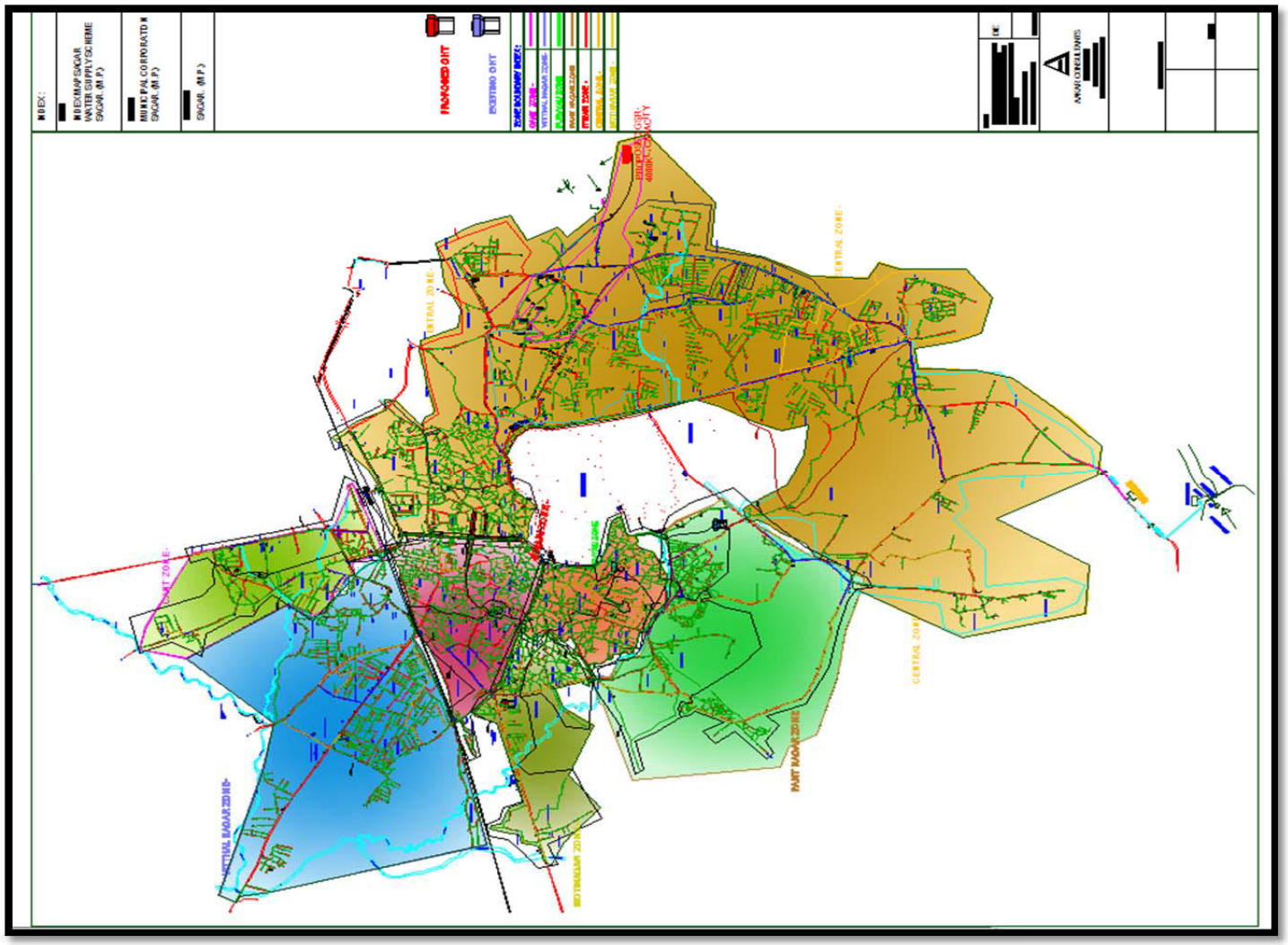


Figure 5: Flow Diagram of Existing and Proposed WTP

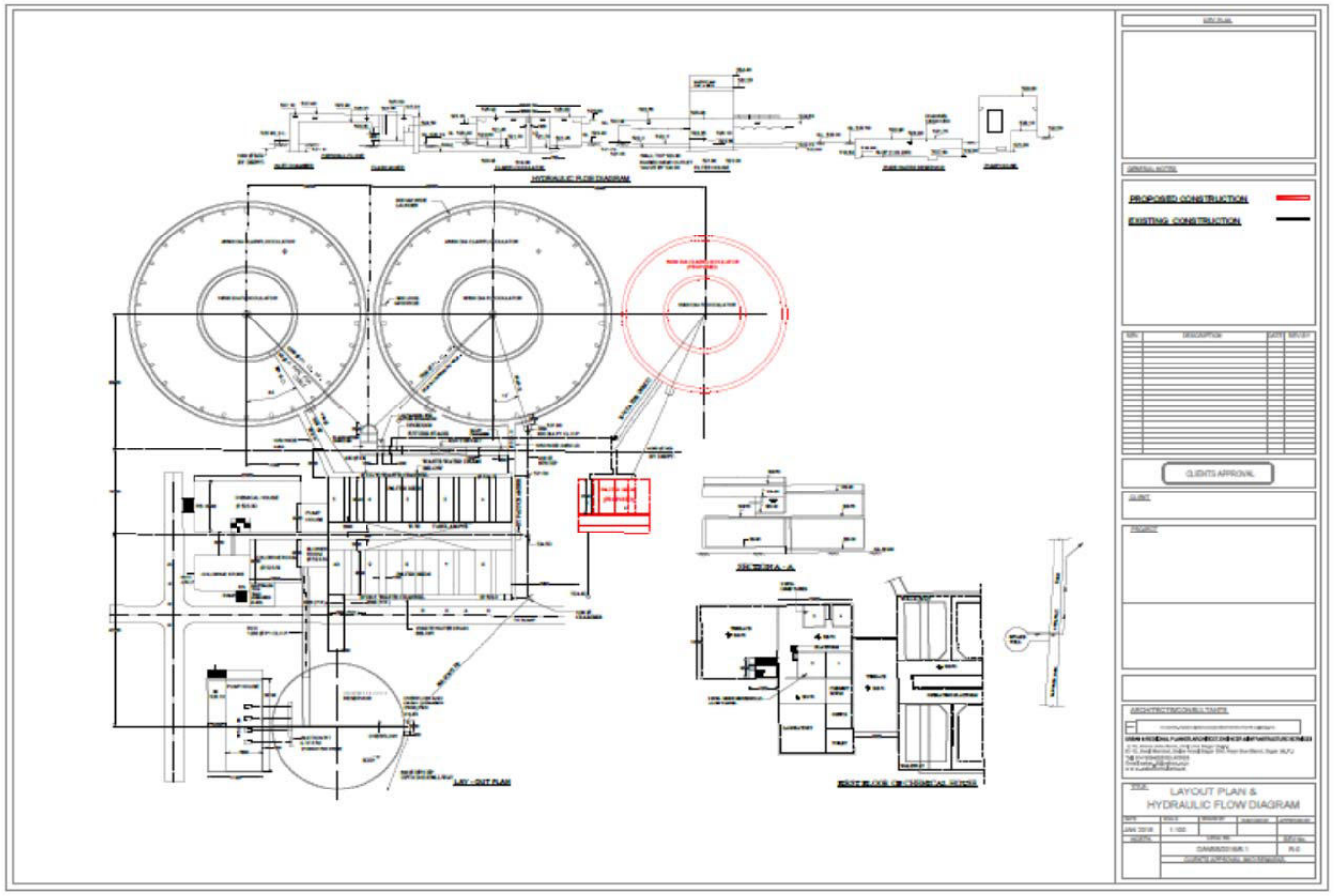


Figure 6: Flow Diagram for Makronia WSS

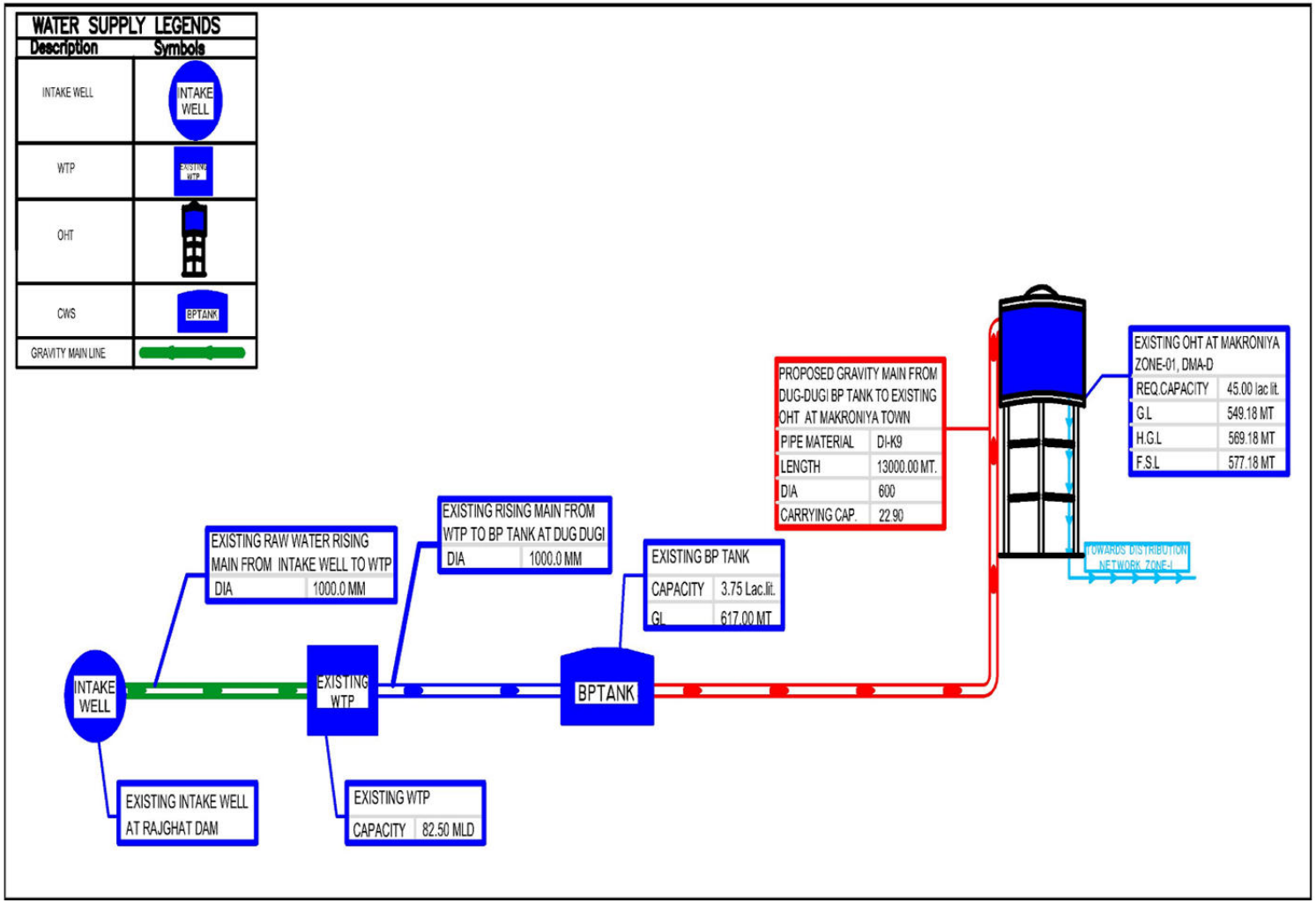
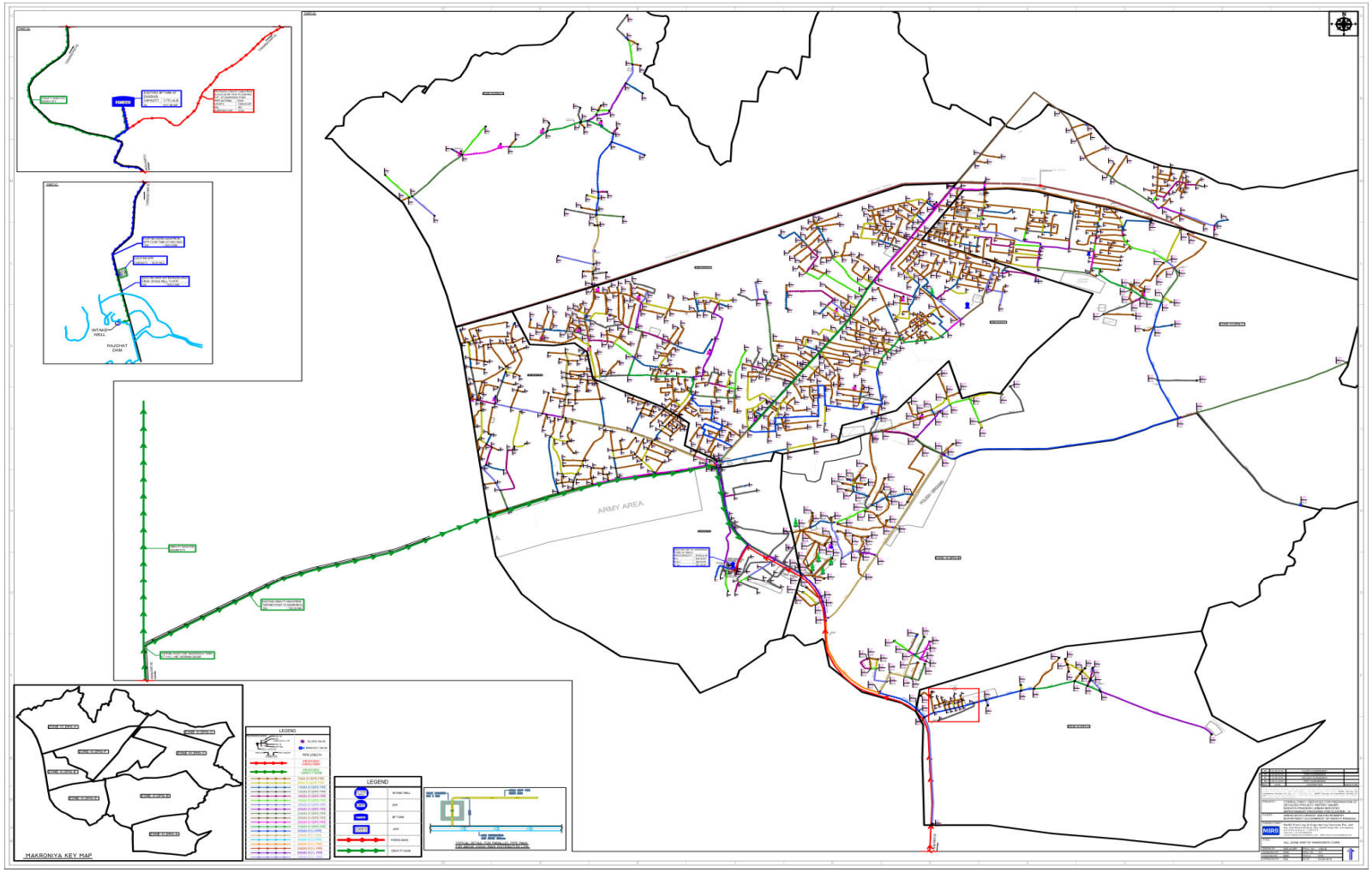


Figure 7: Distribution Map of Makronia WSS



III. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. ADB Policy

22. ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB SPS, 2009. This states that ADB requires environmental assessment of all ADB investments.

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

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

24. **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.

25. **Public disclosure.** ADB will post the safeguard documents on its website as well as disclose relevant information in accessible manner in local communities:

(i) for environmental category A projects, 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 implementing agency during project implementation upon receipt.

B. National Environmental Laws

26. **Environmental assessment.** The GoI EIA Notification of 2006 (replacing the EIA Notification of 1994), sets out the requirement for Environmental Assessment in India. This states that Environmental Clearance (EC) is required for specified activities/projects, and EC must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorized as A or B1 or B2 depending on the scale of the project and the nature of its impacts. None of the components of this water supply subproject

falls under the ambit of the EIA Notification 2006, and, therefore no category assigned, and thus no EIA study and EC required for the subproject.

Table 1.7.1- Noise Level Guidelines[54]		
	One Hour L_{Aeq} (dBA)	
Receptor	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential; institutional; educational[55]	55	45
Industrial; commercial	70	70

27. **Applicable environmental regulations.** Besides EIA Notification 2006, there are various other acts, rules, policies and regulations currently in force in India that deal with environmental issues that could apply to infrastructure development. The specific regulatory compliance requirements of the subproject are shown in Table 4.

Table 4: Applicable Environmental Regulations

Law	Description	Requirement
Madhya Pradesh State Water Policy, 2003	Prepared in accordance with the National Water Policy, it states that "for environmental balance, skillful and planned management of all types of developmental activities, economic use on equitable basis and in view of the prime importance of water for all human and other living beings, an effective and sound water policy is necessary". Policy is detailed in 17 sections dealing with different aspects of water resources. No. 7 deals with Water Allocation Priorities, and according to which drinking water supply shall have the highest priority followed by irrigation, power, tourism, etc. Water Resource Department is nodal department for permitting different uses of water resources. Policy also states that "clear provision for reservation of drinking water shall be made in irrigation projects"	Dam is under ownership of SMC. Dam is already used as source for Sagar and Makronia.
Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments	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 and assigning to CPCB/SPCBs powers &functions relating to water pollution control. Control of water pollution is achieved through administering conditions imposed in consent issued under to this Act. These conditions regulate the quantity and 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) & Consent to Operate (CTO) under Section 25 from Madhya Pradesh Pollution Control Board (MPPCB)	No consent from MPPCB obtained for the existing 82.5 MLD WTP. PIU/ULB to liaison with MPPCB and obtain valid consent. For the proposed new WTP (5.4 MLD) require CFE (prior to start of constriction) and CFO (prior to start of operation) from MPPCB. Application has to be submitted online at http://www.mppcb.nic.in/xgn.html
Environment (Protection) Act, 1986 and CPCB Environmental Standards.	Emissions and discharges from the facilities to be created or refurbished or augmented shall comply with the notified standards	Appendix 4 provides applicable standards for ambient air quality. Appendix 5 provides vehicular emission norms

Law	Description	Requirement
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 6 provides applicable noise standards.
Municipal Solid Wastes Management Rules, 2016	Rules to manage municipal solid waste generated; provides rules for segregation, storage, collection, processing and disposal.	Solid waste generated at proposed facilities shall be managed and disposed in accordance with the MSWM Rules
Construction & Demolition Waste Management Rules, 2016	Rules to manage construction & to waste resulting from construction, remodeling, repair and demolition of any civil structure. Rules define C&D waste as waste comprising of building materials, debris resulting from construction, re-modeling, repair and demolition of any civil structure.	Construction & demolition waste generated from the project construction shall be managed and disposed as per the rules
Labor Laws	The contractor shall not make employment decisions based upon personal characteristics unrelated to job requirements. The contractor shall base the employment relationship upon equal opportunity and fair treatment, and shall not discriminate with respect to aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment or retirement, and discipline. The contractor shall provide equal wages and benefits to men and women for work of equal value or type.	Appendix 8 provides applicable labor laws including amendments issued from time to time applicable to establishments engaged in construction of civil works.

