Initial Environmental Examination

Document Stage: Updated
Project Number: 43253-025
January 2017

IND: Karnataka Integrated Urban Sector Development Investment Program – Tranche 1: Harihara City Sewerage Scheme Subproject

Package Number: 01HRA01

Prepared by Karnataka Urban Infrastructure Development and Finance Corporation, Government of Karnataka for the Asian Development Bank.

INITIAL ENVIRONMENTAL EXAMINATION (IEE)

Updated
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IND: Karnataka Integrated Urban Water Management Investment Program (KIUWMIP)

Tranche 1: Sewerage (Under Ground Drainage) Scheme for Harihar City Municipal Council- Package number 01HRA01

Prepared by Karnataka Urban Infrastructure Development and Finance Corporation, Government of Karnataka for the Asian Development Bank

The initial environmental examination (IEE) prepared based on designs was reviewed and approved by KUIDFC and ADB in October 2014. It has been disclosed in KUIDFC and ADB's website (https://www.adb.org/projects/documents/kiuwmip-tranche-1-sewerage-scheme-harihara-city-municipal-council-iee)

The approved draft IEE (version October 2014) has now been updated reflecting some changes in scope for Harihar Town Underground drainage scheme. Presently project is under implementation

ABBREVIATIONS

ADB	Asian Development Bank
ASI	Archaeological Survey of India
CBO	Community Based Organizations
CFE	Consent for Establishment
CFO	Consent for Operation
CRO	Complaint Receiving Officer
CSS	Construction Supervision Specialist
CGWB	Central Ground Water Board
CMC	City Municipal Council
CPCB	Central Pollution Control Board
DC	Deputy Commissioner
DI	Ductile Iron
DPD	Deputy Project Director
DPR	Detailed Project Report
DSC	Design and Supervision Consultant
EA	Executing Agency
EC	Environmental Clearance
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ERP	Emergency Response Plan
FAL	Facultative Aerated Lagoon
GoI	Government of India
GoK	Government of Karnataka
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
HDPE	High Density Polyethylene
H&S	Health and Safety
IA	Implementing Agency
IEE	Initial Environmental Examination
IFC	International Finance Corporation
INR	Indian Rupee
IWRM	Integrated Water Resource Management
KIUWMIP	Karnataka Integrated Urban Water Management Improvement Porgramme
KPCL	Karnataka Power Transmission Corporation Limited KSPCB Karnataka State Pollution Control Board
KUIDFC	Karnataka Urban Infrastructure Development & Finance Corporation
KPTCL	Karnataka Power Transmission Corporation Limited
LPA	Local Planning Authority
MFF	Multi-tranche Financing Facility
MID	Minor Irrigation Department
MoEFCC	Ministry of Environment, Forest and Climate Change
MoU	Memorandum of Understanding
NGO	Non-Government Organisation
NH	National Highway
NKUSIP	North Karnataka Urban Sector Investment Programme
NWKRTC	North-West Karnataka Road Transport Corporation

ODF	Open Defecation Free
O.E	Over Exploited
O&M	Operations & Maintenance
PIU	Program Implementation Unit
PMU	Program Management Unit
PPE	Personal Protection Equipment
PPTA	Project Preparatory Technical Assistance PUC Pollution Under Control
REA	Rapid Environmental Assessment
RH	Relative Humidity
RoW	Right of Way
RP	Resettlement Plan
SBR	Sequential Batch Reactor
SC	Scheduled Caste / Steering Committee
SEIAA	State Environment Impact Assessment Authority
SH	State Highway
SOP	Standard Operating Procedures
SPS	Safeguard Policy Statement
ST	Scheduled Tribe
STP	Sewage Treatment plant
TMC	Town Municipal Council
TMP	Traffic Management Plan
ULB	Urban Local Body
UGD	Under Ground Drainage
USD	US Dollars
UWSS	Urban Water Supply & Sanitation
WWTP	Wastewater Treatment Plant

WEIGHTS AND MEASURES

dB	Decibels
ha	Hectares
km	kilometre
lpcd	litres per capita per day
lpm	liter per minute
M	million
M	metre
Mcft	million cubic feet
Mcm	million cubic meters
MLD	million litres per day
Mm	millimetre
Ppm	Parts per million

NOTE{S}

In this report, "$" refers to US dollars.