28. **ADB SPS Requirements.** During the design, construction, and operation of the project the PMU and PIUs are required to apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines. 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. International acceptable air and noise quality guidelines are provided below:

Table 5: WHO Ambient Air& Noise Quality Guidelines

Table 1.1.1: WHO Ambient Air Quality Guidelines[7,8]		
	Averaging Period	Guideline value in µg/m³
Sulfur dioxide (SO_2)	24-hour 10 minute	125 (Interim target-1) 50 (Interim target-2) 20 (guideline) 500 (guideline)
Nitrogen dioxide (NO_2)	1-year 1-hour	40 (guideline) 200 (guideline)
Particulate Matter PM_{10}	1-year 24-hour	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20 (guideline) 150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline)
Particulate Matter $PM_{2.5}$	1-year 24-hour	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) 10 (guideline) 75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline)
Ozone	8-hour daily maximum	160 (Interim target-1) 100 (guideline)

IV. DESCRIPTION OF THE ENVIRONMENT

A. Methodology Used for Baseline Study

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

30. The literature survey broadly covered the following:

(i) Project details, reports, maps, and other documents prepared by technical experts of the Sagar Municipal Corporation and Makronia Nagar Palika.
(ii) Discussions with Technical experts of the Sagar Municipal Corporation & Makronia Nagar Palika, and relevant government agencies like, MPPCB, etc.
(iii) Secondary data from previous project reports and published articles, and
(iv) Literature on land use, soil, geology, hydrology, climate, socioeconomic profiles, and other planning documents collected from Government agencies and websites.

31. **Ocular inspection.** Several visits to the project sites were made during IEE preparation period in 2016 to assess the existing environment (physical, biological, and socioeconomic) and gather information with regard to the proposed sites and scale of the proposed project. A

separate socioeconomic study was conducted to determine the demographic information, existing service levels, stakeholder needs and priorities.

B. Physical Resources

1. Location, Area& Connectivity

32. Project area comprises of the urban area and surroundings of the Sagar Municipal Boundary in Sagar District in Bundelkhand Region of Madhya Pradesh State. Population of Sagar is 273,357 (2011 census). Sagar Municipal was upgraded to Nagar Palika Nigam in January 1981. Presently Nagar Nigam has total 48 wards spread over an area of 3375 hectare. The developed area is only 928 hectare which is about 28%.

33. Makronia is Nagar Palika Parishad and developing town of the District Sagar. Population of Makronia is 61,821 as per 2011 census. The town lies 5 km away from District head quarter Sagar. Makronia is newly constituted Nagar Palika Parishad in April 2015. The Nagar Parishad includes Makronia and four other villages namely 1.) Badtuma 2.) Rajakhedi 3.) Gamaria 4.) Semarbag.

2. Topography, Soils and Geology

34. The Sagar and Makronia cities lies on Deccan trap and Vindhyan rock formations. The ranges of the hills are the dominant features of the topography of the area. The Patharia range, which touches the town boundary in southeast, is tiny of short of Vindhyas and is supposed to be highest hill in the area. The Patharia hills attain the maximum height. The other important hills are Tendu Dabar, Purbiyao Tori, Collectorate hill, Lal Korti hill, Hattens folly hill, Sukrawari hill, Ramjhiria hill, etc.. These various hillocks have restricted the physical growth of the town to certain extents.

35. The general geology of Sagar and Makronia comprises of Laterite, Deccan Trap, Lametas and Vindhyans. In general the whole Sagar tehsil is comprises of Deccan trap. The Vindhyans comprise the rocks of upper Rewa series. Intortrapean lime stone is also found. The geological properties of trap are complex in the region.

3. Seismology

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

4. Climatic Conditions

37. The Climate is usually dry except in the southwest monsoon. The monsoon season commences in mid-June and continues till September. This period is characterized by heavy rains, relatively high humidity and high wind velocity. About 90% of the annual rainfall is received during this period. The monsoon is followed by a brief post-monsoon period (October-November) when temperature remains high and the humidity decreases considerably; only a nominal precipitation occurs and wind velocity is also lower. Winter starters from late November and continues up to February. It is characterized by low temperature, and moderate relative humidity. The maximum temperature is recorded in the month of May-June and minimum temperature in the month of January. The town minimum temperature during winter months

ranges from 9.1°C to 26.3 °C, while maximum temperature is recording during the summer ranging from 26.9 °C to 42.4 °C.

38. South west monsoon reaches this area during middle of June. The average rain fall of the town is 1100 mm. Sagar falls under river Ganga basin. During the monsoon period district receive 90% of annual precipitation.

5. Surface Water

39. Lakha Banjara Lake, believed to be named after the person that constructed it in the 11th Century, is an integral part of the city. The city is developed around the lake. Forming the central part of the town, the lake extends to nearly 1.1 sq. km, with catchment area of 5.88 sq. km. Maximum water depth is about 5.5 m, and water is usually at maximum level towards the end of monsoon season. Though this lake was once served as main water supply source to Sagar town, it is presently polluted due to entry of waste water, illegal dumping of solid waste, and activities washing of cattle, bathing etc.,

40. Another important water body near the town is Bebus River, which is a tributary of Betwa river. Bebus flows in the south, 10 km from the town. Rajghat dam constructed across this river is the main source of water supply to the town. Water quality is good.

6. Ground Water

41. Sagar and Makronia come under Bhundelkhand region. This region is covered by Bhundelkhand granite in northern part with thin soil cover. This region is very hard and compact with well-developed joints. These joints were open at the surface and persist to about 20m below the surface. Ground water in this region also occurs in weathered mantle in joints and fracture under water table condition and can sustain well having up to 2lps discharge. Ground water in the alluvium also occurs under water table conditions.

42. Ground water level in this region ranges from 4.5 to 14.57 mbgl during pre-monsoon. Shallow water level in the district is less than 6m in north eastern and south eastern part of the district. Whereas in northern and southern parts the deepest water level recorded was 14.5mbgl. whereas in the post monsoon period the water level ranges from 2.5mbgl to 12.5mbgl with a shallow water level of less than 5 m.

7. Air Quality

43. There is no data on ambient air quality in Sagar and Makronia Towns, which are not subject to monitoring by the Madhya Pradesh Pollution Control Board (MPPCB) as there are no major industries. Located in the semiarid drought prone Bundelkhand region, particulate matter is likely to be high, particularly during summer months. Traffic is the only significant pollutant, so levels of oxides of sulphur and nitrogen are likely to be well within the National Ambient Air Quality Standards (NAAQS).

44. During the construction and laying of water distribution network, ESR and WTP, there will be temporary increase in the level of suspended solids particle and other minute particles from the construction activity and construction material. The residual impact will not be significant and also a short term impact will not have an adverse impact on the residents. No field monitoring (environmental) survey was conducted however, the environmental monitoring program developed as part of the environmental management plan (EMP) will require the

contractors to establish the baseline environmental conditions prior to commencement of civil works. The results will be reported as part of the environmental monitoring report and will be the basis to ensure no degradation will happen during subproject implementation.

C. Ecological Resources

45. Project area mostly comprises urban areas and surroundings of Sagar and Markonia, which are converted to human use many years back. Extent of forest areas in the project area is very limited, and none of the project components are located in the forest areas. The forest areas are confined to low forested hilly areas around the town. None of the subproject components are located in these forests. Forests are mostly covered with teak and mixed tree cover.

D. Economic Development

46. Sagar is an important city of MP located in the backward Bundelkhand region. It acts as a regional commercial node for the entire region, it is centrally located, and has good connectivity with 4 important roads (2 national highway NH 26A & NH 86, and 2 state highways SH14 & SH 15) passing through the city. The city is also connected through Bina-Katni broad gauge line of Central Railways. Administratively, Sagar is divisional headquarter for the five districts of Sagar, Damoh, Panna, Tikamgarh and Chhatarpur, and has evolved as important commercial, educational and service centre in the state. Sagar is famous for its educational institutes, hospitals and market areas. The regional economy is fully agricultural based, and Sagar is the nodal centre for agricultural market.

47. From the industrial point of view Sagar quite backward since there are only few major industries and few small scale industries in or near by area of the town. There are Soya factory, Plastic Factory, Stainless steel for making steel utensils, Soap factory, Oil mills, Agarbati Udyog and Bidi Udyog, etc., Makronia is predominantly an agricultural economy, and there are large tracts of municipal area is still under the agriculture.

48. Total area of the city is 33.75 sq. km housing 273,357 populations (2011 census). Due to presence of low hilly area of Vindyan sandstone inliers in the south, city growth towards this side is restricted. There is a cantonment area in the northwest of the city. Due to these the town development is very dense. Cantonment area houses population of 40,513 (census 2011).

49. Sagar is known for famous educational institutes. Dr. Harisingh Gour University in the city is one of the oldest universities. The City is also home for the Mahar Regiment Centre and Infantry Divisional Headquarter, which were established in 1949 and 1966 respectively.

1. Infrastructure

50. **Roads.** The total road length in the Sagar city is about 366 km. Roads are very narrow in the old town. The main roads, where there are commercial and transport activities, are congested with pedestrians, traffic and activities. The Sagar city has huge traffic volumes along Teenbatti- Radha talkies road, civil line- Teenbatti road and Kabulapul- Rahatgarh railway crossing. The core city area is highly congested with narrow streets, vehicles, pedestrians, hawkers and vendors, etc., Makronia is newly constituted Nagar Palika Parishad in April 2015. The Nagar Parishad includes Makronia and four other villages namely 1.) Badtuma 2.) Rajakhedi 3.) Gamaria 4.) Semarbag. Data on road length is not readily available.

51. **Sewerage.** There is no sewerage collection and treatment system in the towns. Households mainly depend on individual sanitation systems like pit latrines, septic tanks etc. Open defecation is also prevalent in the project area. Septage from septic tanks is collected by mobile tankers with suction arrangement. Improvement of sewerage and sanitation systems in the city is being taken up under the centrally sponsored AMRIT scheme.

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

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

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

E. Socio- economic Profile

55. **Sagar.** According to the census, the population of Sagar was 273,296 in 2011, increased from 232,133 in 2001, which shows an increase of 17.7 % over the decade. Overall literacy is 89.44% (higher than the state average of 69.3%). The literacy figures are reported at 93.68% for males and 84.79% for females. The sex ratio is 914 females per 1000 males, less than the state average of 918. With an area of 33.7 sq. km under the municipal limits, average population density is 8882 persons/ sq. km, but this varies across the city with very high densities in the ore area of the city.

56. Population of Makronia as per 2011 census was 61,821.

F. History, Culture & Tourism

57. There are two school thoughts of how the name Sagar came into existence. It is believed that name “Sagar’ is the modified form of “Saugor”, which is said be formed from two words: sau meaning 100 and gahr meaning forts; the region is known for large number of forts. It is also believed that Sagar is originated from Hindi word Sagar meaning lake or sea. The history of Sagar dates back to circa 1660 AD when Udan Shah, a descendant of Nihal Shah, built a small fort and founded a village close to it called Parkota which is now part of town. Subsequently, it came under the possession of Peshwas. In 1818 AD, a greater part of the district was ceded by the Peshwa Baji Rao II to the British.

58. Lakha Banjara Lake (also known as Sagar Lake) in the heart of the city is a popular local tourist spot. The city is famous for various temples situated in and around Sagar. However, there are no protected or notified monuments in and around the city.

Figure 8: Site Environmental Feature

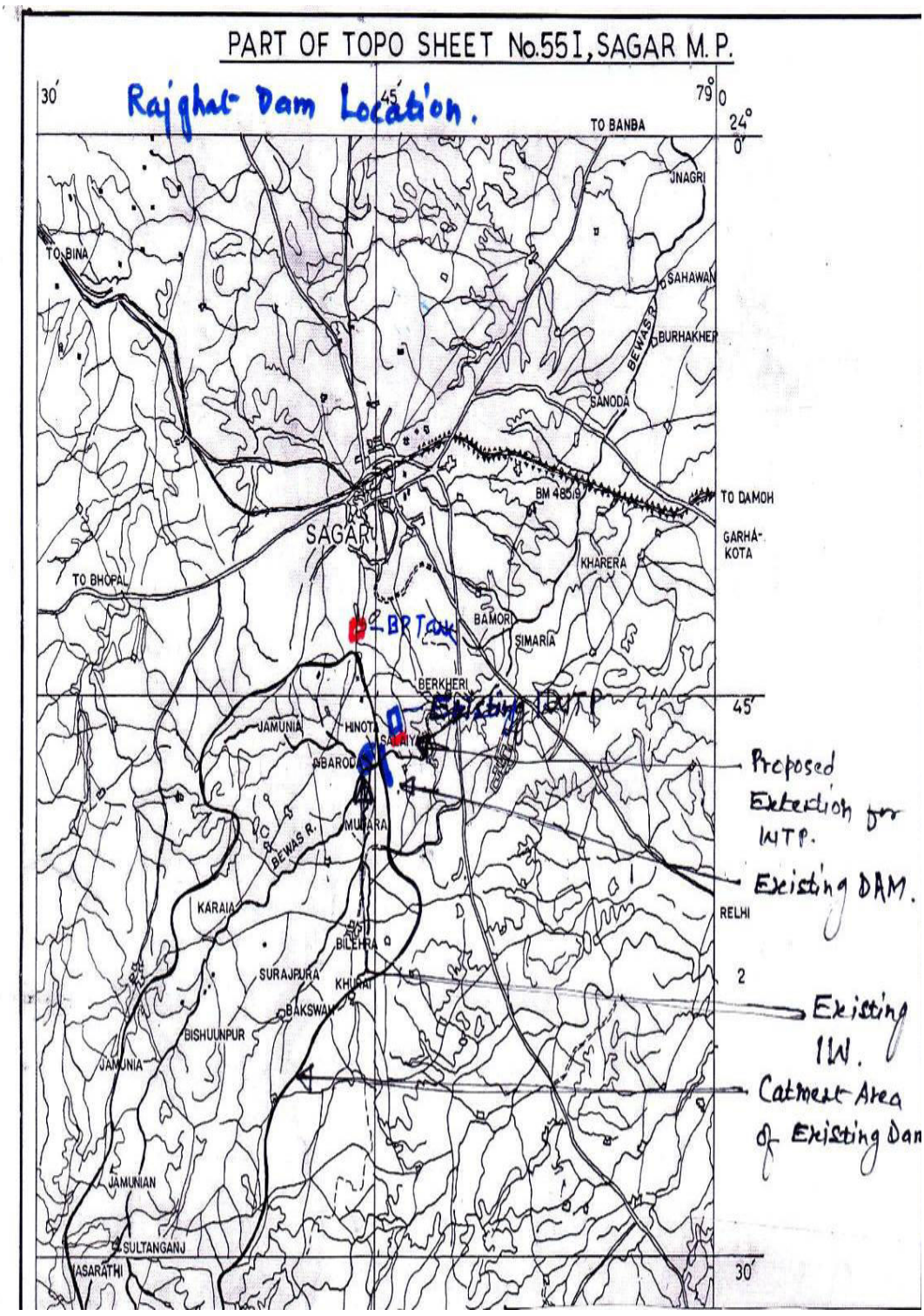


Table 6: Site Environmental Features

S. No	Infrastructure	Location & Environmental Features	Site Photograph
1	WTP site	WTP site is located adjacent to the existing WTP campus; site is currently vacant, and covered with shrubs and bushes and sparse tree cover.	
2	BP Tank	BP Tank of capacity 375 KL is proposed at RL of 604.00 m at Dugdugi hill is being proposed.	
3	Reservoirs	1. ESR at Rajeev ward (Motinagar): 900 KL ESR is proposed at motinagar, land is vacant and free of vegetation. Land owned by SMC.	
4		2. ESR- 2400KL: 2400 KL ESR is proposed at Sanichari hill. Land is under possession of revenue department and vacant. This is located opposite the lake; site is presently covered with rubble and debris. One old dilapidated building is adjacent to the site. Construction needs to be done carefully by choosing proper method so that there is no impact on the old building.	

S. No	Infrastructure	Location & Environmental Features	Site Photograph
5		3. GLSR- 3700 KL: 3700 KL GLSR is proposed at university, proposed site is vacant and no vegetation covers at proposed site. There is one old transformer and electric poles, which needs to be dismantled.	
6	Transmission lines and Distribution network	Transmission pipelines will be mostly laid along the main roads. Pipes will be laid underground. Pipes will be laid within the road right of way (ROW) - in road's earthen shoulder in wider roads, and within the carriageway in narrow roads, where there is no space. Roads in the old part of the town are quite narrow and pipes will be laid mostly in the center of the road. There is no forest land within the prescribed limit of the town. Hence there is no involvement of Forest land or required any permission for implementing this project. There is no tree cutting involved during construction period.	

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Introduction

59. 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.

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

(i) **Location impacts** include impacts associated with site selection and include loss of on-site biophysical array and encroachment either directly or indirectly on adjacent environments. It also includes impacts on people who will lose their livelihood or any other structures by the development of that site.

(ii) **Design impacts** include impacts arising from Investment Program design, including technology used, scale of operation/throughput, waste production, discharge specifications, pollution sources and ancillary services.

(iii) **Construction impacts** include impacts caused by site clearing, earthworks, machinery, vehicles and workers. Construction site impacts include erosion, dust, noise, traffic congestion and waste production.

(iv) **O&M impacts** include impacts arising from the operation and maintenance activities of the infrastructure facility. These include routine management of operational waste streams, and occupational health and safety issues.

61. 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).

62. 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.

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

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

B. Pre-Construction Impacts – Design & Location

65. **Design of the Proposed Components.** Technical design of the (i) water treatment plant; (ii) raw water and clear water mains repair, (iii) storage reservoirs, and (iv) distribution network, connections and other items like flow meters, follows the relevant national planning and design guidelines, focusing on providing a robust system which is easy to operate, sustainable, efficient and economically viable. Following environmental considerations are included in the project:

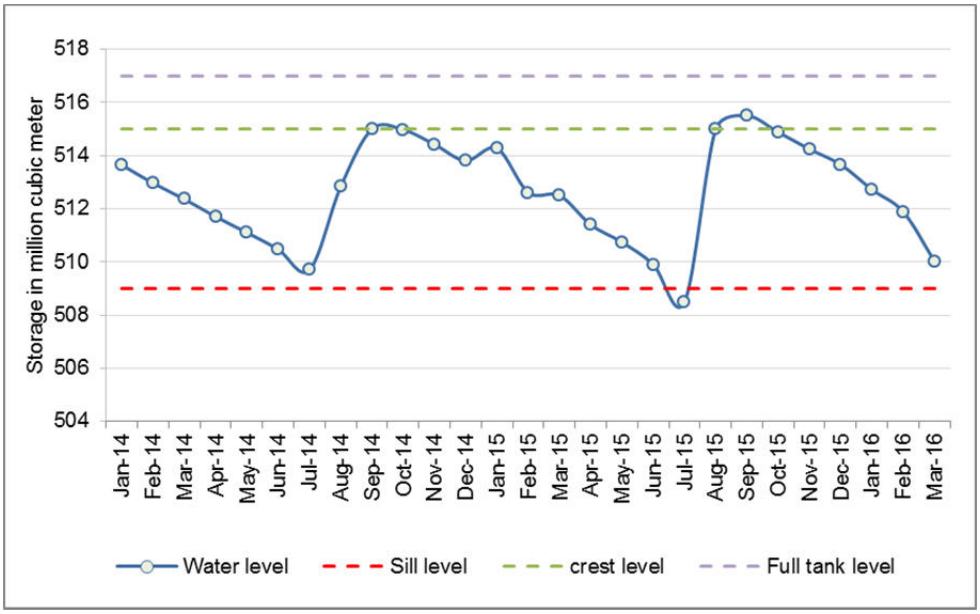
(i) Continuation of existing surface water source without any rehabilitation or augmentation
(ii) Recovering wash water from treatment process
(iii) Treatment and reuse of sludge from treatment process
(iv) Improving the exiting WTP with wash water and sludge management and chlorine safety measures
(v) 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)
(vi) Designing the entire system to maintain optimal flow and terminal pressure, and optimizing the overall energy usage
(vii) Reducing the incidence of water borne diseases by providing 100% population including urban poor with potable water supplies
(viii) Preparation and implementation of a water quality surveillance program including development of a laboratory as part of the project by DBO contractor to ensure that supplied water meets the drinking water standards

(ix) Development of laboratory with all necessary environment, health and safety measures and adopting international standard procedures for water quality testing
(x) Improve water use efficiency and reduce water wastage at household level by recording and monitoring the water usage, and charging the consumers as per usage; due consideration to urban poor
(xi) Minimize unaccounted for water (UFW) losses using district metered area approach with flow meter and pressure logging arrangements to identify and rectify the leaks, and unauthorized connections
(xii) Using low-noise and energy efficient pumping systems

66. **Water Source.** Sustainability: Subproject does not include development of any new water source or augmentation of the existing source. As per the project design, the existing Rajghat Dam source will be continued as a source for subproject towns. Rajghat Dam is constructed across Bebus River having catchment area of 472 sq. km and is exclusively for the water supply of Sagar (including the Cantonment area) and Makronia. Rajghat dam is owned by the SMC.

67. Total storage capacity of the dam is 62.7 MCM, which is adequate to meet the project yearly demand of the design year. Following chart shows the recorded water levels of the Rajghat dam from 2014 to 2016. It is evident that in both 2014 and 2015, the dam is full to its crest level at the end of monsoon season (September), which gradually reduced to its minimum in summer and up to the arrival of monsoon flows in June-July.

Figure 9: Rajghat Dam Water Level (2014-16)



68. **Rajghat Dam Water Quality.** The catchment area is mostly characterized by agricultural and barren lands, and forest areas. There are no polluting sources like industries or mining in the catchment areas. Habitations are limited to small villages, there is no major city located in the catchment. Conventional water treatment and disinfection which is proposed in the project is adequate to make the water usable for drinking purposes. A regular water quality regime needs

to be established for checking the raw water quality. The water supplied to the consumers at all-time must meet the drinking water standards (Appendix 7).

69. **Use of Chlorine as Disinfectant.** It is proposed to use chlorine at WTP. Facilities are not located close to habitations, however safety precautions are necessary to ensure the safety of workers. To avoid any risk, the chlorination facility will be provided with the following:

(i) Chlorine neutralization pit with a lime slurry feeder
(ii) Proper ventilation, lighting, entry and exit facilities
(iii) Facility for isolation in the event of major chlorine leakage
(iv) Personal protection and safety equipment for the operators in the chlorine plant
(v) Provide training to the staff in safe handling and application of chlorine; this shall be included in the contract of Chlorinator supplier
(vi) Supplier of Chlorinator equipment shall provide standard operating manual for safe operation and as well as maintenance and repairs; preferably these shall be provided both in English and Hindi Languages

70. **Sensitive project locations.** Subproject components are mostly located in the urban areas of Sagar and Makronia, where there are no sensitive environmental features. There are some hilly forest areas en route to the Rajghat dam source, however, none of the components are located in the forest. Dugdugi hill, on which the BP Tank is proposed is covered with this vegetation cover. The new tank will be located near the existing tank, but at lower level. Vegetation, which is mostly consists of bushes, shrubs and local tree species, needs to be removed for both construction of tank and pipelines (inlet and outlet). The clearance of vegetation needs to be minimized, and adequate compensatory tree plantation needs to be taken up. Removal of vegetation on this hill slopes may also lead to erosion, and therefore necessary measures to control vegetation needs to be included. There are trees and vegetation in the WTP campus where the new WTP. Removal of vegetation and trees shall be minimized by selecting the site appropriately within the campus and minimize tree cutting. There are also trees along some roads in Sagar. Following measures are to be implemented:

(i) Minimize removal of trees, vegetation on Dugdugi hill; undertake replantation of the sites as far as possible immediately after the construction
(ii) All the cut and open surfaces shall be properly consolidated and protected with surface pitching /grass turfing, etc., as appropriate to avoid any surface erosion in the hill slopes
(iii) Conduct census of trees to be removed, obtain permission, and undertake compensatory tree plantation at the rate of 10 trees for 1 tree removed.
(iv) Avoid removal of trees and vegetation along the roads best pipeline alignments and layout planning of reservoirs and facilities, however, if this cannot be avoided fully, undertake compensatory tree plantation (10 trees to 1 tree removed)

71. **Utilities.** Telephone lines, electric poles and wires, water lines within the proposed project locations may require to be shifted in few cases. To mitigate the adverse impacts due to relocation of the utilities, the contractor, in collaboration with ULB will (i) identify the locations and operators of these utilities to prevent unnecessary disruption of services during construction phase; and (ii) instruct construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.

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

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

C. Environmental Audit of Existing Water Treatment Plant

74. There is an existing WTP in Sagar of capacity 82.5 MLD, which will be used for the project with necessary improvements. As per the ADB SPS 2009, this is an associated facility and therefore the component operation shall comply with the ADB and applicable environmental laws of India. A random environmental audit is conducted to (i) assess the compliance of the existing WTP with environmental legislations; (ii) improve environmental performance; and (iii) increase the Sagar SMC's knowledge, thus increasing its ability to continually improve and minimize future potential liabilities. A more detailed environmental audit and risk assessment shall be carried out during detailed design stage.

Table 7: Salient Features of Sagar WTP

Location	Near Rajghat Dam, Sagar, MP Latitude: 23.735° N Longitude: 78.752° E
Start of operation (year)	2001
Owned by	SMC Sagar
Capacity	82.5 million liters per day (MLD)
Water supply source	Rajghat Dam, 500 m from the WTP
Water treatment process	Treatment process: The treatment process is conventional, and has following units: Coagulation flocculation, chemical dosing, filtration, and disinfection with chlorine. There are 10 rapid sand filters Materials: All civil structures are made of reinforced cement concrete, and mechanical units like the clariflocculator bridge, etc. are of mild steel.
Backwash water and sludge management	-filter backwash water is let into open drains as there is no recycling of backwash into inlet - the settled sludge from the bottom of the clarifiers is periodically flushed into the drains. -This practice of discharge of backwash and sludge directly into the drains, wastes water, pollutes and silts receiving water bodies. -the untreated backwash and sludge flushing ultimately reaches disposed into River Tungabhadra which is flowing near the site.
Chlorination system	Chlorine dosage system is not proper; there are no safety precautions in place. Chlorine cylinders (900 kg tonners) are placed at the facility; 900 kg cylinder is adequate for 20 days usage, and about 20 cylinders are used every year. Cylinders are imported from Indore, and 8 cylinders are imported at once and stored at the facility. All cylinders are stored in open area with roof.

	No safety systems like leak detection or emergency alarm or lime slurry pit available in the facility. Operators are not aware of safety measures or actions to be performed during any emergency. Safety equipment like masks and oxygen cylinders are provided at the facility, but are not in usable condition. There have no instances of any chlorine gas leakage till date as reported by the local WTP staff.

Table 8: Compliance with Applicable National and State Regulations

Act / Rule	Clearance requirement	Compliance Status of WTP at Sagar
EIA Notification	The EIA Notification of 2006 and 2009 (replacing the EIA Notification of 1994) 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 will require clearance from Madhya Pradesh Pollution Control Board (MPPCB). However, PMU needs to liaise with the MPPCB if there are any changed to this statute requirement	N/A Normally 8 tonners (of capacity 900 kg each) are stored at the site, which is less than 10 tons
Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments Air (Prevention and Control of Pollution) Act of 1981, Rules of 1982 and amendments.	Consent to operate from MPPCB	*Non-compliant* At present there is no Consent obtained from the MPPCB for this plant. This is mandatory and needs to be obtained.
Environment (Protection) Act, 1986 and CPCB Environmental Standards	Emissions and discharges from the facilities to be created, refurbished, or augmented shall comply with the notified standards.	
	a. Air emissions	No significant air emissions.
	b. Effluent	*Non-compliant* Filter backwash water is let into open drains and the settled sludge from the bottom of the clarifiers is periodically flushed into open drains directly that ultimately reach river Bebus. A proper treatment and disposal is necessary
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 WTP is not located in notified forest lands.
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 WTP is not located near any protected monument

75. **Compliance & Corrective Actions**. This WTP at present has no consent for operation (CFO) from the MPPCB, which is mandatory under the Water Act, 1974. This needs to be obtained and PMU will liaise with MPPCB and obtain valid CFO prior to start of operation. WTP generates back wash water which contains impurities that need to be removed prior to disposal into natural water bodies, and also generates sludge from treatment process. At present, backwash water include sludge from clariflucculators is let into open drains, that join back river Bebus. This therefore needs improvement so that the wastewater disposed the natural water bodies meet the CPCB disposal standards. Also sludge needs to be properly dried prior to disposal in a land fill. Therefore to comply with government regulations and ADB SPS 2009 following are included in the existing WTP rehabilitation works as part of this project ensure the compliance and improve environmental performance.

(i) Provision of backwash recirculation facility – this will not only improve environmental performance but also minimizes raw water intake
(ii) If the above is not feasible for technical reasons, then a simple sedimentation pond/tank of adequate capacity will be developed within the WTP campus; back will be sent this tank, where the impurities will be settled, and only clarified water will be disposed. The sludge from this tank will be periodically removed and dried in sludge drying beds, and disposed of.
(iii) Creation of sludge collection, drying and disposal system
(iv) Proper & safe facility for handling and storing chemicals used in treatment process (alum, bleaching powder, chlorine etc.,) including provision of personal protection equipment
(v) Training for the workers in safe operation of WTP

D. Construction Impacts

76. **Pipeline laying works.** Civil works in the project include linear excavation for laying pipes along the roads, placing pipes in the trench and refilling with the excavated soil. The trenches will be of 0.4 m – 0.7 m wide and 0.8 to 1.2 m depth. Subsequent to completion of works, road reinstatement will be undertaken by the contractor as part of the civil works. The roads in the core city area of both the cities are very narrow and congested with pedestrians and vehicles, while the roads in outer areas are wide.

77. 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 pipe laying works will include laying pipes at required gradient, fixing collars, elbows, tees, bends and other fittings including conveying the material to work spot and testing for water tightness. 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. As trenches are a maximum of 1.2 m, there is no risk of collapse of trenches or risk to surrounding buildings.

78. 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. About 95% of the excavated soil will be used for refilling the refilling the trench after placing the pipe and therefore residual soil after pipe laying and refilling is not significant. This soil shall be used for construction of WTP in ground leveling.

79. Other civil works in the subproject include construction of water treatment plant, repairs and rehabilitation existing plants, construction of reservoirs and overhead tanks. These works will be confined to sites, and construction will include general activities like excavation for foundation, construction of foundations, columns, walls and roof in cement concrete and masonry, and fixing of mechanical and electrical fixtures, etc.

80. 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 city 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. These anticipated impacts are temporary and for short duration.

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

(i) Use material sources permitted by government;
(ii) Verify suitability of all material sources and obtain approval of PIU; and
(iii) Submit to PIU on a monthly basis documentation of sources of materials.

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

(i) Damp down exposed soil and any stockpiled material on site by water sprinkling;
(ii) Use tarpaulins to cover sand and other loose material when transported by trucks;
(iii) Clean wheels and undercarriage of haul trucks prior to leaving construction site
(iv) Disallow access in the work area except workers to limit soil disturbance and prevent access by barricading and security personnel
(v) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly

83. **Surface Water Quality**. Run-off from stockpiled materials and chemical contamination from fuels and lubricants during construction works can contaminate receiving water bodies. Lakha Banjara lake is situated in the center of the town covering a vast area, therefore there is risk of polluted runoff from the construction sites entering the lake. Rainfall in the project area is although confined to monsoon, necessary measures are to be implemented to ensure that these are mitigated. Construction contractor will be required to:

(i) All earthworks be conducted during the dry season to prevent the problem of soil run-off during monsoon season;
(ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
(iii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, only designated disposal areas shall be used;
(iv) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;

(v) Place storage areas for fuels and lubricants away from any drainage leading to water bodies;
(vi) Dispose any wastes generated by construction activities in designated sites; and (vii) Conduct surface quality inspection according to the Environmental Management Plan (EMP).

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

(i) Prepare and implement a Construction Waste Management Plan
(ii) Stockpiles, lubricants, fuels, and other materials should be located away from steep slopes and water bodies;
(iii) Avoid stockpiling any excess spoils. Excess excavated soils should be dispose to approved designated areas;
(iv) Domestic solid wastes should be properly segregated in biodegradable and no biodegradable for collection and disposal to designated solid waste disposal site;
(v) Residual and hazardous wastes such as oils, fuels, and lubricants shall be disposed in disposal sites approved by local authorities;
(vi) Prohibit burning of construction and domestic waste;
(vii) Ensure that wastes are not haphazardly dumped within the project site and adjacent areas.
(viii) Get approval of PIU in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.

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

(i) Plan activities in consultation with PIU so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance;
(ii) 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 use portable street barriers to minimize sound impact to surrounding sensitive receptor; and
(iv) Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s.
(v) Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity;

(vi) Special care shall be taken during the construction ESR at Sanichari hill site, where an old and dilapidated stone masonry building is situated next to the site. The excavation, and vibration from the construction activities may endanger this building.

86. **Accessibility**. Excavation along the roads, hauling of construction materials and operation of equipment on-site can cause traffic problems. Roads in the core/old city areas of Sagar are very narrow. However, most of the roads are used by pedestrians and two wheelers, and four wheelers vehicles are very limited. Potential impact is negative but short term and reversible by mitigation measures. The construction contractor will be required to:

(i) Confine work areas along the roads to the minimum possible extent; all the activities, including material & waste/surplus soil stocking should be confined to this area. Proper barricading should be provided; avoid material/surplus soil stocking in congested areas
(ii) immediately removed from site/ or brought to the as and when required
(iii) Leave spaces for access between mounds of soil;
(iv) Provide walkways and metal sheets where required to maintain access across for people and vehicles;
(v) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
(vi) Schedule transport and hauling activities during non-peak hours;
(vii) Locate entry and exit points in areas where there is low potential for traffic congestion; (vii) Keep the site free from all unnecessary obstructions;
(viii) Drive vehicles in a considerate manner;
(ix) Coordinate with Traffic Police for temporary road diversions, where necessary, and for provision of traffic aids if transportation activities cannot be avoided during peak hours
(x) Notify affected public by public information notices, providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.

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

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

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

(i) Leave spaces for access between mounds of soil;

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

89. **Socio-Economic – Employment**. Manpower will be required during the 24-months construction stage. This can result in generation of temporary employment and increase in local revenue. Thus potential impact is positive and long-term. The construction contractor will be required to:

(i) Employ at least 50% of the labor force, or to the maximum extent; and

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

(i) Comply with all national, state and local labor laws :
(ii) Develop and implement site-specific occupational health and safety (OH&S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use personal protective equipment; (c) OH&S Training[1] for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;
(iii) Ensure that qualified first-aid is provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;
(iv) Provide medical insurance coverage for workers;
(v) Secure all installations from unauthorized intrusion and accident risks;
(vi) Provide supplies of potable drinking water;
(vii) Provide clean eating areas where workers are not exposed to hazardous or noxious substances;
(viii) 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;
(ix) 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;
(x) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
(xi) Ensure moving equipment is outfitted with audible back-up alarms;

[1] 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.

(xii) 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

(xiii) 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.

91. **Asbestos Materials.** Existing water distribution network is mostly asbestos cement (AC) pipes, and because of the health risks these will be left in situ and replaced by new pipes. Plan pipeline alignments carefully to avoid any conflict or damage.

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

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

93. Central parts of the city are characterized by narrow roads and some of which are accessible only by foot/two wheelers. 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 (~400 mm) and depth (~700 mm) of trench is minimal, it will pose safety risk, especially for children and elders the construction contractor will be required to:

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

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

(i) Consult PIU before locating project offices, sheds, and construction plants;
(ii) Minimize removal of vegetation and disallow cutting of trees;
(iii) Provide drinking water, water for other uses, and sanitation facilities for employees;

(iv) Ensure conditions of livability at work camps are maintained at the highest standards possible at all times;
(v) Prohibit employees from poaching wildlife and cutting of trees for firewood;
(vi) Train employees in the storage and handling of materials which can potentially cause soil contamination;
(vii) Recover used oil and lubricants and reuse or remove from the site;
(viii) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
(ix) Remove all wreckage, rubbish, or temporary structures which are no longer required; and
(x) Confirm to PMU report in writing that the camp has been vacated and restored to pre project conditions before acceptance of work.

95. **Debris disposal.** Prior to the commencement of works, contractor shall identify a debris disposal site in consultation with the PIU and adhering to following criteria:

(i) The site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, top-soil stripping, stacking and preservation should be undertaken prior to initiation of any activities.
(ii) Debris disposal site shall be at least 200 m away from surface water bodies.
(iii) No residential areas shall be located within 100 m downwind side of the site.
(iv) The site is minimum 250 m. away from sensitive locations like hospitals, religious places, ponds/lakes or other water bodies.
(v) The local governing body and community shall be consulted while selecting the site.

96. **Dismantling of old transformer and electric poles**. There is old transfer and electric poles at the proposed ESR site in the University, which need to be removed and disposed properly. Since it is likely that the old transformers contain oils with PCBs, proper collection and disposal is necessary. Project authority shall liaise with the MP Electricity distribution company to safety remove, dismantle dispose this oil through an approved recycler.