CURRENCY EQUIVALENTS
(as of November 2016)

Currency unit	–	Equivalent
Rs 1.00	=	$ 0.015
$1.00	=	Rs. 66.7

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EXECUTIVE SUMMARY

1. The Karnataka Integrated Urban Water Management Investment Program (KIUWMIP, the programme) aims to improve water resource management in urban areas in a holistic and sustainable manner. Investment support will be provided to modernize and expand Urban Water Supply and Sanitation (UWSS) while strengthening relevant institutions to enhance efficiency, productivity and sustainability in water use.

2. Harihar city sewerage scheme subproject is one of the subprojects proposed in Tranche-1. 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 SPS (2009). This Initial Environmental Examination (IEE) addresses city sewerage scheme components proposed under Tranche 1 which includes sewer network components, pumping stations and sewage treatment plant.

3. **Categorization.** Harihar sewerage system subproject is classified as Environmental Category B as per the SPS as no significant impacts are envisioned. Accordingly this Initial Environmental Examination (IEE) has been prepared and assesses the environmental impacts and provides mitigation and monitoring measures to ensure no significant impacts as a result of the subproject.

4. **Subproject Scope**. The subproject formulated under this Investment Program to address gaps in sewerage infrastructure, and to meet the design demand includes laying of sewer network (new network of 72.16 km including 2640 Manholes); construction of 4 nos. sewage pumping stations and one 18 MLD sewage treatment plant.

5. **Implementation Arrangements.** Karnataka Urban Infrastructure Development & Finance Corporation (KUIDFC) is the Executing Agency (EA) responsible for overall technical supervision and execution of all subprojects funded under the Investment Program. Implementation activities will be overseen by a separate Program Management Unit (PMU) in its head office at Bangalore, in coordination with its regional office and 2 divisional offices established to supervise the implementing agencies in each geographical area. A team of senior technical, administrative and financial officials, including safeguards specialists, will assist the PMU in managing and monitoring program implementation activities. The Implementing Agencies (IA) is ULBs. Project Implementation Units (PIUs) dedicated exclusively to the project are set up in each town. The PIUs staffed by qualified and experienced officers and are responsible for the day-to-day activities of project implementation in the field, and which under the direct administrative control of the PMU/PIU/PMDCSC. Consultant team (PMDCSC) is responsible for subproject planning and management, assuring technical quality of design and construction, designing the infrastructure and supervising construction; and safeguards document preparation.

6. **Description of the Environment**. Subproject components are located in Harihar urban area or in its immediate surroundings were converted into agricultural or urban use for many years ago, and there is no natural habitat left at these sites. The subproject sites are located in existing right of ways (RoWs) and government-owned land. The Proposed STP is located in the outskirts of the city near the Tungabhadra River behind Kirloskar factory. All the four Pumping stations are located at the end of the city. All 4 sewage lifting stations are designed such that there is no impact on neighboring property

7. There are no mangroves, or estuaries in or near the subproject location. There are no forest areas within or near Harihar. Traffic management will be necessary during pipe-laying on busy roads.

8. **Environmental Management.** An Environmental Management Plan (EMP) is included as part of this IEE, which includes (i) mitigation measures for environmental impacts during implementation; (ii) an environmental monitoring program, and the responsible entities for mitigating, monitoring, and reporting; (iii) public consultation and information disclosure; and (iv) a grievance redress mechanism. A number of impacts and their significance have already been reduced by amending the designs. The EMP is included in civil work bidding and contract documents.

9. Locations and siting of the proposed infrastructures were considered to further reduce impacts. These include (i) locating all facilities on government-owned lands, as far as possible, to minimize the need for land acquisition and relocation of people; (ii) laying of pipes in RoWs along main/access roads and other facilities on government vacant lands to the possible extent, to reduce acquisition of land and impacts on livelihoods specifically in densely populated areas of the city and(iii). Under the KIUWMIP Project, an 18 MLD FAL type STP is proposed behind Kirloskar factory and four numbers of Sewage Pumping Stations are proposed at Amaravathi, Guttur, APMC and Keshavanagara areas of Harihara. Selection of Land for STP and four Sewage Pumping Stations are in such a way that there is no major impact on the Environmental hazards and nearby livelihood.