E. Operation and Maintenance Impacts

97. Operation and Maintenance of the water supply system will be carried out by SMC directly or through an external operator. During the system design life (15/30 years for mechanical/civil components) it shall not require major repairs or refurbishments and should operate with little maintenance beyond routine actions required to keep the equipment in working order. The stability and integrity of the system will be monitored periodically to detect any problems and allow remedial action if required. Any repairs will be small-scale involving manual, temporary, and short-term works involving regular checking and recording of performance for signs of deterioration, servicing and replacement of parts.

98. Recurrence of pipe bursting and leakage problems can be managed by the leak detection and water auditing surveys. The ULB will be required to ensure that the leak detection and rectification time is minimized.

99. Since back water is recovered and recirculate in the WTP, no wastewater will be generated from water treatment process. The sludge generated from the wash water storage tank, and sedimentation tanks

100. 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. Following are included in the project design to dispose the sludge and back wash:

101. Provision for recirculation system for filter backwash – backwash water from filter beds will be sent to a storage tank, and after allowing adequate time for settlement of solids, clarified water will be pumped to WTP inlet. This arrangement will avoid pollution and also minimize wastage of water.

102. Accumulated sludge from clariflocculators, filter backwash etc., will be disposed-off at sludge drying beds for natural drying. Dried sludge will be disposed of in a land fill or used as soil conditioner if it is suitable.

103. The citizens of the Sagar and Makronia will be the major beneficiaries of the improved water supply system, as they will be provided with a constant supply of better quality water, piped into their homes at an appropriate pressure. The project will improve the over-all health condition of the city as water borne diseases will 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. This should also improve the environment of these areas, should deliver major improvements in individual and community health and well-being.

VI. VII. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Overview

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

105. Most of the main stakeholders have already been identified and consulted during preparation of this IEE, and any others that are identified during project implementation will be brought into the process in the future. Primary stakeholders of the subproject are: residents, shopkeepers and businesspeople who live and work alongside the roads in which network improvements will be provided and near sites where facilities will be built (WTP and water tanks), and government and utility agencies responsible for provision of services in Sagar and Makronia ,WRD, and MPPCB, etc.,. Secondary stakeholder are: NGOs and CBOs working in the area, community representatives, beneficiary community in general, government agencies, the executing and implementing agencies (MPUDC, PMU and PIUs), Government of India and the ADB.

106. Stakeholder consultation held at Sagar on 10th December 2015 at SMC office and in Makronia on 15th January 2016 at Makronia Nagar Parishad office.

B. Public Consultation

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

1. Consultation during Project Preparation

108. Institutional consultations were conducted with the relevant Governmental Departments such as WRD, PHED, MPPCB etc. The subproject proposals are formulated in consultation with Sagar municipal Corporation and Makronia Nagar Parishad to suit the requirements of the respective towns.

109. Focus-group discussions with affected persons and other stakeholders were conducted to learn their views and concerns. A socio economic household survey has been conducted in the town, covering sample households, to understand the household characteristics, health status, and the infrastructure service levels, and also the demand for infrastructure services. General public and the people residing along the project activity areas were also consulted during visits to the project sites. Formal town-level consultation meetings were conducted in January 2016 in all the three subproject towns. Besides, several other meetings also conducted at ward-level with communities and at market with street vendors and hawkers. The details of consultation are provided in Appendix 1.

110. The people are willing to extend their cooperation as the activities are proposed to improve the water supply service levels and the living standards. Stakeholder expressed their concern regarding water charges, affordability, disturbance and loss of business due to the work in market area (dust, road closure etc.). The project team explained the proposed mitigation measures to mitigate / minimize such issues.

2. Consultation during construction

111. Prior to start of construction, ULB and PIU with the assistance of PMC will conduct information dissemination sessions at various places and solicit the help of the local community, leaders/prominent for the project work. At each ward/neighborhood level, focus group meetings will be conducted to discuss and plan construction work with local communities to reduce disturbance and other impacts.

112. A constant communication will be established with the affected communities to redress the environmental issues likely to surface during construction phases and also regarding the grievance redress mechanism. ULB/PIU and PMC 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

113. Executive summary of the IEE will be translated in Hindi and made available at the offices of PMU, PIU, Nagar Parishad offices, and also displayed on their notice boards. Hard copies of the IEE will be accessible to citizens as a means to disclose the document and at the same time creating wider public awareness. Electronic version of the IEE in English and Executive Summary in Hindi will be placed in the official website of the MPUDC, PMU after approval of the IEE by Government and ADB. Stakeholders will also be made aware of grievance register and redress mechanism.

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

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

VII. GRIEVANCE REDRESS MECHANISM

A. Project Specific Grievance Redress Mechanism

116. A program-specific grievance redress mechanism (GRM) shall be established to receive, evaluate, and facilitate the resolution of AP's concerns, complaints, and grievances about the social and environmental performance at the level of the project. The following GRM provides a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project.

117. A common GRM will be in place for social, environmental, or any other grievances related to the project. The GRM will provide an accessible and trusted platform for receiving and facilitating resolution of affected persons' grievances related to the program. The multi-tier GRM for the project is outlined below, each tier having time-bound schedules and with responsible persons identified to address grievances and seek appropriate persons' advice at each stage, as required. ULB-wide public awareness campaigns will ensure that awareness on grievance redress procedures is generated through the campaign.

118. **Who can complain:** A complaint may be brought by persons who are, or could be, "directly, indirectly, materially, and adversely" affected by the project. A complaint can be submitted on behalf of the affected person/people by a representative, provided that he or she identifies the affected person/people and includes evidence of the authority to act on their behalf.

119. **What the Grievance/Complain should contain**: Any concerns pertaining to safeguard compliance - environment, involuntary resettlement, and indigenous people, design related issues, compensation, service delivery or any other issues or concerns related to the project. The complaint must contain name, date, address/contact details of the complainant, location of the problem area, along with the problem. In addition, online filing using the state's existing grievance redress mechanism or telephone helpline will also be open to use by affected persons.[2]

[2] Government of Madhya Pradesh has a special program called Chief Minister's Monitoring Programme, which monitors development programs in the state and provides for online registration of complaints. The Public Grievance Redressal Department of GoMP clearly displays the Chief Minister's Helpline Number, through which persons may lodge complaints directly to the highest authority in the state. The website of the Public Grievance Redressal Department also provides a kiosk locator for district level grievance redress kiosks. http://www.mp.gov.in/web/guest/home.

120. **Where to file a Complaint**: Complainants will have the flexibility of conveying grievances/suggestions by dropping or reporting grievance redress/suggestion forms in complaints/suggestion boxes to be installed by project at respective Nagar Parishad Offices, CM (Chief Minister) Helpline, PIU offices or by e-mail or by writing in a complaints register in the PIU offices or at construction site offices.

121. **How to file a Complaint:** The application should be precise and specific. The application can be sent either by post or through electronic means or deliver personally. A sample grievance form is at **Appendix 13.**

(i) Offline System - The application can be made on the application form available at all accessible places (NPs/ Office of PIUs/ construction site offices). The application should have the name and complete postal address of the applicant.

(ii) Online System - Grievances pertaining to the implementation of the project can also be filed online at the website of MPUDC/PMU or by e-mails.

122. **Documentation:** Documentation of the complaints is important and must contain 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. PMU with the support of PIU will have the overall responsibility for timely grievance redress, and for registration of grievances, related disclosure, and communication with the aggrieved party. All the documents made available to the public at the community level (at ward offices) and will include information on the contact number, address and contact person for registering grievances, and will be disseminated throughout the project area by the PIU.

123. **Grievance/Problem Redress through Participatory Process:** Efforts must be made by the PIU with the support of safeguard consultants to resolve problems amicably, conflicts through participatory process with the community and the Nagar Parishads. In case of grievances that are immediate and urgent in the perception of the complainant, the Contractor, and supervision personnel from the PIU will provide the most easily accessible or first level of contact for the quick resolution of grievances. Contact phone numbers and names of the concerned staff and contractors, will be posted at all construction sites at visible locations.

124. Following process will be followed:

(i) 1st level grievance. In case of grievances that are immediate and urgent in the perception of the complainant, PMC supervising staff will direct the contractor to and ensures that it is resolved. If the grievance is not under the contractor scope, but under the program, PMC (field office) will resolve this issue. All the grievances should be resolved within 3 days of receipt of a complaint/grievance. The complaints/grievances received in the CM helpline that are related to MPUSIP will be referred to project GRM at this first level. CM helpline staff will be included in the GRM training so that they can identify the related grievances and forward to this project GRM.

(ii) 2nd level grievance. All grievances that cannot be redressed at first level within 3 days will be brought to the notice of PIU and PMC Assistant Environmental Specialist. PIU will review the grievance and act appropriately to resolve it within 10 days of receipt.

(iii) 3rd level grievance. All the grievances that are not addressed at 2nd level by PIU within in 10 days of receipt will be brought to the notice of notice of the Grievance Redressal Committee (GRC).[3] GRC will meet twice a month and determine the merit of each grievance brought to the committee. The GRC will resolve the grievance within 1 month of receiving the complaint. All decisions taken by the GRC will be communicated to complainant by the Nodal Officer.

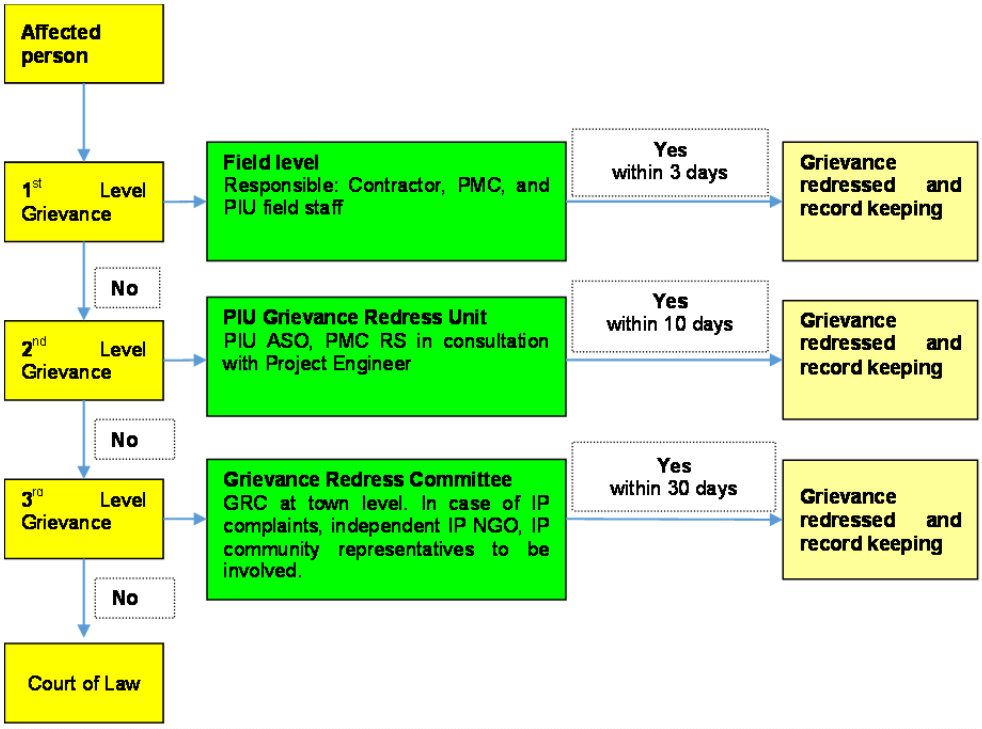
125. In case of any inter-departmental or inter-jurisdictional coordination required for resolution of specific grievances, the PIU will refer the matter directly to the PMU for state-level or inter-departmental coordination and resolution, instead of the town-level GRC. The project GRM notwithstanding, an aggrieved person shall have access to the country's legal system at any stage, and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM. Alternatively, if the grievance is related to land acquisition, resettlement & rehabilitation,[4] the APs can approach the Land Acquisition, Rehabilitation and Resettlement Authority (LARRA) of Madhya Pradesh, established under the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation, and Resettlement Act, 2013.

126. **Record-keeping**. PIU will keep records of grievances received, corrective actions taken and the final outcome. The number of grievances recorded and resolved and the outcomes will be displayed/disclosed in the PIU office, ULB offices, and on the web.

[3] Grievance redress committee (GRC) will be formed at town-level with members composed of: ULB Chairperson, ULB CMO, Environmental Specialist of PMC, PIU Dy.PM and PIU Community Development Officer. In case of any complaints by IP or members of scheduled tribes, the PIU will include as special member, a representative of an independent local NGO involved in tribal welfare. Special invitees to hearing of IP complaints will include two representatives from affected IP community and the project IP NGO, if appointed for IPP implementation.

[4] The Authority admits grievance only with reference to the LA and R&R issues under the new Act

Figure 10: MPUSIP Grievance Redress Mechanism



ASO=Assistant Safeguard Officer, GRC = Grievance Redressal Committee; PMC = Project Management Consultants, PMU = Project Management Unit

VIII. ENVIRONMENTAL MANAGEMENT PLAN

A. Implementation Arrangements

127. Urban Development and Housing Department (UDHD) of Government of Madhya Pradesh will be the Executing Agency for the Program, responsible for management, coordination and execution of all activities funded under the loan. Implementing Agency will be the recently established Madhya Pradesh Urban Development Company (MPUDC), a wholly owned subsidiary of GoMP. A central Project Management Unit (PMU) attached to MPUDC will be responsible for implementing the MPUSIP. The PMU will be supported by Program Implementation Units (PIUs) with a flexibility to redeployment depending upon the implementation requirements.

128. The PMU and PIUs will be supported by several teams of Design Consultants in preparation of preliminary engineering designs.

129. Water Resource Review Committee (WRRC) is constituted to undertake a thorough review of the source when recommended by the Design Consultant in regard to techno-economic feasibility and sustainability especially ensuring climate change resilience, and Technical Review Committee (TRC) to review and approve the preliminary designs developed by the Design Consultants.

130. Project Management Consultant (PMC) centrally located in PMU and with field teams located in PIUs shall be responsible for implementation of the Program. All infrastructure contracts will be procured through performance-based contracts (PBCs) and include build-operate (BO) framework. Based on the preliminary designs prepared by Design Consultants, the DBO (design-build-operate) Contractor will design, construct, commission and operate for 10 years, after which it will be transferred to the respective ULB. The preparation, review, and approval of project design and due diligence studies including bidding process is centralized at the PMU. PIUs will provide necessary support to PMU in preparation, and will play main role in supervising the construction process.

131. Two Committees - an Empowered and Executive Committee and a Technical Clearance and Tender Committee have been constituted by the Government to be responsible for effective and timely implementation of the Program.

132. **Safeguards**. At PMU, there will be two safeguard specialists: (i) Project Officer (Environment) and (ii) Social & Gender Offer, who will responsible for compliance with the environmental and social safeguards in program implementation. PO (Environment) will have overall responsibility in implementation of the investment program as per the Environmental Assessment & Review Framework (EARF) agreed between ADB and the government. At individual subproject level, PO will ensure that environmental assessment is conducted, and a project-specific is prepared and implemented, and the compliance, and corrective actions, if any are reported as required. Environmental Specialist (ES) of the PMC will have primary responsibility of preparing the safeguard documents and supervising the EMP implementation, while the PO (Environment) will review, approve and oversee the compliance. At each PIU, an Assistant Project Manager will be given additional responsibilities of safeguard tasks and will be designated as Assistant Environmental Officer (ASO). ASO will oversee the safeguards implementation at PIU level and report to PO (Environment) at PMU. Specifically ASO will coordinate public consultation, information disclosure, regulatory clearances and approvals, EMP implementation and grievance redress. EHS supervisor of DBO Contractor will provide all necessary assistance to ES of PMC in updating IEEs and will supervise day-to-day EMP implementation.

B. Environmental Management Plan

133. An environmental management plan (EMP) has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels.

134. The EMP will guide the environmentally-sound construction of the subproject and ensure efficient lines of communication between MPUDC, project management unit (PMU), project implementing unit (PIU), consultants and contractors. The EMP will (i) ensure that the activities are undertaken in a responsible non-detrimental manner; (i) provide a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site; (ii) guide and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iii) detail specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (iv) ensure that safety recommendations are complied with. The EMP includes a monitoring program to measure the environmental condition and effectiveness of implementation of the mitigation measures. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries.

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

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

137. For civil works, the contractor will be required to (i) carry out all of the mitigation and monitoring measures set forth in the approved SEP; and (ii) 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 SEP. The contractor shall allocate budget for compliance with these SEP measures, requirements and actions.