10. Potential impacts were identified in relation to location, design, construction and operation of the improved infrastructure. No significant location specific impacts were noticed. Subprojects are confined to CMC boundary. One religious place (Sri. Sadguru Samartha Narayana Ashram) is located at about 100 m from the STP site, some factories are located nearby (brick factory), and a college is located at about 250 m. Green buffer zone will be maintained around STP to reduce any aesthetic or odour impacts. Sewage Pumping stations are proposed at four locations namely Amaravathi, Guttur, APMC and Keshavanagara. Except Amaravathi area there are no as such major households in and around the lifting stations. To avoid any nuisance to the surrounding areas due to bad odour, and also to maintain the aesthetical value, green buffer area will be developed around the pumping stations. STP is designed to meet the specified disposal limits, and therefore no impacts due to treated water disposal is envisaged. Treated waste water will be disposed into a nallah (stream) flowing adjacent to the STP site. This nallah currently carries wastewater generated in the city area and flows downstream and meets River Tungabhadra at about 1.1 km from the STP site. This nallah flows through agricultural lands and therefore the treated water will be mostly utilized for irrigation. Where there is no irrigation demand, treated wastewater water may flow down and the river. Considering that the river flow is very high compared to the volume of treated water disposal and adequate treatment as per the discharge standards no negative impacts on river water quality envisaged. There is only one water abstraction point in the downstream proximity (about 350 m) . This is abstraction point is for an industry, and as per the information gathered, industry abstracts water only during monsoon high flows, and stores in the ponds located inside the industry.

11. During the construction phase, impacts mainly arise from the need to dispose of moderate quantities of waste soil and disturbance to residents, businesses, and traffic. These are common temporary impacts of construction in urban areas, and there are well developed methods for their mitigation. Measures such as conducting work in lean season and minimizing inconvenience by best construction methods will be employed. 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.

12. 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.

13. The stakeholders were involved in developing the IEE through discussions on-site and public consultation, after which views expressed were incorporated into the IEE and in the planning and development of the subproject. The updated IEE will be disclosed via the ADB and KUIDFC 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.

14. The citizens of the Harihar city will be the major beneficiaries of this subproject. Under KUIWMIP the sewerage system will cover the presently uncovered areas under KMRP and will remove the human waste rapidly and treated from those areas served by the network. Diseases of poor sanitation, such as diarrhea and dysentery, should be reduced, so people should spend less on healthcare and lose fewer working days due to illness, so their economic status should also improve.

15. The most noticeable net environmental benefits to the population of the towns will be positive and large as a result of: i) improved sanitation and environmental health (ii) quality of water in the open channels and the water bodies, through the expansion of sewerage networks and treatment capacity.

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

17. **Monitoring and Reporting.** The PMU, PIU, and DSC consultants will be responsible for monitoring. The DSC will submit monthly monitoring reports to PMU, and the PMU will send semi-annual monitoring reports to ADB. ADB will post the environmental monitoring reports on its website.

18. **Conclusions and Recommendations**. The proposed subproject is 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 subproject 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). Construction and operation of STP requires consent for establishment (CFE) and consent for operation (CFO) respectively from the Karnataka State Pollution Control Board. CFE has been obtained while the CFO will be obtained after construction and prior to start of STP operation.

I. INTRODUCTION

A. Background

1. The Karnataka Integrated Urban Water Management Investment Program (KIUWMIP) aims to improve water resource management in urban areas in a holistic and sustainable manner. Investment support will be provided to modernize and expand urban water supply and sanitation (UWSS) while strengthening relevant institutions to enhance efficiency, productivity and sustainability in water use. The Program focuses on priority investments and institutional strengthening in water supply and sanitation within an IWRM context.

2. The Program implemented over a four-year period beginning in 2014, and funded by a loan via the Multi-tranche Financing Facility (MFF) of Asian Development Bank (ADB). The Executing Agency is the Karnataka Urban Infrastructure Development Finance Corporation (KUIDFC) and implementing agencies for the Investment Program will be respective Urban Local Bodies (ULBs). Harihar, Byadgi, Ranebennur and Davangere are the four towns chosen to benefit from the first tranche of the investment.

3. The expected outcome will be, improved water resource planning, monitoring and service delivery in four towns of the Upper Tungabhadra sub basin. Tranche 1 will have three outputs; (i) Expanded efficient UWSS infrastructure in four towns of the Upper Tungabhadra sub basin; (ii) Improved water resource planning, monitoring and service delivery in Karnataka; and (iii) KUIDFC strengthened capacity. This IEE is based on an assessment of proposed underground drainage (UGD) components, pumping stations, treatment of sewage within the project area i.e., Harihar City.

B. Background of IEE

4. The Harihar City Underground Drainage sub project is proposed in **Tranche -1** of the KIUWMIP. Project components include improvement of underground sewage network, construction of sewage pumping stations and sewage treatment plant.

5. ADB's Safeguard Policy Statement, 2009, requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for Environmental Assessment are described in detail in ADB Environmental Assessment Guidelines, 2003. This states that ADB requires environmental assessment of all project loans, programme loans, sector loans, sector development programme loans, financial intermediary loans and private sector investment operations.

6. This IEE, for the Harihar city Underground Drainage subproject, discusses the environmental impacts and mitigation measures relating to the location, design, construction and operation of all physical works proposed under this subproject. IEE relies mainly on secondary sources of information and site reconnaissance surveys including on-site informal discussions with the local people. The IEE follows the process and documentation as per the ADB's Safeguard Policy Statement (SPS, 2009). The Rapid Environmental Assessment Checklists are presented in **Appendix 1.**

C. Environmental Regulatory Compliance

7. **Table 1** presents a summary of environmental regulations and mandatory requirements applicable to the sub project

Table 1: Applicable Environmental Regulations

Law	Description	Requirement
EIA Notification	The EIA Notification of 2006 and 2009 (replacing the EIA Notification of 1994), set out the requirement for environmental assessment in India. This states that Environmental Clearance (EC) is required for certain defined activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorized as A or B depending on the scale of the project and the nature of its impacts. Categories A projects require Environmental Clearance from the Ministry of Environment, Forest and Climate change (MoEFCC). Category B projects require Environmental Clearance from the State Environmental Impact Assessment Authority (SEIAA).	Sub project is not a listed activity in Schedule I of this notification and hence environmental clearance is not required.
Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments	Control of water pollution is achieved through administering conditions imposed in consent issued under provision of the Water (Prevention and Control of Pollution) Act of 1974. These conditions regulate the quality and quantity of effluent, the location of discharge and the frequency of monitoring of effluents. Any component of the Project having the potential to generate sewage or trade effluent will come under the purview of this Act, its rules and amendments. Such projects have to obtain Consent For Establish (CFE) under Section 25 of the Act from Karnataka State Pollution Control Board (KSPCB) before starting implementation and Consent For Operate (CFO) before commissioning. The Water Act also requires the occupier of such projects to take measures for abating the possible pollution of receiving water bodies.	Underground Drainage sub-components of the project require does not require CFE and CFO under this Act . Construction of new STP will required CFE and CFO from KSPCB. CFE is already obtained. Attached as **Appendix 2** of this report. Important conditions as specified in the consent is mentioned below the table. All relevant forms, prescribed fees and procedures to obtain the CFE and CFO can be found in the KSPCB website (www.kspcb.gov.in).
Air (Prevention and Control of Pollution) Act of 1981, Rules of 1982 and amendments.	The projects having potential to emit air pollutants into the atmosphere have to obtain CFE under Section 21 of the Air (Prevention and Control of Pollution) Act of 1981 from KSPCB before starting implementation and CFO before commissioning the project. The occupier of the project/facility has the responsibility to adopt necessary air pollution control measures for abating air pollution.	For the project, the following will require CFE and CFO from KSPCB: (i) diesel generators; (ii) wet mix plants; and (iii) stone crushers, if installed for construction. All relevant forms, prescribed fees and procedures to obtain the CFE and CFO can be found in the KSPCB website (www.kspcb.gov.in).
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 standards notified.	**Appendix 3** provides applicable standards for ambient air quality which should be followed during construction phase.

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 4** provides applicable noise standards which should be followed during construction phase.
Ancient Monuments and Archaeological Sites and Remains Rules of 1959	The Rules designate areas within a radius of 100 meters (m) and 300 m from the "protected property" as "protected area" and "controlled area" respectively. No development activity (including mining operations and construction) 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.	As per present design Harihareshwara temple (an ASI protected monument) is not located within 300 m of pipe laying area, sewage pumping station and STP In case of any chance of laying pipelines within 300 m of protected monument (Harihareswara Temple), prior permission will be obtained from the National Monument Authority (NMA) through the ASI. Due precautions as per the ASI directions will be taken during the construction.
Land Acquisition Act of 1894	Private land acquisition is guided by the provisions and procedures in this Act. The District Collector or any other officer designated will function as the Land Acquisition Officer on behalf of the Government. There is a provision for consent award to reduce the time for processing if the land owners are willing to agree on the price fixed by the Land Acquisition Officer.	Four sites are required for construction of sewage Lift Stations. Presently all sites under control of Harihar CMC
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 5** provides applicable labour laws including amendments issued from time to time applicable to establishments engaged in construction of civil works.
Biodiversity Act of 2002	The Biodiversity Act 2002 primarily addresses access to genetic resources and associated knowledge by foreign individuals, institutions or companies, to ensure equitable sharing of benefits arising out of the use of these resources and knowledge to the country and the people.	Not applicable to Harihar Sewerage Project as no mentioned activities are involved in the project