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

Table 9: Design Stage Environmental Management Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Cost and Source of Funds
Design of water supply system	Unsustainable source; resource & energy use	• Continuation of existing surface water source without any rehabilitation or augmentation • Recovering wash water from treatment process • Treatment and reuse of sludge from treatment process • Improving the exiting WTP with wash water and sludge management and chlorine safety measures • 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) • Designing the entire system to maintain optimal flow and terminal pressure, and optimizing the overall energy usage • Reducing the incidence of water borne diseases by providing 100% population including urban poor with potable water supplies • Preparation and implementation of a water quality surveillance program including development of a laboratory as part of the project by DBO contractor to ensure that supplied water meets the drinking water standards • Development of laboratory with all necessary environment, health and safety measures and adopting international standard procedures for water quality testing • 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 • 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 • Using low-noise and energy efficient pumping systems •	These measures are already included in the preliminary designs. DBO Contractor (DBOC) to follow, enhance where possible. PMU to ensure compliance.	Part of project costs
Waste generation from WTP operations	Environmental pollution	• Obtain consent from MPPCB for WTP for the existing WTP & the new WTP	PMU / Nagar Parishad; DBOC to prepare application, and assist as required	No costs; scope of IA & DBO
Chlorine usage as disinfectant at WTPs	Chlorine handling & application risk – health &safety risk to workers and general public	• Provide the following measure at the chlorine application unit: o Chlorine neutralization pit with a lime slurry feeder o Proper ventilation, lighting, entry and exit facilities o Facility for isolation in the event of major chlorine leakage (if needed) o Personal protection and safety equipment for the operators in the chlorine plant o Provide training to the staff in safe handling and application of chlorine; this	These measures are already included in the preliminary designs. DBOC to follow, enhance where	Project Costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Cost and Source of Funds
		shall be included in the contract of Chlorinator supplier ○ Supplier of Chlorinator equipment shall provide standard operating manual for safe operation and as well as maintenance and repairs; preferably these shall be provided both in English and Hindi Languages	possible. PMU to ensure compliance.	
Corrective actions at the existing WTP to ensure compliance with ADB SPS 2009 and GoI regulatory framework	Non-compliance	• Provide backwash recirculation facility – this will not only improve environmental performance but also minimizes raw water intake • If the above is not feasible for technical reasons, then a simple sedimentation pond/tank of adequate capacity will be developed within the WTP campus; back will be sent this tank, where the impurities will be settled, and only clarified water will be disposed. The sludge from this tank will be periodically removed and dried in sludge drying beds, and disposed of. • Creation of sludge collection, drying and disposal system • Proper & safe facility for handling and storing chemicals used in treatment process (alum, bleaching powder, chlorine etc.,) including provision of personal protection equipment • Training for the workers in safe operation of WTP	These measures are already included in the preliminary designs. DBOC to follow, enhance where possible. PMU to ensure compliance.	Project Costs

Table 10: Pre-Construction State Environmental Management Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Cost and Source of Funds
EMP Implementation & reporting	Unsatisfactory compliance to EMP	• Appoint EHS supervisor and designate 1 EHS coordinator (among the technical staff) in each town • Ensure that all pre-construction activities are complete prior to start of construction work • Ensure timely submission of monitoring reports	DBO contractor	Cost for implementation of mitigation measures responsibility of contractor.
Utilities	Damage/ disturbance to telephone lines, electric lines, water lines in project area	• Identify and include locations of utilities in the detailed designs/drawings to prevent unnecessary disruption of services • Prepare a contingency plan to include actions to be taken in case of unintentional interruption of services.	DBOC with PIU collaboration. PMU to ensure compliance	Project costs – general construction practice
Construction works on hills and removal of trees and vegetation at work sites	Removal of trees and vegetation, and erosion	• Minimize removal of trees, vegetation on Dugdugi hill; undertake replantation of the sites as far as possible immediately after the construction • All the cut and open surfaces shall be properly consolidated and protected with surface pitching /grass turfing, etc., as appropriate to avoid any surface erosion in the hill slopes • Conduct census of trees to be removed, obtain permission, and undertake compensatory tree plantation at the rate of 10 trees for 1 tree removed.	DBOC to follow PIU/ PMU to ensure compliance	Project costs – general construction practice

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Cost and Source of Funds
		• Avoid removal of trees and vegetation along the roads best pipeline alignments and layout planning of reservoirs and facilities, however, if this cannot be avoided fully, undertake compensatory tree plantation (10 trees to 1 tree removed)		
Construction work camps, stockpile areas, storage areas and waste disposal areas	Conflicts with local community; disruption to traffic flow and sensitive receptors	• Prioritize barren, waste, infertile, vacant lands within the area, • Shall not be located in productive agricultural lands, water bodies, natural drainage channels, flood plains & groundwater recharge areas, forests, vegetative lands, etc. • Locate at sites that will not promote instability, flooding and result in destruction of natural drainage, vegetation, irrigation, & drinking water supply; • For private lands, obtain land owner's (not lessees) written consent; indicate the requirement for reinstatement to original • Site should have a minimum buffer of 0.5 – 1 km from all socially, environmentally sensitive areas (e.g. residential, socio-cultural areas water bodies (0.5 km), forests (1km), etc.,) • Take extreme care in selecting sites to avoid direct disposal to water body which will inconvenience the community. • Document site's pre-project conditions	DBOC to identify locations following the criteria PIU to ensure compliance and approve	Part of project costs
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.	• Obtain material only existing borrow sites/quarries already permitted by the Department of Mines and Geology; • If new quarries sites/quarries are necessary, contractor shall be obtain all necessary permissions as per the law in force. • Contractor to obtain construction materials only after written permission / approval of PIU for respective sources • Maintain a construction material register at the site	DBOC to identify sources that have all permits, if required, obtain permits, and submit to PIU PIU to check and approve	Part of project costs
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, permits, clearance, NOCs, etc., required for the project prior to award of contact or start of civil works, as necessary. • Include in detailed designs, drawings and documents all regulatory conditions and provisions, where required • Contractor to identify & obtain all necessary approvals, including in compliance with labor laws, before start of construction; • Contractor to acknowledge in writing to PIU and provide copies of all obtained permits, clearance, NOCs, etc.	PMU / PIU to obtain project clearances; DBOC to provide necessary assistance DBOC to obtain construction permits & PIU to ensure	Part of project costs
Asbestos Cement Pipes	Health risk due to exposure to asbestos	• Obtain details from PHED/SMC on location of underground AC pipes • Locate the new piper carefully to avoid encountering AC pipes	DBOC in coordination with	Part of project costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Cost and Source of Funds
	materials	• Leave the AC pipes undisturbed in the ground.	PIU and ULB	

Table 11: Construction Stage Environmental Management Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
EMP Implementation Training	Irreversible impact to the environment, workers, and community	• Project manager and all key workers will be required to undergo training on EMP implementation including spoils/waste management, Standard operating procedures (SOP) for construction works; occupational health and safety (OH&S), core labor laws, applicable environmental laws, etc.	DBOC PMC Construction and Environmental Specialists to conduct the training	Cost of EMP Implementation Orientation Training to contractor is responsibility of PMU. Other costs responsibility of contractor.
Air Quality	Emissions from construction vehicles, equipment, and machinery used for installation of pipelines resulting to dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons.	• Control dust by water sprinkling on exposed soil, stock stockpiled material on site • Barricade area, provide wind sheets • 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 • Prevent entry of traffic, public in construction area • Fit all heavy equipment, and machinery with air pollution control devices which are operating correctly; all the vehicle shall meet the emission norms and shall have valid pollution under control (PUC) certificate (Appendix 6) • Conduct air quality monitoring as per the monitoring plan	DBO Contractor	Cost for implementation of mitigation measures responsibility of contractor. Air quality monitoring costs are included in the EMP costs of project
Surface water quality	Mobilization of settled silt materials, and chemical contamination from fuels and lubricants during installation of pipelines can contaminate nearby surface water quality.	• Avoid earthworks during the rainy season • Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets; • Reuse excess spoils & materials in the construction as far a possible • Identify disposal sites prior to construction & dispose construction waste only at designated areas • Install temporary silt traps basins along the drainage leading to the water bodies; • Place storage areas for fuels and lubricants away from any drainage leading to water bodies; • Conduct surface quality inspection according to the Environmental Management Plan (EMP).	DBO Contractor	Cost for implementation of mitigation measures responsibility of contractor. Water quality monitoring costs are included in the EMP costs of project

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
Noise Levels	Increase in noise level due to earth-moving and excavation equipment, and the transportation of equipment, materials, and people	• Conduct noise generating activities (e.g., cc road cutting) during day time • 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; • Maintain maximum sound level not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. • Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity; • Consult local communities in advance to avoid working at sensitive times, such as religious and cultural festivals.	DBO Contractor	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, spoils, oils, lubricants, and other similar items.	• Prepare and implement a Construction Waste Management Plan • Stockpiles, lubricants, fuels, and other materials should be located away from steep slopes and water bodies; • Avoid stockpiling any excess spoils; dispose immediately to designated areas • Domestic solid waste generated at construction camps and work sites shall be properly managed (collected, segregated, disposed properly); waste should not burned • Residual and hazardous wastes such as oils, fuels, and lubricants shall be disposed through approved recyclers • Environmentally restore the work sites to at least pre-project conditions; PIU to approve in writing that site is restored	DBO Contractor	Cost for implementation of mitigation measures responsibility of contractor.
Ecological Resources – Terrestrial	Loss of vegetation and tree cover	• Avoid removal of vegetation / tree cutting • If unavoidable, minimize as far as possible, and obtain tree-cutting permit • Plant 3 trees for every one cut	DBO Contractor	Cost for implementation of mitigation measures responsibility of contractor.
Land use	Environmental Issues due to land use change	• The impact due to change in land use will be negligible due to this project.	Not applicable	Not applicable
Accessibility	Traffic problems and conflicts near project	• Confine work areas along the roads to the minimum possible extent; all the activities,	DBO Contractor	Cost for implementation of mitigation measures

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
	locations and haul road	including material & waste/surplus soil stocking should be confined to this area. Proper barricading should be provided; avoid material/surplus soil stocking in congested areas – immediately remove from site/ or brought to the as and when required • Leave spaces for access between mounds of soil; • Provide walkways and metal sheets where required to maintain access across for people and vehicles; • 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; • Keep the site free from all unnecessary obstructions; • Drive vehicles in a considerate manner; • Coordinate with Traffic Police for temporary road diversions, where necessary, and for provision of traffic aids • Notify affected area by public information notices, providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints. • For works in very narrow roads • 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.		responsibility of contractor.
Socio-Economic – Income.	Impede the access of residents and customers to nearby shops	• Do not obstruct access; provide temporary access, by leaving spaces in excavation, provide walkways and metal sheets for people and vehicles where necessary to continue business • Increase workforce in the areas with	DBO Contractor	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		predominantly institutions, place of worship, business establishment, hospitals, and schools; • Consult businesses and institutions regarding operating hours and factoring this in work schedules		
Socio-Economic – Employment	Generate temporary employment and increase in local revenue	• Employ local persons in construction work if manpower is available	DBO Contractor	Cost for implementation of mitigation measures responsibility of contractor.
Occupational Health and Safety	Occupational hazards which can arise during work	• Comply with all national, state and local core labor laws (see Appendix 8 of this IEE) • Implement site-specific occupational health and safety (OH&S) measures, such as the following • Provided personal protective equipment (PPE) to workers(like helmet, gumboot, safety belt, gloves, nose musk and ear plugs), and ensure that they are used • Conduct OH&S training workers/staff • Do no employ ad-hoc work procedures, follow best & acceptable work practices • Document work-related accidents • Provide qualified & easily accessible first-aid facilities all times at all sites • Secure all installations from unauthorized intrusion and accident risks; • Provide potable drinking water; • Provide clean eating areas where workers are not exposed to hazardous or noxious substances; • Provide H&S orientation training to all workers to ensure that they are apprised of the basic site rules of work at the site, PPEs, and preventing injuring to fellow workers; • Ensure 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	DBO Contractor	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		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 a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.		
Community Health and Safety.	Traffic accidents and vehicle collision with pedestrians during material and waste transportation	• Plan routes to avoid times of peak-pedestrian activities and high risk areas. • Prevent public entry in to work areas through barricading and security guards • Maintain regularly the vehicles and minimize potentially serious accidents caused by equipment malfunction or premature failure. • Provide road signs and flag persons to warn of on-going trenching activities. • In very narrow streets, conduct work section-wise (~100 m), and complete excavation, pipe laying and backfilling in minimum possible time (1 day preferably)	DBO Contractor	Cost for implementation of mitigation measures responsibility of contractor.
Work Camps and worksites	Temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants Unsanitary and poor living conditions for workers	• Establish camps only after site approval • Avoid cutting of trees/ clearing bushes • Provide adequate drinking water, water for other uses, and sanitation facilities • Ensure conditions of livability at work camps are maintained at the highest standards possible at all times; • 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; • Manage solid waste according to the preference hierarchy: reuse, recycling and disposal to designated areas; • Ensure unauthorized persons specially children	DBO Contractor	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		are not allowed in any worksite		
Post-construction clean-up	Damage due to debris, spoils, excess construction materials	• Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required • All excavated roads shall be reinstated to original condition. • All disrupted utilities restored • All affected structures rehabilitated/compensated • 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. • All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be top soiled and regressed • The contractor must arrange the cancellation of all temporary services. • Restore the work sites to pre-project conditions; PIU to approve in writing that site is restored	DBO Contractor	Cost for implementation of mitigation measures responsibility of contractor.

Table 12: Operation Stage Environmental Management Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Check for blockage and leakage problems reducing the water losses	Loss of water, increased demand and inconvenience to consumers & general public	• Effective leak detection and water auditing to reduce the water losses	DBO Contractor	PIU, SMC and MNP	Operating costs
Water contamination – raw water contamination at source and treated water during transmission	Impacts on public health	• Ensure protection of water source quality any entry of wastewater into the river upstream of Rajghat Dam sites should be prevented. • Contamination of treated water during transmission and distribution should be prevented by quickly identifying, isolating and repairing the leak section. Develop a system of leak detection and rectification. • Prepare and implement a water quality	SMC and MNP DBO Contractor	PMU in coordination with WRD PIU, SMC and MNP	Operating costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		surveillance program including development of a water quality laboratory. • Conduct regular monitoring of raw & treated water and ensure that water supplied at all times meets the drinking water standards (Appendix 7)			
Discharge the impurities and other solids collected due to filtration and back wash	Pollution of streams /drains	• Backwash water will be recirculate so no wastewater generated from WTP • Maintain the mechanical parts as per the maintenance plan to avoid any hazards	DBO Contractor	PIU and PIU, SMC and MNP	Operating costs
Sludge generation	Land and water pollution, impacts on health & environment	• Collect the sludge from WTP units, dry in sludge drying beds, and reuse / dispose safely as per the design	DBO Contractor	PIU and PIU, SMC and MNP	Operating costs
Increased in sewage generation	Water pollution, and impacts on public health and environment	• Sanitation facilities needs to be improved at community level and at the town level to meet the increased sewage demand	PIU, SMC and MNP	PMU	To be identified - PIU, SMC and MNP
Generation of waste materials	Impacts on public health and environment	• Collect solid wastes and dispose to approved disposal yards	DBO Contractor	PIU and respective Nagar Parishads	Operating costs
Occupational health and safety	Health, social and economic impacts on the workers	• Provide appropriate PPE to workers & training on its proper use • Use fall protection equipment when working at heights. • Maintain work areas to minimize slipping and tripping hazards. • Implement a training program for operators who work with chlorine regarding safe handling practices and emergency response procedures. • Prepare escape plans from areas where there might be a chlorine emission. • Install safety showers and eye wash stations near the chlorine equipment and other areas where hazardous chemicals are stored or used. • Prohibit eating, smoking, and drinking except in designated areas.	DBO Contractor	PIU and PIU, SMC and MNP	Operating costs

Table 13: Construction Stage Environmental Monitoring Plan

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 12.**	Regularly as required during construction; checklist to be filled monthly once	Supervising staff and safeguards specialists	Part of TOR of PIU, PMC and PMU
Ambient air quality	6 locations (3 locations in Sagar town, 2 in Makronia and 1 at the WTP site)	• PM10, PM2.5 NO2, SO2, CO	Once before start of construction Quarterly (yearly 4-times) during construction (2 year period considered)	DBO Contractor	Cost for implementation of monitoring measures responsibility of contractor (54 samples x 5000 per sample = 270,000)
Ambient noise	6 locations (3 locations in Sagar town, 2 in Makronia and 1 at the WTP site)	• Day time and night time noise levels (24 hours)	Once before start of construction Quarterly (yearly 4-times) during construction (2 year period considered)	DBO Contractor	Cost for implementation of monitoring measures responsibility of contractor (54 samples x 1500 per sample = 81,000)
Surface water quality	2 locations (Lakha Banjara lake and Rajghat dam downstream)	• pH, Oil & grease, Cl, F, NO3, TC, FC, Hardness, Turbidity BOD, COD, DO, Total Alkalnity	Once before start of construction & Quarterly during construction (24)	DBO Contractor	Cost for implementation of monitoring measures responsibility of contractor (18 samples x 4000 per sample = 72,000)

Table 14: Operation Stage Environmental Monitoring Plan

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Source water quality	Near intake point in Rajghat Dam	pH, Cl, F, NO3, TC, FC, Hardness, Turbidity BOD, COD, DO, Total Alkalnity heavy metals & pesticides	Yearly twice (pre & post monsoon)	DBO Contractor	O&M costs (water quality will be tested at the internal laboratory part of WTP – parameters like pesticides will be tested at an accredited laboratory)
Monitoring of quality of water supplied to consumers	Consumer end-random sampling in all zones	pH, Nitrite, Nitrate, Turbidity , Total Alkalnity, Total coli form and Feacal coli form	Monthly once	DBO Contractor	O&M costs (water quality will be tested at the internal laboratory part of WTP)
Sludge quality and suitability as manure	WTP	Analysis for concentration of heavy metals and confirm that value are within the following limits (all units are in mg/kg dry, except pH) • Arsenic - 10.00, • Cadmium - 5.00 • Chromium - 50.00 • Copper - 300.00 • Lead - 100.00 • Mercury - 0.15 • Nickel - 50.00 • Zinc - 1000.00 • PH - 5.5-8.5	Yearly once	DBO Contractor	O&M costs (testing to be done at an accredited external laboratory)

C. EMP Compliance Responsibilities

139. **PMU Responsibilities**. PO (Environment) will be supported by PMC, which will be staffed with an Environmental Specialist, and Environmental Coordinators. Key tasks and responsibilities of the PO (Environment) for this sub project include the following:

1. Bidding stage:

(i) Prior to invitation of bids for civil works contract, ensure that

   a. Consent for establishment (CFE) is obtained from MPPCB for WTP construction

(ii) Ensure that EMP is included in bidding documents and civil works contracts

(iii) Ensure that the bid/contract documents include specific provisions requiring contractors to comply with all applicable labour laws and core labour standards including:

   a. Labour welfare measures and provision of amenities
   b. prohibition of child labour as defined in national legislation for construction and maintenance activities;
   c. equal pay for equal work of equal value regardless of gender, ethnicity, or caste;
   d. elimination of forced labour;
   e. the requirement to disseminate information on sexually transmitted diseases, including HIV/AIDS, to employees and local communities surrounding the project sites.

(iv) Ensure that staff required for implementation of EMP (EHS officer) is included in the bid requirements

(v) Ensure that EMP cost is included in the project cost

(vi) In the pre-bid meeting, provide insight into the EARF requirements, IEE update, EMP measures, and overall compliance requirements to the bidders

2. Construction stage:

(i) Facilitate and ensure that all necessary environmental clearances/permissions, including that of contractor's are in place prior to start of construction

(ii) Organize an induction course for the training of contractors, preparing them on EMP implementation, environmental monitoring, and on taking immediate action to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation.