Law	Description	Requirement
Ramsar Convention, 1971	The Ramsar Convention is an intergovernmental treaty that provides the framework for national action and international co-operation for the conservation and wise use of wetlands and their resources. India is one of the signatories to the treaty. The Ramsar convention made it mandatory for the signatory countries to include wetland conservation in their national land use plans.	Not applicable to Harihar Sewerage Project as no wetlands presents in the project area.
Wildlife Protection Act, 1972	This overarching Act provides protection to wild animals, birds, plants and matters connected with habitat protection, processes to declare protected areas, regulation of wildlife trade, constitution of state and national board for wildlife, zoo authority, tiger conservation authority, penalty clauses and other important regulations.	Not applicable to Harihar Sewerage project as none of the project component will have any impact on wildlife or protected areas.
Forest (Conservation) Act, 1980	The Forest (Conservation) Act prevents the use of forest land for non-forest uses without the clearance from Ministry of Environment, Forests & Climate Change (MoEFCC), Govt. of India	Not applicable to Harihar Sewerage Project as there is no forest area within or adjacent to the project area.
Karnataka Forest Act, 1963 and Karnataka Forest Rules, 1969	This Act makes the basis for declaration of Reserved Forests, constitution of village forest committees, management of reserved forests and penalties and procedures.	Not applicable to Harihar Sewerage Project as there is no forest area within or adjacent to the project area.
Karnataka Preservation of Trees Act, 1976 and Karnataka Preservation of Trees Rules, 1977	This Act has put restriction on felling of trees in the State unless until permitted by the Tree Officer. Any person desiring to fell a tree shall apply in writing to the tree officer for permission in that behalf. It further defines clauses for planting adequate number of trees, planting in place of fallen/destroyed trees, preservation of trees and adoption of trees.	During the implementation of this project, no tree cutting is envisaged, hence not applicable to Harihar Sewerage Project

8. Conditions specified by KSPCB in the CFE. Is listed below.

- The treatment plant shall be used for the treatment of sewage only, at any point of time. The treatment plant shall be used for the treatment of sewage not exceed 18 MLD
- There is requirement from the City Municipal Council (CMC) to ensure that there shall not be any odour nuisance in the surrounding area due to the operation of the STP. Sufficient green belt shall be developed around the STP site
- The CMC shall utilize the treated sewage for irrigation purpose after treating the same to the stipulated standards
- The solid wastes collected in the treatment plant premises in the form of general garbage shall be disposed off sufficiently to the satisfaction of the Board so as not to cause fugitive emissions, dust problems or water pollution through leaching etc. of any kind
- The authority shall immediately report to the board of any accident or unforeseen act or event resulting in release of discharge of effluents or emissions or solid wastes etc., in excess of standards stipulated and the authorities shall immediately take appropriate corrective and preventive actions under intimation.

9. The effluent discharge standards as per KSPCB is mentioned in the below table.

Table 2: Effluent Discharge standards as per KSPCB

Sl no.	Characteristics	Tolerance limits
1	Suspended solids, mg/l max	30
2	pH Value	5.5-9.0
3	Oil and Grease, mg/l	10
4	Bio-Chemical Oxygen Demand mg/l (5 days at 20 deg Celcius max)	20

10. The ADB guidelines, on the other hand, stipulate addressing environmental concerns, if any, of a proposed activity in the initial stages of project preparation. For this, the ADB SPS categorizes the proposed components into various categories (A, B or C) to determine the level of environmental assessment required to address the potential impacts. Level of environmental assessment required for each category is presented below.

(i) Category A: Project components with potential for significant adverse environmental impacts. An Environmental Impact Assessment (EIA) is required to address significant impacts.

(ii) Category B: Project components judged to have some adverse environmental impacts, but of lesser degree and/or significance than those for Category A. An Initial Environmental Examination (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: Project components unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are still reviewed.