(iii) provide oversight on environmental management aspects of subprojects and ensure EMPs are implemented by PIU and contractors

(iv) Supervise and provide guidance to the PIUs to properly carry out the environmental monitoring as per the EMP

(v) Oversee grievance redress mechanism to address any grievances brought about in a timely manner; ensure that records are properly maintained

(vi) Consolidate monthly environmental monitoring reports from PIU and submit semi-annual monitoring reports to ADB

(vii) Oversee site closures to ensure that all work / facility sites are restored properly prior to issuing work completion certificate to the contractor

3. Operation stage:

(i) Ensure and consent for operation (CFO) is obtained from MPPCB for both the new WTP and existing WTP prior to start of operation

140. **PIU Responsibilities**. PIU will be headed by a Project Manager and supported by PMC. An Assistant Project Manager of PIU will be given additional responsibilities of safeguard tasks and will be designated as Assistant Environmental Officer (ASO). ASO will be supported by PDMC Environmental Specialist and Environmental Coordinator. Key tasks and responsibilities of the ASO for this subproject include the following:

(i) Provide necessary support to SMC in obtaining permission from MPPCB; liaison with PMU and regulatory agencies
(ii) Oversee day-to-day implementation of EMPs by contractors, including compliance with all government rules and regulations, take necessary action for obtaining rights of way
(iii) Oversee environmental monitoring by contractors
(iv) Take corrective actions when necessary to ensure no environmental impacts
(v) Submit monthly environmental monitoring reports to PMU
(vi) Conduct continuous public consultation and awareness
(vii) Address any grievances brought about through the grievance redress mechanism in a timely manner as per the EMP

141. Contractor's responsibilities:

1. Bidding stage:

(i) Understand the EMP requirements and allocate necessary resources (budget, staff, etc.,)
(ii) Understand the regulatory compliance requirements related to labour welfare, safety, environment etc.,

2. Design stage:

(i) Review the IEE Report including the REA checklist, category and the EMP, and conduct site visits to understand the environmental sensitivity of the project sites.
(ii) Update the REA checklist, confirm the category, and update/revise the IEE Report of the project reflecting the changes /amendments /additions that are effected in the project during the detailed design
(iii) Update / revise and finalize the EMP
(iv) Provide all necessary technical assistance to PIU / ULB in obtaining regulatory clearances/approvals.
(v) Ensure that Consent for establishment (CFE) is obtained from MPPCB for WTP construction prior to start of work
(vi) Ensure that all design-related measures of the EMP, and conditions, if any, of government regulatory agencies (like MPPCB consent conditions) are duly included in the final designs.
(vii) Ensure that all the measures, and improvement works required to ensure the compliance of the existing WTP with ADB SPS 2009 and government regulations are included

3. Construction stage:

(i) Ensure that all regulatory clearances (both project related and contractor related) are in place before start of the construction work.
(ii) Mobilize EHS officer and Archaeological supervisor prior to start of work
(iii) Confirm with PIU availability of rights of way at all project sites prior to start of work.
(iv) Prepare and submit:
  a. Construction waste management (CWM) plan
  b. Traffic management (TM) plan
(v) Implement the mitigation measures as per the EMP including CWM & TM Plans
(vi) Follow the EMP measures/guidelines for establishment of temporary construction camps, construction waste disposal sites, and material borrow areas, etc.,
(vii) Implement EMP and ensure compliance with all the mitigation and enhancement measures
(viii) Conduct environmental monitoring (air, noise, water etc.,) as per the EMP
(ix) Undertake immediate action as suggested by PIU / PMU / PMC to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation
(x) Submit monthly compliance reports on EMP implementation
(xi) Act promptly on public complaints and grievances related to construction work and redress in a timely manner in coordination with PIU
(xii) Comply with applicable government rules and regulations

4. Operation stage:

(i) Obtain CFO from MPPCB in coordination with the ULB, and comply with MPPCB conditions, if any, during the operation phase
(ii) Implement the operation phase EMP including the monitoring plan
(iii) Submit quarterly EMP implementation report

D. Training Needs

142. The following **Table 15** presents the outline of capacity building program to ensure EMP implementation. The costs to be covered by the project's capacity building program. The detailed cost and specific modules will be customized for the available skill set after assessing the capabilities of the target participants and the requirements of the project by the ES of PMC.

Table 15: Outline Capacity Building Program on EMP Implementation

Description	Target Participants& Venue	Estimate (INR)	Cost and Source of Funds
1. Introduction and Sensitization to Environmental Issues (1 day) - ADB Safeguards Policy Statement - Government of India and Madhya Pradesh 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 and consultants involved in the project At PMU, Bhopal (combined program for all subprojects)	-	Included in the overall program cost

Description	Target Participants& Venue	Estimate (INR)	Cost and Source of Funds
2. EMP implementation (1/2 day) - EMP mitigation & monitoring measures -Roles and responsibilities - Public relations, - Consultations - Grievance redress - Monitoring and corrective action planning - Reporting and disclosure - Construction site standard operating procedures (SOP) - AC pipe protocol - Traffic management plan - Waste management plan - Site clean-up & restoration	All PIU staff, contractor staff and consultants involved in the Sagar and Makronia subproject At PIU	-	Part of overall program costs – PMC will conduct at PIU office Part of scope of work of PMU, PIU, PMC & DBOC
3. Contractors Orientation to Workers (1/2 day) - Environment, health and safety in project construction	Once before start of work, and thereafter regular briefing every month once. Daily briefing on safety prior to start of work All workers (including unskilled laborers)	-	Contractors cost

E. Monitoring and Reporting

143. During the detailed design stage, DBO Contractor should confirm PMU the mobilization of Environmental Expert for IEE update and integrating design stage EMP into designs.

144. Prior to commencement of the works, the contractor will submit a compliance report to PIU that all identified pre-construction mitigation measures as detailed in the EMP are undertaken. Contractor should confirm EHS supervisor is mobilized and EHS coordinators are designated for each town for effective implementation of the EMU. PMU with the assistance of the PMC will review the report and permit commencement of works.

145. During construction, results from internal monitoring by the contractor will be reflected in their monthly EMP implementation reports to the PIU. ES will review and advise contractors for corrective actions if necessary. Quarterly report summarizing compliance and corrective measures taken will be prepared by PMC field team at PIU and submitted to PMU (**Appendix 11**). During operation, the contractor will conduct management and monitoring actions as per the operation stage EMP, and submit to PMU and ULB a quarterly report on EMP implementation and compliance.

146. Based on monthly &quarterly reports and measurements, PMU will submit to ADB, semi-annual (6-monthly) Environmental Monitoring Reports (EMR).Once concurrence from the ADB is received the report will be disclosed on the MPUDC and PMU websites.

147. ADB will review project performance against the MPUSIP 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

F. EMP Implementation Cost

148. Most of the mitigation measures require the contractors to adopt good site practice, which should be part of their normal procedures already, so there are unlikely to be major costs associated with compliance. The costs which are specific to EMP implementation and are not covered elsewhere in the projects are given below.

Table 16: Cost Estimates to Implement the EMP

	Particulars	Stages	Unit	Total Number	Rate (INR)	Cost (INR)	Costs Covered By
A.	**Implementation staff**						
1	EHS Supervisor	Construction	per month	24	50,000	1,200,000	Civil works contract
	Subtotal (A)					**12, 00,000**	
B.	**Mitigation Measures**						
1	Consent for establishments & consent for operation from MPPCB	Pre-construction	Lump sum			100,000	Project costs
2	Provision for tree cutting & compensatory plantation measures	Construction	Per tree	100	1,000	100,000	Civil works contract
3	Traffic management at work sites (Pavement Markings, Channelizing Devices, Arrow Panels and Warning Lights)	Construction	Lump sum	-	-	300,000	Civil works contract
	Subtotal (B)					**500,000**	
C.	**Monitoring Measures**						
1	Air quality monitoring	Construction	per sample	54	5,000	270,000	Civil works contract
2	Noise levels monitoring	Construction	Per sample	54	1,500	81,000	Civil works contract
3	Surface water monitoring	Construction	Per sample	18	4,000	72,000	Civil works contract
	Subtotal (C)					**423,000**	
D.	**Capacity Building**						
1.	Training on EMP implementation	Preconstruction	lump sum			100,000	PMU
2	Preparation of plans and protocols (traffic management plan, waste (spoils) management plan etc., chance find protocol	Preconstruction	Lump sum			50,000	Civil works contract

5.	Contractors Orientation to Workers on EMP implementation	Prior to dispatch to worksite	Lump sum			25,000	Civil works contract
	Subtotal (D)					**175,000**	
	Total (A+B+C+D)				**INR**	**2,298,500**	

IX. CONCLUSION AND RECOMMENDATION

149. The process described in this document has assessed the environmental impacts of all elements of the Sagar and Makronia water supply improvement project. 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.

150. The project do not involve any intervention or augmentation of water, as the water is sourced from the existing dam, which was built exclusively for Sagar water supply, and has adequate water storage to meet the project demand. So no source related impacts are envisaged. Existing WTP does not have proper wash water & sludge management and chlorine safety facilities, therefore these are included in the proposed project proposals to ensure compliance with the ADB SPS 2009 and also with the government regulatory framework. For the new WTP, these facilities are already included in the designs. Existing WTP also does not have the mandatory Consent For Operation (CFO) from the Madhya Pradesh Pollution Control Board (MPPCB), which needs to be obtained from the MPPCB for rehabilitation and further operation.

151. During the construction phase, impacts mainly arise from the construction dust and noise, the need to dispose of large quantities of waste soil and import a similar amount of sand to support the sewer in the trenches; and from the disturbance of residents, businesses, traffic and important buildings by the construction work. The social impacts (access disruptions) due to construction activities are unavoidable, as the residential and commercial establishments exist along the roads where pipes will be laid. Appropriate mitigation measures are suggested. Other specific measures include safe handling and disposal of old transformer at the University ESR site, minimize tree cutting and vegetation removal at WTP site, and at Dugdugi hill including proper erosion control measures.

152. 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. Application and handling of chlorine gas will involve certain risks, and appropriate measures are suggested for safe application.

153. 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 project implementation.

154. The project's grievance redressal mechanism will provide the citizens with a platform for redressal of their grievances, and describes the informal and formal channels, time frame, and mechanisms for resolving complaints about environmental performance.

155. The EMP will assist the PMU, PIU, PMC and contractors in mitigating the environmental impacts, and guide them in the environmentally sound execution of the proposed project.

156. 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.

157. The project will benefit the general public by contributing to the long-term improvement of water supply systems and community livability in Sagar and Makronia

158. Therefore, as per ADB SPS, the project is classified as environmental category B and does not require further environmental impact assessment. However, to conform to government guidelines, the project requires Consent for Establishment (CFE) and Consent for Operation (CFO) for WTP from MPPCB. These permissions/approvals shall be obtained both for the existing WTP and proposed WTP.

159. An in depth audit of the existing WTP will also be conducted by the DBO contractor during the detailed stage, and the proposed measures will be reviewed and further strengthened where required to ensure the compliance with ADB SPS 2009 and government regulatory framework.

160. This IEE shall be updated during the detailed design stage by the DBO contractor to reflect any changes, amendments and will be reviewed and approved by PMU.

APPENDIX 1: STAKEHOLDER CONSULTATIONS

Stakeholder Consultations- Sagar WSS

Sr. No.	Name of the Participant	Representing Area
1	Ayodhya Prasad Jatav	Sanjay Nagar Kachhi Basti
2	Monu	Sanjay Nagar Kachhi Basti
3	Bikesh Vishwakarma	Sanjay Nagar Kachhi Basti
4	Rohit	Sanjay Nagar Kachhi Basti
5	Mahesh	Sanjay Nagar Kachhi Basti
6	Sitaram Ahirwar	Sanjay Nagar Kachhi Basti
7	Mahindra Ahirwar	Sanjay Nagar Kachhi Basti
8	Vindravan	Sanjay Nagar Kachhi Basti
9	Santosh	Sanjay Nagar Kachhi Basti
10	Vinod	Sanjay Nagar Kachhi Basti
11	Roopkishor	Sanjay Nagar Kachhi Basti
12	Hemraj	Sanjay Nagar Kachhi Basti
13	Moti Lal	Sanjay Nagar Kachhi Basti
14	Jagdish Jatav	Sanjay Nagar Kachhi Basti
15	Neelesh Jatav	Sanjay Nagar Kachhi Basti
16	Veer Singh Jatav	Sanjay Nagar Kachhi Basti
17	Mohan Lal Ahirwar	Sanjay Nagar Kachhi Basti
18	Krishna	Sanjay Nagar Kachhi Basti
19	Poona	Sanjay Nagar Kachhi Basti
20	Lakshmi Bai	Sanjay Nagar Kachhi Basti
21	Munee	Sanjay Nagar Kachhi Basti
22	Deeprani	Sanjay Nagar Kachhi Basti
23	Neeta bai	Sanjay Nagar Kachhi Basti
24	KushamBai	Sanjay Nagar Kachhi Basti
25	Mamta	Sanjay Nagar Kachhi Basti
26	Anita	Sanjay Nagar Kachhi Basti
27	Sushma	Sanjay Nagar Kachhi Basti
28	Koshelya	Sanjay Nagar Kachhi Basti
29	Shila Bai	Sanjay Nagar Kachhi Basti
30	Mula Bai	Sanjay Nagar Kachhi Basti
31	Hemlata	Sanjay Nagar Kachhi Basti
32	Shela Bai	Sanjay Nagar Kachhi Basti
33	Sheel	Sanjay Nagar Kachhi Basti
34	Parvati	Sanjay Nagar Kachhi Basti
35	Meena	Sanjay Nagar Kachhi Basti

Sr. No.	Name of the Participant	Representing Area
36	Kamla Bai	Sanjay Nagar Kachhi Basti
37	Ramkali	Sanjay Nagar Kachhi Basti
38	Jayoti	Sanjay Nagar Kachhi Basti
39	Rekha	Sanjay Nagar Kachhi Basti
40	Devkee	Sanjay Nagar Kachhi Basti
41	Durgesh Athiya	Sanjay Nagar Kachhi Basti
42	Rajesh	Sanjay Nagar Kachhi Basti
43	Pramood	Sanjay Nagar Kachhi Basti
44	Hariram	Sanjay Nagar Kachhi Basti
45	Devi Prashad	Kishor nayalay Kachhi Basti
46	Mahindra singh	Kishor nayalay Kachhi Basti
47	Uddet Ahirwar	Kishor nayalay Kachhi Basti
48	Suneel	Kishor nayalay Kachhi Basti
49	Shovaram Patel	Kishor nayalay Kachhi Basti
50	Santosh Kori	Kishor nayalay Kachhi Basti
51	damre kori	Kishor nayalay Kachhi Basti
52	Seelchand Kori	Kishor nayalay Kachhi Basti

Sr. No.	Name of the Participant	Representing Area
53	Punam Kori	Kishor nayalay Kachhi Basti
54	Shankar	Kishor nayalay Kachhi Basti
55	Tikaram Ahirwar	Kishor nayalay Kachhi Basti
56	Hira Lal	Kishor nayalay Kachhi Basti
57	Ratan Patel	Kishor nayalay Kachhi Basti
58	Dayashankar	Kishor nayalay Kachhi Basti
59	Bharat sen	Kishor nayalay Kachhi Basti
60	Devkinandan Dubay	Kishor nayalay Kachhi Basti
61	Nayaran	Kishor nayalay Kachhi Basti
62	Devi Ahirwar	Kishor nayalay Kachhi Basti
63	Lalita	Kishor nayalay Kachhi Basti
64	munee Bai	Kishor nayalay Kachhi Basti
65	Santosh Rani	Kishor nayalay Kachhi Basti
66	Hari Bai	Kishor nayalay Kachhi Basti
67	Jayanti Bai	Kishor nayalay Kachhi Basti
68	Halli Bai	Kishor nayalay Kachhi Basti
69	Ashok Rani	Kishor nayalay Kachhi Basti
70	Nanad Rani	Kishor nayalay Kachhi Basti
71	Shiya Rani	Kishor nayalay Kachhi Basti
72	Asha Rani	Kishor nayalay Kachhi Basti
73	Jashoda Bai	Kishor nayalay Kachhi Basti
74	Sheel Rani	Kishor nayalay Kachhi Basti
75	Latkari Bai	Kishor nayalay Kachhi Basti

Sr. No.	Name of the Participant	Representing Area
76	Radha Rani	Kishor nayalay Kachhi Basti
77	Gomti Bai	Kishor nayalay Kachhi Basti
78	Sangeeta Sahu	Kishor nayalay Kachhi Basti
79	Archna Jatav	Kishor nayalay Kachhi Basti
80	Mamta	Kishor nayalay Kachhi Basti
81	Nisha	Kishor nayalay Kachhi Basti
82	Shayam Bai	Kishor nayalay Kachhi Basti
83	Soniya	Kishor nayalay Kachhi Basti
84	Suhani	Kishor nayalay Kachhi Basti
85	Janki	Kishor nayalay Kachhi Basti
86	Shitare	Kishor nayalay Kachhi Basti
87	Chandrashekhar Rajak	Kishor nayalay Kachhi Basti
88	Ramakaran Patel	Kishor nayalay Kachhi Basti
89	Ashok	Kishor nayalay Kachhi Basti
90	Lakshman	Kishor nayalay Kachhi Basti
91	Rajkumar	Kishor nayalay Kachhi Basti
92	Chandan	Kishor nayalay Kachhi Basti
93	Omkar	Kishor nayalay Kachhi Basti
94	Raj	Kishor nayalay Kachhi Basti
95	Sashi Rohit	Bidi Colony Kachhi Basti
96	Neelam Namdev	Bidi Colony Kachhi Basti
97	Nisha Namdev	Bidi Colony Kachhi Basti
98	Maya Namdev	Bidi Colony Kachhi Basti
99	Aawaj	Bidi Colony Kachhi Basti
100	Najween	Bidi Colony Kachhi Basti
101	Bandna Parasar	Bidi Colony Kachhi Basti
102	Gafur Ali	Bidi Colony Kachhi Basti
103	Gita Parashar	Bidi Colony Kachhi Basti
104	Sunil Namdev	Bidi Colony Kachhi Basti
105	Amir Khan	Bidi Colony Kachhi Basti
106	Ikrar khan	Bidi Colony Kachhi Basti
107	Safik khan	Bidi Colony Kachhi Basti
108	Asif khan	Bidi Colony Kachhi Basti

Sr. No.	Name of the Participant	Representing Area
109	Ayan	Bidi Colony Kachhi Basti
110	Krishna kumar	Bidi Colony Kachhi Basti
111	Arbaj khan	Bidi Colony Kachhi Basti
112	muhmad Rafik	Bidi Colony Kachhi Basti
113	Halle dada	Bidi Colony Kachhi Basti
114	Ashok patel	Bidi Colony Kachhi Basti
115	Garibdas	Bidi Colony Kachhi Basti

Sr. No.	Name of the Participant	Representing Area
116	Kailash	Bidi Colony Kachhi Basti
117	Ramsingh	Bidi Colony Kachhi Basti
118	Mohan	Bidi Colony Kachhi Basti
119	Pappu	Bidi Colony Kachhi Basti
120	Naresh	Bidi Colony Kachhi Basti


सागर जल आवर्धन योजना
परिचर्चा


सागर जल आवर्धन योजना
परिचर्चा

Table A1.1: Details of Stakeholder Consultation photographs and list of participants of Sagar

Date	Location	No. of Participants	Participants	Topics Discussed	Issues Raised
10th Dec. 2015	at Parishad hall of Municipal Corporation	Total=25 M=11, F=4	Elected representatives, Commissioner, Engineers, Revenue Inspector	• Existing status of drinking water supply, need for project and demand from the community; • Existing drinking water supply quality by District Water Supply and Sanitation Sub-division Office; • Upfront cash collection; • Area covered by the project; • Status of existing drinking water supply system; • Need for improvements to present system; • Potential positive and negative impacts project implementation; • Local community's response to the project.	• Willingness to connect to piped drinking water supply; • collection of 5% cash upfront; • subsidy to the poor; whether community taps would be provided; • community participation in project implementation; • Implementing agency; and better /improved service. • The Municipal Corporations do not have capacity or resource to be party in sharing the loan repayment.