11. The environmental impacts of Harihar Underground Drainage sub project have been identified and assessed as part of the planning and design process. Environmental assessment using ADB's Rapid Environmental Assessment Checklists for Sewerage Scheme were conducted, and results of the assessments 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.

D. Scope of IEE

12. The IEE was based mainly on secondary sources (India Meteorological Department, Central Ground Water Board, Census Department of India etc.) of information and field reconnaissance surveys; no field monitoring (environmental) survey was conducted. Stakeholder consultation was an integral part of the IEE.

E. Report Structure

13. This Report contains Eight (8) sections including this introductory section: (i) Introduction; (ii) Description of Program components; (iii) Description of the environment; (iv) Screening of potential environmental impacts and mitigation measures; (v) Public consultation and information disclosure; (vi) Institutional requirements and EMP; (vii) Finding and recommendation; and (viii) Conclusions.

II. DESCRIPTION OF THE PROGRAM COMPONENTS

14. Harihar, the second largest urban center in Davanagere District, is located at a distance of 275 km from State capital, Bangalore and 14 km from District headquarter Davanagere. Harihar is one of the city in the Davanagere District of Karnataka, almost at the geographical centre of the State. The city is situated on the banks of the River Tungabhadra on national Highway 4 (Pune –Bangalore). The city is the Taluk headquarters of the Harihar Taluk in Davanagere District. The city has good road and rail connections with major towns both in the state and neighboring states. The City Municipal Council's jurisdiction extends up to an area of 20.99 Sq.km with 14,796 households including 3 local Panning area villages with populations of 96,514 as per the census 2011 within 34 wards and added planning area. It is one of the important educational, industrial and commercial trade centers of the District. The agricultural development around the town is extensive due to the presence of the Bhadra irrigation canal. Owing to the irrigation facilities, agro based industries are also growing at faster.

A. Need for Infrastructure Improvement in Harihar

1. Sewerage

15. There is no working underground drainage system in Harihar. The system of soak pits and septic tanks are used for the disposal of sewage in the city. Presently, the sewage from the town is collected into three major drains viz. Goudarageri *nala*, Matha *nala* and Kirloskar *nala* by the interception of natural valley and further diverting the same to the STP for treatment. The screen and grit chamber along with intercepting sewers are provided for each above *nala* and collected into Wet well. The sewage collected in the wet well is pumped to ridge manhole and then conveyed through 600 mm dia. gravity main up to Wet well located in the STP site and further pumped to treatment units. The gravity main is silted up to 20% to 25% of the pipe dia. During the heavy rain and floods, the flow will be bye-pass in to the *nala* course, the spill weir by regulating the sluice valve installed at tapping point. M.S gratings are provided at each tapping point for screening the floating materials and debris in the sewer lines. The screens are regularly cleaned manually for smooth flow of sewage.

16. The STP of 8.84 MLD capacity Waste Stabilization Ponds (WSP) was constructed by Karnata Urban Water Supply & Drainage Boards (KUWS & DB) in 2003 under National River Conservation Project (NRCP). It consists of three waste stabilization ponds followed by maturation ponds for treatment process. The existing waste stabilization pond system is not operating and is in a poor condition, with most of the plant damaged or overgrown with bushes/weeds.

2. Sewerage Schemes under Implementation

17. Presently, an Underground Drainage Scheme is being implemented under Karnataka Municipal Reforms Project (KMRP) assisted by World Bank in the town utilising the existing infrastructure covering core area with the road length of 46.5 Km. including mains, sub-mains, trunk mains and laterals. Construction of New STP/Rehabilitation of Existing STP is not undertaken by KMRP. The Completion date of the Project is May 2018. The network implementing under KMRP is covering approximately 70.5% of the population and 30% by road length. The balance 29.5% of population is not covered by sewage network and sewage generated is discharging directly in to the Thungabhadra River.

18. In realization of this situation, the Harihar CMC which is on the bank of river has been rightly selected by KUIDFC to take up the underground drainage scheme as a

priority sector for infrastructure development of the town under the ADB funded KIUWMIP to protect water bodies polluting with direct release of sewage in to the river.

B. Description of the Subproject

19. It is proposed provide sewage collection, conveyance, treatment and disposal infrastructure to cover the rest of the town area that is not covered under the KMRP. This subproject includes sewer network, sewage lifting stations and a Sewage Treatment Plant (STP).