10th Dec. 2015	Intake , treatment plant and reservoir tank locations	total=20 M-12, F-8	Community people	• All the locations of different component structures proposed for water supply system and are inspected. • The status of land ownership is verified. • Consulted on the different issues with community	• All the proposed component structures are found to be located within the domain of public/government land. • No private land acquisition is required for the proposed system. • Community gave consent on supporting project and shown willingness for hiked user charges for better quantity .
12th Dec. 2015	Localities along the proposed transmissio n and distribution network alignments	Total=25 M-20,F-5	local politicians, beneficiaries local business/ small restaurant/ street vendors	• Inspection of entire alignment to assess impacts and whether any need for business surveys; • Discussion on project's safeguards policies and potential issues	• How the temporary disruption to businesses could be avoided; avoid construction works on market days. • May be temporary shifting of street vendors and weekly markets may be proposed to open area.
13th Dec. 2015	wards having dilapidated lines	total=20 M-10 F-10	MALE : Employment in government/p rivate sector, businessmen, retired persons FEMALE: Housewives	Relevant information on the proposed project. • Benefits of the project. • Hassle-free work procedure without disrupting daily activities and transportation system. • No chance of structure or income loss. • Grievance redressal procedures. • Public participation and awareness.	• Commencement date of project work and duration. • Water logging during heavy monsoon. • Chances of damaging the existing water pipelines during project implementation. • Lack of public awareness in proper use of underground drainage system. • Scarcity of drinking water in the area. • Public sensitization on proper use of underground sewerage system

Stakeholder consultation – Makronia WSS

— जलप्रदाय योजना हेतु जनसंपर्क —

क्रमांक	पदाधिकारी के नाम	पद नाम	हस्ताक्षर
01	श्रीमती सुशीला रोहित	अध्यक्ष	
02	" " मणि ठाकुर	उपाध्यक्ष	
03	" अशोक पटेल	पार्षद वार्ड क्र. 01	
04	" मति कौशल्या सेन	—"— 02	
05	" राजा रिहारिया	—"— 03	
06	" मति उमाबाई सिंह	—"— 04	
07	" बाबूलाल रोहित	—"— 05	
08	" मति विनिता सिंह	—"— 06	
09	" हरलाल साहू	—"— 07	
10	" मति कौशल्या अहिरवार	—"— 08	
11	" " चन्द्रानी पटेल	—"— 09	चन्द्रानी
12	" मति पिंकी/ दिनेश	—"— 11	
13	" " सीमा अहिरवार	—"— 12	

क्रमांक	पदाधिकारियों के नाम	पद नाम	हस्ताक्षर
14	श्री संजय जैन	पार्षद वार्ड क्र. 13	[signature]
15	" श्रीमति केशरबाई अहिरवार	— " — 14	केशरबाई
16	" विक्की विजय	— " — 15	विजय गौतम
17	" राजू डिक्सा	— " — 16	Pinja Reetu
18	" भागीरथ सब्जी वाले	— " — 17	भागीरथ
19	" श्रीमति रुक्मणि गौंड	— " — 18	[signature]
20	माननीय श्री लक्ष्मीनारायण यादव	सांसद महोदय	
21	" श्री प्रदीप लारिया	विधायक महोदय	[signature]

जल प्रदाय योजना हेतु जन परामर्श लिया गया। जिस हेतु निकाय के पार्षदों के साथ बैठक में चर्चा की गई।

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Table A1.2: Summary of Consultation with Stakeholders

Date	Location	No. of Participants	Participants	Topics Discussed	Issues
15th Jan. 2016	At Community hall	T=25 M=12 F=13	Chairperson of ULB, Chief Municipal Officer, Junior Engineer, Revenue Inspector, Elected representatives	• Present drinking water supply source and its condition • Need of improvement of the present situation • Briefing on project objectives probable implementation procedures • Potential positive and negative impacts due to project implementation • Land use and area to be covered under the project • Drinking water user charge	• ULB Chairman has concern that Makroniya is newly formed Municipal Body the project financial burden Nagar Palika able to handle or not • The Nagar Parishads do not have capacity or resource to be party in sharing the loan repayment. • The Chairman of the ULB expressed willingness to accept the project; • Makroniya Nagar Parishad is operating water supply system for the town but capacity to be build. • Operation and maintenance of the facilities developed under the project and community participation; • Probability of keeping the poor and the vulnerable out of the user charge.
15th Jan. 2016	Makroniya Nagar Palika	Total -20 (Female- 09 Male -11)	(Slum area near Jabalpur road)	• Briefing on project objectives probable implementation procedures • Potential positive and negative impacts due to project implementation • Experiences sharing on - livelihood activities, Resettlement and Rehabilitation, women empowerment tribal development, health, education, convergence with existing government social security schemes etc. • Grievance Redress procedures	• None of the people knew about the proposed project. On learning about the project, they expressed that they were happy that the entire community would be benefited from the upgraded water supply. • Assured full support during implementation.
21st Jan. 2016	ward no. 14	Total - 29 (Female 15, Male - 14)	Community People	• Status of existing drinking water supply system; • Need for improvements to present system; • Relevant information of the upcoming project and benefits of the project. • Potential positive and negative impacts due to project implementation • Ensuring no income loss	• The area has insufficient and inadequate drinking water resource. Water supply to the area is done through two tube wells that supplies water to the community people. The area faces severe water crisis during the summer season when the ground water level drops. • The community willingly accepted the project.

					The community members expressed that their economic situation would prevent them from paying water user charges. (The men work as daily laborers and the women Housewives).
21st Jan. 2015	Market area	Total=25 M=15, F=10	Street vendors & shopkeepers, Vyapari Sangh	• Project effective for Makroniya community people • Community participation in project implementation • Completion of project on time. • Vyapari Sangh cooperates when laying done in congested whole sale market temporarily shifting of weekly vegetable market during excavation. • shifting of Street vendors. • Shifting or adjusting extended potion of shopkeepers.	• As excavation not been able to done at night because labor will not get agree to work in night shift so shifting will be done at a vacant place near or next lane such that no income loss takes place due the civil work. Vendors get agreed on proposal • Like small hotels owners showed concern during excavation dust spoils eatable items.

Appendix 2: REA Checklist

Instructions:

- This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Regional and Sustainable Development Department.
- This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department.
- 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 / Madhya Pradesh Urban Services Improvement Program – Sagar Water Supply Project
Sector Division: Urban Development

SCREENING QUESTIONS	Yes	No	REMARKS
Water Supply			
A. Project Siting: Is the project area…			
▪ Densely populated?	✓		Project activities extend to the entire city including the densely populated areas. There are no major negative impacts envisaged, because pipeline will be located in unused government lands alongside the existing roads and can be constructed without causing disturbance to, houses, and commercial establishments. In narrow streets, disruption to road users is likely, and measure like best activity scheduling, alternative routes, prior information to road users, houses and shops will minimize the impact to acceptable levels.
▪ Heavy with development activities?			-
▪ Adjacent to or within any environmentally sensitive areas?			
▪ Cultural heritage site			
▪ Protected Area			
▪ Wetland			
▪ Mangrove			
▪ Estuarine			
▪ Buffer zone of protected area			
▪ Special area for protecting biodiversity			
▪ Bay			
B. 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 no significant water pollution sources in the catchment. Raw water quality is tested and found that it is suitable for domestic use
▪ Impairment of historical/cultural monuments/areas and loss/damage to these sites?			
▪ Hazard of land subsidence caused by excessive ground water pumping?			Not applicable; project does not involve groundwater abstraction
▪ 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?			No; the water will be abstracted only with due permission of government and allocation of water from Rajghat dam for water supply of Sagar. Drinking water is priority as per the MP water policy.
▪ Unsatisfactory raw water supply (e.g. ▪ Excessive pathogens or mineral constituents)?			Raw water quality is tested and found that it is suitable for domestic use. Bacteriological contamination is noticed, and water will be subjected for treatment prior to supply
▪ Delivery of unsafe water to distribution system?			Water will be treated and disinfected prior to supply
SCREENING QUESTIONS	Yes	No	REMARKS
▪ Inadequate protection of intake works or wells, leading to pollution of water supply?			Water is abstracted from Rajghat reservoir. There are no major polluting sources in the catchment.
▪ Over pumping of ground water, leading to salinization and ground subsidence?			-
▪ Excessive algal growth in storage reservoir?			Regular cleaning of storage tanks will be conducted during operation
▪ Increase in production of sewage beyond capabilities of community facilities?	✓		Sewerage system is also being planned for project city under the MPUSIP
▪ Inadequate disposal of sludge from water treatment plants?			Appropriate provisions for sludge drying and disposal is included in the project
▪ Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?			-
▪ Impairments associated with transmission lines and access roads?			-
▪ Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.			Measures for safe handling of chlorine are included
▪ Health and safety hazards to workers from the management of chlorine used for disinfection and other contaminants?			Measures for safe handling of chlorine are included
▪ Dislocation or involuntary resettlement of people			There is no resettlement of people for project implementation.
▪ Social conflicts between construction workers from other areas and community workers?			The contractor will be utilizing the local labor force as far as possible; in case if it is unavoidable, labor camps and facilities will be provided appropriately. No conflicts envisaged
▪ Noise and dust from construction activities?	✓		All the construction machineries employed will 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			No; appropriate O&M will conducted

inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?			
▪ Delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?			Not envisaged
SCREENING QUESTIONS	Yes	No	REMARKS
▪ Accidental leakage of chlorine gas?			Measures for safe handling of chlorine are included
▪ Excessive abstraction of water affecting downstream water users?			Water abstraction will be limited to the allocated quantity for Sagar.
▪ Competing uses of water?			Water abstraction will be limited to the allocated quantity for Sagar
▪ Increased sewage flow due to increased water supply			Sewerage system is also being planned for project citys under the MPUSIP
▪ Increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant			Sewerage system is also being planned for project cities under the MPUSIP

Climate Change and Disaster Risk Questions The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.	Yes	No	Remarks
Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes?		✓	Semi-arid zone, unreliable rainfall, less vegetation cover. Promote more efficient use of water by reducing losses and wastage to counter increased demands due to higher temperatures.
Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (e.g., changes in rainfall patterns disrupt reliability of water supply; sea level rise creates salinity intrusion into proposed water supply source)?	✓		Reduction in rainfall may affect the water availability from dam. Given the priority for drinking water supply, dead storage will be utilized in case of low rain fall years
Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?		✓	No
Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by using water from a vulnerable source that is relied upon by many user groups, or encouraging settlement in earthquake zones)?		✓	No

APPENDIX 3: CUMULATIVE CAPACITY OF BABUS RIVER AT RAJGHAT DAM

(19 No. gat each of span 19 M)

Sr. No.	R.L.	AREA IN Sq. m.	Area In Million Sq. m.	capacity in million Cum.	Cumulative Capacity in million Cum.	Remark
1	496.00					
2	497.00	48600	0.0476	0.0162	0.0162	
3	498.00	81000	0.081	0.0641	0.0800	
4	499.00	202500	0.2025	0.1371	0.2174	
5	500.00	218700	0.2181	0.2105	0.4279	
6	501.00	526500	0.5265	0.3615	0.7894	
7	502.00	680400	0.6804	0.6018	1.3912	
8	503.00	105300	1.053	0.8599	2.2511	
9	504.00	1425600	1.4256	1.3345	3.5857	
10	505.00	16200	1.621	1.5385	5.0242	
11	506.00	186300	1.863	1.1400	6.7642	
12	507.00	2673000	2.673	2.2553	9.0200	
13	508.00	364500	3.645	3.1464	12.1604	
14	509.00	400950	4.009	3.8258	15.9918	L.S.L.
15	510.00	4495.500	4.495	4.2501	20.2419	dead storage
16	511.00	5872.500	5.872	5.1686	25.4086	
17	512.00	7468.200	7.468	6.654	32.062	
18	513.00	9112500	9.112	8.2768	40.3387	
19	514.00	1,10,97000	11.097	10.0884	50.4271	
20	515.00	1,35,67500	13.567	12.3127	62.7398	CREST LEVEL
21	516.00	1,62,81000	16.281	16.9036	77.6434	
22	517.00	1,88,73000	18.873	17.5610	95.2044	F.T.L
23	518.00	2,20,72500	22.072	20.4518	115.6552	M.W.L
24	519.00	2,59,20000	25.920	23.9705	139.6267	
25	520.00	3,30,37500	30.375	28.1165	167.7431	T.B.L 520.50
26	521.00	3,32,10000	33.210	31.7704	199.5225	
27	522.00	3,64,50,000	35.450	34.810	234.3325	

APPENDIX 4: NATIONAL AMBIENT AIR QUALITY STANDARDS

SL NO:	Pollutants	Time weighted average	Concentration in ambient air		Method of measurement
			Industrial, Residential, Rural & Other Areas	Ecologically Sensitive Areas	
1	Sulphur Dioxide (SO_2) $\mu g/m^3$	Annual 24 hours	50 80	20 80	Improved West and Geake Ultraviolet fluorescence
2	Nitrogen Dioxide (NO_2) $\mu g/m^3$	Annual 24 hours	40 80	30 80	Modified Jacob & Hochheiser (Na-Arsenite) Chemiluminescence
3	Particulate Matter (Size less than 10 µm) or PM10 $\mu g/m^3$	Annual 24 hours	60 100	60 100	Gravimetric -TOEM -Beta attenuation
4	Particulate Matter (Size less than 2.5 µm) or PM2.5 $\mu g/m^3$	Annual 24 hours	40 60	40 60	Gravimetric -TOEM -Beta attenuation
5	Carbon Monoxide (CO) mg/m^3	8 hours 1 hours	02 04	02 04	Non Dispersive Infra-Red (NDIR) Spectroscopy

APPENDIX 5: NATIONAL AMBIENT AIR QUALITY STANDARDS IN RESPECT OF NOISE

Area code	Category of area/zone	Limit in dB (A)	
		Day time	Night time
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45
D	Silence zone	50	40

APPENDIX 6: VEHICLE EXHAUSTS EMISSION NORMS

1. Passenger Cars

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

2. Heavy Diesel Vehicles

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

Source: Central Pollution Control Board

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

APPENDIX 7: DRINKING WATER STANDARDS

No.	Substance or characteristic	Requirement Desirable limit	Undesirable effect outside the desirable	Permissible limit in the absence of alternate Source	Remarks
Essential Characteristic					
1.	Colour Hazen Units, Max	5	Above 5, consumer acceptance decreases	25	Extended to 25 only if toxic Substance are not suspect in absence of alternate sources
2.	Odour	Unobjectionable	-	-	a) test cold and when heated b) test are several dilutions
3.	Taste	Agreeable	-	-	Test to be conducted only after safely has been established
4.	Turbidity (NTU) Max	5	Above 5, consumer acceptance decreases	10	-
5.	pH value	6.5 to 8.5	Beyond this range the water will after the mucous membrane and/or water supply system	No relaxation	-
6.	Total Hardness (mg/L) CaCO3	300	Encrustation in water supply structure and adverse effects on domestic use	600	-
7.	Iron (mg/L, Fe) Max	0.3	Beyond this limit taste/appearance are affected; has adverse effects on domestic uses and water supply structure and promotes iron bacteria	1.0	-
8.	Chlorides 250 (mg/L, Cl) Max	250	Beyond effects outside the desirable limit	1000	-
9.	Residual free Chlorine (mg/L), Max	0.2	-	-	To be applicable only when water is chlorinated. Tested at customer end. When protection against viral infection is required, it should be min. 0.5 mg/L.
Desirable Characteristics					
10.	Dissolved solids mg/L. Max	500	Beyond this, palatability decreases and may cause gastrointestinal irritation.	2000	-
11.	Calcium (mg/L, Ca) Max.	75	Encrustation in water supply structure and adverse effects on domestic use.	200	-
12.	Magnesium (mg/L, Mg) Max	30	Encrustation in water supply structure and adverse effects on domestic use.	100	-
13.	Copper (mg/L, Cu) Max	0.05	Astringent taste dis coloration and corrosion of pipes fittings and utensils will be caused beyond	1.5	-

No.	Substance or characteristic	Requirement Desirable limit	Undesirable effect outside the desirable	Permissible limit in the absence of alternate Source	Remarks
			this.		
14.	Manganese (mg/L, Mn) Max	0.1	Beyond this limit taste/appearance are affected, has adverse effect on domestic use and water supply structure	0.3	-
15.	Sulphate (mg/L, SO4) Max.	200	Beyond this causes gastro intestinal irritation when magnesium or sodium are present	400	May be extended up to 400 provided magnesium (as Mg) does not exceed 30
16.	Nitrate (mg/L, NO3) Max.	45	Beyond this Methaemoglobinemia takes place.	100	-
17.	Fluoride (mg/L, F) Max.	1.0	Fluoride may be kept as low as possible. High fluoride may cause fluorosis.	1.5	-
18.	Phenolic Compounds (mg/L C6H5OH) Max.	0.001	Beyond this, it may cause objectionable taste and odour	0.002	-
19.	Mercury (mg/L Hg) Max	0.001	Beyond this the water becomes toxic	No Relaxation.	To be tested when pollution is suspected
20	Cadmium (mg/L, Cd) Max	0.01	Beyond this the water becomes toxic	No Relaxation.	To be tested when pollution is suspected
21.	Selenium (mg/L, Se) Max	0.01	Beyond this the water becomes toxic.	No Relaxation.	To be tested when pollution is suspected
22.	Arsenic (mg/L, As) Max.	0.05	Beyond this the water becomes toxic	No Relaxation	To be tested when pollution is suspected
23.	Cyanide	0.05	Beyond this the water becomes toxic	No Relaxation	To be tested when pollution is suspected
24.	Lead (mg/L Pb) Max.	0.05	Beyond this the water becomes toxic	No Relaxation	To be tested when pollution is suspected
25.	Zinc (mg/L, Zn) Max.	5	Beyond this limit it can cause astringent taste and an opalescence in water	15	To be tested when pollution is suspected
26.	Anionic detergents (mg/L, MBAS) Max	0.2	Beyond this limit it can cause a light froth in water	1.0	To be tested when pollution is suspected
27.	Chromium (mg/L, Cr6+	0.05	May be carcinogenic above this limit	-	-
28.	Poly-nuclear Aromatic Hydrocarbons (mg/l, PAH) Max	-	May be carcinogenic	-	-
29.	Mineral oil (mg/L)	0.01	Beyond this limit, undesirable taste and odour after chlorination takes place	0.03	To be tested when pollution is suspected
30.	Pesticides (mg/L) max	Absent	Toxic	0.001	-

No.	Substance or characteristic	Requirement Desirable limit	Undesirable effect outside the desirable	Permissible limit in the absence of alternate Source	Remarks
Radioactive materials					
31.	Alpha emitters Bq/L Max	-	-	0.1	-
32.	Beta emitters Pci/L Max	-	-	1.0	-
33.	Alkalinity (mg/L,) Max	200	Beyond this limit, taste becomes unpleasant	600	-
34.	Aluminum (mg/L, Al) Max	0.03	Cumulative effect is reported to cause dementia	0.2	
35.	Boron (mg/L) Max	1.0	-	5.0	-

APPENDIX 8: SALIENT FEATURES OF MAJOR LABOUR LAWS APPLICABLE TO ESTABLISHMENTS ENGAGED IN CONSTRUCTION OF CIVIL WORKS

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

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

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

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

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

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

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

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

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

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

(xi) Industrial Employment (Standing Orders) Act, 1946 - It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50).

The Act provides for laying down rules governing the conditions of employment by the employer on matters provided in the Act and get the same certified by the designated Authority.

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

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

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

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

APPENDIX 9: SAMPLE OUTLINE SPOILS (CONSTRUCTION WASTE) MANAGEMENT PLAN

- The Spoil Management Plan should be site specific and be part of the monthly Construction Management Plan.
- The contractor, in consultation with the PIU, has to find out appropriate locations for the disposal of the excess soil generated. The spoils should be deposited only at these sites.
- Further precautions need to be taken in case of the contaminated spoils
- The vehicle carrying the spoil should be covered properly.
- The spoils generating from each site should be removed on the same day or immediately after the work is complete. The site / road should be restored to the original condition.

I. Spoils information

The spoil information contains the details like a) The type / material, b) Potential contamination by that type, c) Expected volume (site / component specific), d) Spoil Classification etc.

II. Spoils management

The Spoil Management section gives the details of a) Transportation of spoil b) disposal site details c) Precautions taken d) Volume of contaminated spoil, if present, d) Suggested reuse of disposal of the spoil

III. Documentation

The volume of spoil generated (site specific, date wise), site disposed, reuse / disposal details should be documented properly.

APPENDIX 10: SAMPLE OUTLINE TRAFFIC MANAGEMENT PLAN

A. Principles for TMP around the Water Pipes Construction Sites

1. One of the prime objectives of this TMP is to ensure the safety of all the road users along the work zone, and to address the following issues:

(i) the safety of pedestrians, bicyclists, and motorists travelling through the construction zone;
(ii) protection of work crews from hazards associated with moving traffic;
(iii) mitigation of the adverse impact on road capacity and delays to the road users;
(iv) maintenance of access to adjoining properties; and
(v) addressing issues that may delay the project.

B. Operating Policies for TMP

2. The following principles will help promote safe and efficient movement for all road users (motorists, bicyclists, and pedestrians, including persons with disabilities) through and around work zones while reasonably protecting workers and equipment.

(i) Make traffic safety and temporary traffic control an integral and high-priority element of project from planning through design, construction, and maintenance.
(ii) Inhibit traffic movement as little as possible.
(iii) Provide clear and positive guidance to drivers, bicyclists, and pedestrians as they approach and travel through the temporary traffic control zone.
(iv) Inspect traffic control elements routinely, both day and night, and make modifications when necessary.
(v) Pay increased attention to roadside safety in the vicinity of temporary traffic control zones.
(vi) Train all persons that select, place, and maintain temporary traffic control devices.
(vii) Keep the public well informed.
(viii) Make appropriate accommodation for abutting property owners, residents, businesses, emergency services, railroads, commercial vehicles, and transit operations.

3. **Figure A10.1 to Figure A10.11** illustrates the operating policy for TMP for the construction of water pipes and the sewers along various types of roads.

C. Analyze the impact due to street closure

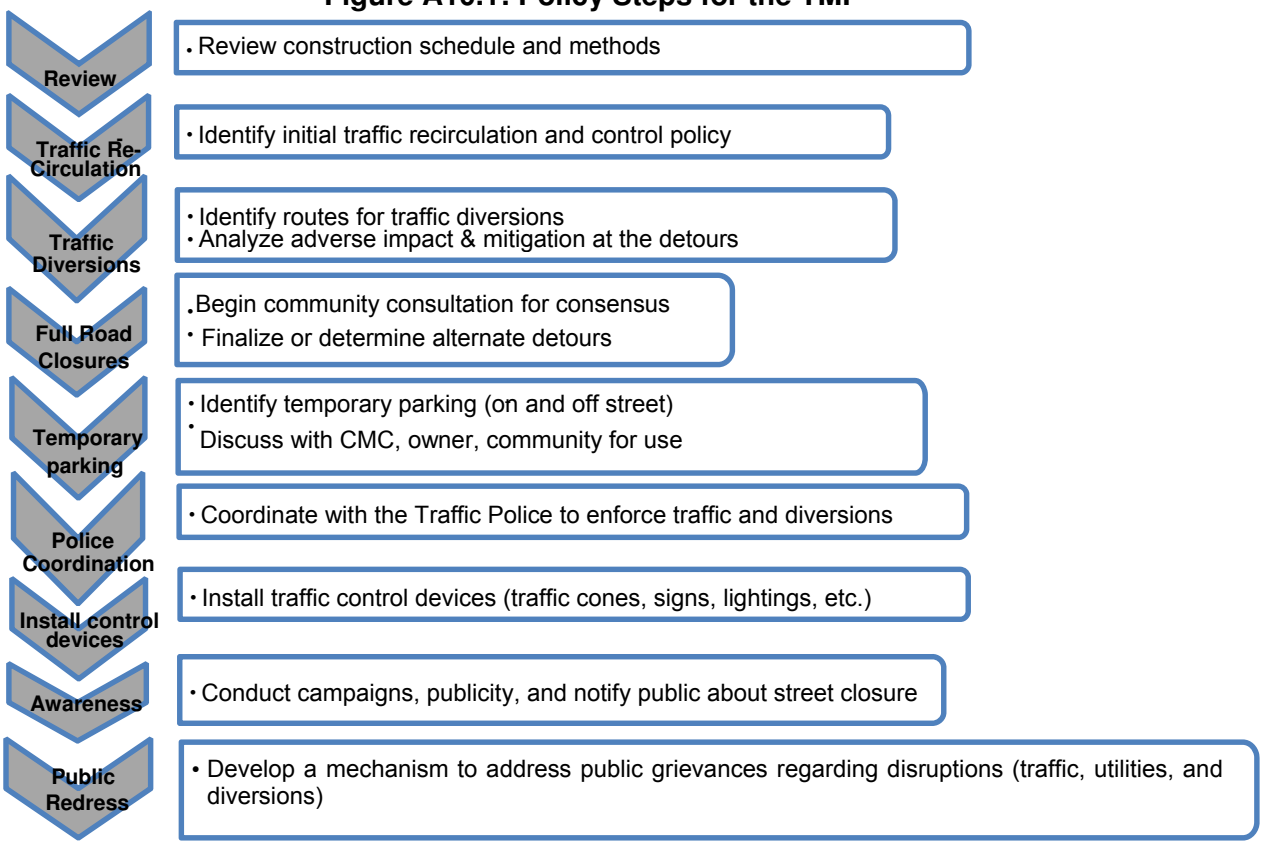
4. Apart from the capacity analysis, a final decision to close a particular street and divert the traffic should involve the following steps:

(i) approval from the ULB/Public Works Department (PWD) to use the local streets as detours;
(ii) consultation with businesses, community members, traffic police, PWD, etc., regarding the mitigation measures necessary at the detours where the road is diverted during the construction;
(iii) determining of the maximum number of days allowed for road closure, and incorporation of such provisions into the contract documents;
(iv) determining if additional traffic control or temporary improvements are needed along the detour route;

(v) considering how access will be provided to the worksite;
(vi) contacting emergency service, school officials, and transit authorities to determine if there are impacts to their operations; and
(vii) developing a notification program to the public so that the closure is not a surprise. As part of this program, the public should be advised of alternate routes that commuters can take or will have to take as result of the traffic diversion.

5. If full road-closure of certain streets within the area is not feasible due to inadequate capacity of the detour street or public opposition, the full closure can be restricted to weekends with the construction commencing on Saturday night and ending on Monday morning prior to the morning peak period.

Figure A10.1: Policy Steps for the TMP



D. Public awareness and notifications

6. As per discussions in the previous sections, there will be travel delays during the constructions, as is the case with most construction projects, albeit on a reduced scale if utilities and traffic management are properly coordinated. There are additional grounds for travel delays in the area, as most of the streets lack sufficient capacity to accommodate additional traffic from diverted traffic as a result of street closures to accommodate the works.

7. The awareness campaign and the prior notification for the public will be a continuous activity which the project will carry out to compensate for the above delays and minimize public claims as result of these problems. These activities will take place sufficiently in advance of the

time when the roadblocks or traffic diversions take place at the particular streets. The reason for this is to allow sufficient time for the public and residents to understand the changes to their travel plans. The project will notify the public about the roadblocks and traffic diversion through public notices, ward level meetings and city level meeting with the elected representatives.

8. The PIU will also conduct an awareness campaign to educate the public about the following issues:

(i) traffic control devices in place at the work zones (signs, traffic cones, barriers, etc.);
(ii) defensive driving behavior along the work zones; and
(iii) reduced speeds enforced at the work zones and traffic diversions.

9. It may be necessary to conduct the awareness programs/campaigns on road safety during construction.

10. The campaign will cater to all types of target groups i.e. children, adults, and drivers. Therefore, these campaigns will be conducted in schools and community centers. In addition, the project will publish a brochure for public information. These brochures will be widely circulated around the area and will also be available at the PIU, and the contractor's site office. The text of the brochure should be concise to be effective, with a lot of graphics. It will serve the following purpose:

(i) explain why the brochure was prepared, along with a brief description of the
(ii) project;
(iii) advise the public to expect the unexpected;
(iv) educate the public about the various traffic control devices and safety measures adopted at the work zones;
(v) educate the public about the safe road user behavior to emulate at the work zones;
(vi) tell the public how to stay informed or where to inquire about road safety issues at the work zones (name, telephone, mobile number of the contact person; and
(vii) indicate the office hours of relevant offices.

E. Install traffic control devices at the work zones and traffic diversion routes

11. The purpose of installing traffic control devices at the work zones is to delineate these areas to warn, inform, and direct the road users about a hazard ahead, and to protect them as well as the workers. As proper delineation is a key to achieve the above objective, it is important to install good traffic signs at the work zones. The following traffic control devices are used in work zones:

(i) Signs
(ii) Pavement Markings
(iii) Channelizing Devices
(iv) Arrow Panels
(v) Warning Lights

12. Procedures for installing traffic control devices at any work zone vary, depending on road configuration, location of the work, construction activity, duration, traffic speed and volume, and pedestrian traffic. Work will take place along major roads, and the minor internal roads. As

such, the traffic volume and road geometry vary. The main roads carry considerable traffic; internal roads in the new city areas are wide but in old city roads very narrow and carry considerable traffic. However, regardless of where the construction takes place, all the work zones should be cordoned off, and traffic shifted away at least with traffic cones, barricades, and temporary signs (temporary “STOP” and “GO”).

13. **Figure A2 to Figure A6** illustrates a typical set-up for installing traffic control devices at the work zone of the area, depending on the location of work on the road way, and road geometrics:

(i) Work on shoulder or parking lane
(ii) Shoulder or parking lane closed on divided road
(iii) Work in Travel lane
(iv) Lane closure on road with low volume
(v) Street closure with detour

14. The work zone should take into consideration the space required for a buffer zone between the workers and the traffic (lateral and longitudinal) and the transition space required for delineation, as applicable. For the works, a 30 cm clearance between the traffic and the temporary STOP and GO signs should be provided. In addition, at least 60 cm is necessary to install the temporary traffic signs and cones.

15. Traffic police should regulate traffic away from the work zone and enforce the traffic diversion result from full street closure in certain areas during construction. Flagman/ personnel should be equipped with reflective jackets at all times and have traffic control batons (preferably the LED type) for regulating the traffic during night time.

16. In addition to the delineation devices, all the construction workers should wear fluorescent safety vests and helmets in order to be visible to the motorists at all times. There should be provision for lighting beacons and illumination for night constructions.

APPENDIX 11: QUARTERLY REPORTING FORMAT FOR ASSISTANT SAFEGUARDS OFFICER

1. Introduction

(i) Overall project description and objectives
(ii) Description of sub-projects
(iii) Environmental category of the sub-projects
(iv) Details of site personnel and/or consultants responsible for environmental monitoring
(v) Overall project and sub-project progress and status

No.	Sub-Project Name	Status of Sub-Project				List of Works	Progress of Works
		Design	Pre-Construction	Construction	Operational Phase		
		□	□	□	□		
		□	□	□	□		
		□	□	□	□		

2. Compliance status with National/ State/ Local statutory environmental requirements

No.	Sub-Project Name	Statutory Environmental Requirements	Status of Compliance	Action Required

3. Compliance status with environmental loan covenants

No. (List schedule and paragraph number of Loan Agreement)	Covenant	Status of Compliance	Action Required

4. Compliance status with the environmental management and monitoring plan

(i) Provide the monitoring results as per the parameters outlined in the EMP. Append supporting documents where applicable, including Environmental Site Inspection Reports.
(ii) There should be reporting on the following items which can be incorporated in the checklist of routine Environmental Site Inspection Report followed with a summary in the semi-annual report send to ADB. Visual assessment and review of relevant site documentation during routine site inspection needs to note and record the following:
    - What are the dust suppression techniques followed for site and if any dust was noted to escape the site boundaries;
    - If muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads;

- adequacy of type of erosion and sediment control measures installed on site, condition of erosion and sediment control measures including if these were intact following heavy rain; o Are their designated areas for concrete works, and refueling;
- Are their spill kits on site and if there are site procedure for handling emergencies;
- Is there any chemical stored on site and what is the storage condition?
- Is there any dewatering activities if yes, where is the water being discharged;
- How are the stockpiles being managed;
- How is solid and liquid waste being handled on site;
- Review of the complaint management system;
- Checking if there are any activities being under taken out of working hours and how that is being managed.

Summary Monitoring Table

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
Design Phase						
Pre-Construction Phase						
Construction Phase						
Operational Phase						

Overall Compliance with CEMP/ EMP

No.	Sub-Project Name	EMP/ CEMP Part of Contract Documents (Y/N)	CEMP/ EMP Being Implemented (Y/N)	Status of Implementation (Excellent/ Satisfactory/ Partially Satisfactory/ Below Satisfactory)	Action Proposed and Additional Measures Required

5. Approach and methodology for environmental monitoring of the project

- Brief description on the approach and methodology used for environmental monitoring of each sub-project

6. Monitoring of environmental impacts on project surroundings (ambient air, water quality and noise levels)

(i) Brief discussion on the basis for monitoring
(ii) Indicate type and location of environmental parameters to be monitored
(iii) Indicate the method of monitoring and equipment to be used
(iv) Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements

As a minimum the results should be presented as per the tables below.

Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Government Standards)		
			PM10 µg/m ^{3}	SO_2 µg/m^3	NO_2 µg/m^3

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM10 µg/m ^{3}	SO_2 µg/m^3	NO_2 µg/m^3

Water Quality Results

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L

Site No.	Date of Sampling	Site Location	Parameters (Monitoring Results)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L

Noise Quality Results

Site No.	Date of Testing	Site Location	LA eq (dBA) (Government Standard)	
			Day Time	Night Time

Site No.	Date of Testing	Site Location	LA eq (dBA) (Monitoring Results)	
			Day Time	Night Time

7. Summary of key issues and remedial actions

- Summary of follow up time-bound actions to be taken within a set timeframe.

8. Appendixes

(i) Photos
(ii) Summary of consultations
(iii) Copies of environmental clearances and permits
(iv) Sample of environmental site inspection report
(v) Other

APPENDIX 12: SAMPLE ENVIRONMENTAL SITE INSPECTION REPORT

Project Name
Contract Number

NAME: _____ DATE: _____
TITLE: _____DMA: _____
LOCATION: _____ GROUP: _____

WEATHER:

Project Activity Stage	Survey	
	Design	
	Implementation	
	Pre-Commissioning	
	Guarantee Period	

Monitoring Items	**Compliance**
Compliance marked as Yes / No / Not applicable (NA) / Partially Implemented (PI)	
EHS supervisor appointed by contractor and available on site	
Construction site management plan (spoils, safety, schedule, equipment etc.,) prepared	
Traffic management plan prepared	
Dust is under control	
Excavated soil properly placed within minimum space	
Construction area is confined; no traffic/pedestrian entry observed	
Surplus soil/debris/waste is disposed without delay	
Construction material (sand/gravel/aggregate) brought to site as & when required only	
Tarpaulins used to cover sand & other loose material when transported by vehicles	
After unloading , wheels & undercarriage of vehicles cleaned prior to leaving the site	
No AC pipes disturbed/removed during excavation	
No chance finds encountered during excavation	
Work is planned in consultation with traffic police	
Work is not being conducted during heavy traffic	
Work at a stretch is completed within a day (excavation, pipe laying & backfilling)	
Pipe trenches are not kept open unduly	
Road is not completely closed; work is conducted on edge; at least one line is kept open	
Road is closed; alternative route provided & public informed, information board provided	
Pedestrian access to houses is not blocked due to pipe laying	
Spaces left in between trenches for access	
Wooden planks/metal sheets provided across trench for pedestrian	
No public/unauthorized entry observed in work site	
Children safety measures (barricades, security) in place at works in residential areas	
Prior public information provided about the work, schedule and disturbances	
Caution/warning board provided on site	
Guards with red flag provided during work at busy roads	
Workers using appropriate PPE (boots, gloves, helmets, ear muffs, etc.)	
Workers conducting or near heavy noise work is provided with ear muffs	

Monitoring Items	Compliance
Compliance marked as Yes / No / Not applicable (NA) / Partially Implemented (PI)	
Contractor is following standard & safe construction practices	
Deep excavation is conducted with land slip/protection measures	
First aid facilities are available on site and workers informed	
Drinking water provided at the site	
Toilet facility provided at the site	
Separate toilet facility is provided for women workers	
Workers camps are maintained cleanly	
Adequate toilet & bath facilities provided	
Contractor employed local workers as far as possible	
Workers camp set up with the permission of PIU	
Adequate housing provided	
Sufficient water provided for drinking/washing/bath	
No noisy work is conducted in the nights	
Local people informed of noisy work	
No blasting activity conducted	
Pneumatic drills or other equipment creating vibration is not used near old/risky buildings	

Signature

_____

Sign off

_____ _____

Name **Name**
Position **Position**

APPENDIX 13: SAMPLE GRIEVANCE REGISTRATION FORM

(To be available in Hindi and English)

The _____Project welcomes complaints, suggestions, queries, and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback. Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing *(CONFIDENTIAL)* above your name. Thank you.

Date	Place of registration	Project City Project:			
Contact information/personal details					
Name		Gender	* Male * Female	Age	
Home address					
Place					
Phone no.					
E-mail					
Complaint/suggestion/comment/question Please provide the details (who, what, where, and how) of your grievance below: If included as attachment/note/letter, please tick here:					
How do you want us to reach you for feedback or update on your comment/grievance?					

FOR OFFICIAL USE ONLY

Registered by: (Name of official registering grievance)	
Mode of communication: Note/letter E-mail Verbal/telephonic	
Reviewed by: (Names/positions of officials reviewing grievance)	
Action taken:	
Whether action taken disclosed:	Yes No
Means of disclosure:	