20. **Sewer network**. Following **Table 3** gives details of the sewer network constructed under the KMRP and proposed under this KIUWMIP (under ADB funding).

Table 3: Status of infrastructure KMRP and KIUWMIP

Sl. No.	Component	Proposed Under KMRP	Proposed Under KUIWMIP- ADB funded
1	Sewer Network Coverage	46.31 km.	72.16 km.
2	Manholes	1528 Nos.	2640 Nos.
3	House Service Connections	7000 Nos.	7500 Nos.
4	% population covered	70.5%	29.5%

21. **Sewage Lifting Pumping Stations**: A total of four sewage lift stations have been proposed under KUWMIP to limit the depth of excavation in the sewage collection system in areas proposed to be severed. Since, the ultimate stage flow at these locations is relatively low; it is proposed to install lift stations. Sewage from the lift stations shall be pumped to the nearest manhole on a downstream gravity trunk sewer through a bell-mouth chamber. Design details of the suction well, sewage pumps and pumping main in the proposed lift stations are furnished in Table below.

Table 4: Lift Stations- Size & Selection

Parameter	Unit	LS	LS	LS	LS
		North SewageDistrict 3 (Kesav Nagar)	North Sewage District 5 (at Amaravathi)	North Sewage District 6 (at Guttur)	South Sewage District-2 (APMC yard)
Intermediate Stage (2031)	lpm	54.03	7.26	81.49	19.63
Ultimate Stage (2046)	lpm	68.70	11.98	109.38	26.35
Dia. Of Sump well	M	4.00	3.00	4.00	3.00
Pumping Dia proposed	mm	300	150	400	200
Material of Pipe		DI, K-7	DI, K-7	DI, K7	DI, K-7
Length of pumping	M	750	1010	1500	960
Pumping head	M	15.5	15.00	15.15	15.5

Parameter	Unit	LS	LS	LS	LS
		North SewageDistrict 3 (Kesav Nagar)	North Sewage District 5 (at Amaravathi)	North Sewage District 6 (at Guttur)	South Sewage District-2 (APMC yard)
BHP	HP	22	3	33	8

22. **Sewage Treatment Plant**: Design population and flows at various stages of the project pertinent to the proposed STP are furnished. Estimated quantity of sewage generated is given in **Table 5**. The total Population and entire city sewage of Harihara will be covered for this STP.

Table 5: Quantity of sewage generated

Year	Population	Net water supply (MLD)	Total Sewage Generated (MD)
Design Base Year 2016	116471	15.72	13.21
Intermittent Year 2031	156725	21.16	17.77
Ultimate Year 2046	210365	28.40	23.86

23. Therefore, the sewage treatment plant required for Harihar City Municipal Council shall be designed for the ultimate stage treatment capacity of 23.86 MLD and installation may be up to intermittent year requirement of 17.77 MLD i.e 18 MLD. It is also concluded that the construction of STP (FAL) at existing treatment plant in a phased manner without affecting the treating of the sewage pumping to the STP.

24. For construction of 24 MLD (23.86) capacity Facultative Aerated Lagoon (FAL) process STP for the ultimate year, the Land required is around 24 Acre considering the greenery around the treatment plant. The land available is 20 Acre which is behind Kirloskar factory area and it is in the hands of Municipal Council. Now for the installation of treatment plant for intermittent year requirement is 18.0 MLD (17.77) and available land is sufficient. For the future expansion additional 3 to 4 acre of land is required for the construction 24MLD STP.

25. It was decided to adopt a combination of Facultative lagoons of 3 No with 120m length, 40m width and 5 m overall depth with 2 concrete baffles in each lagoon, 9 No of fixed surface aerator of 15HP and Maturation Ponds/ Polishing ponds of 3 No with 100m length 40 m width and 1.5 m depth with 2 concrete baffle walls. The length and width would be influenced by the top width and side slopes of the bund wall and the baffle walls. The baffle wall was fixed at 3.33 m C/C in the length of the lagoon. The outer bund has a top width of 3 m for vehicular movement. The inner slope of the bund walls was taken as 2 horizontal to 1 vertical. The soil in the site is silty clay, which shows a high degree of in-situ compaction at depths greater than 1.0m. The top 0.3m is black cotton soil and below that it is brownish clay. The trial pit walls retain verticality till a depth of 3m. All the above mentioned characteristics would assist in providing a stable slope of 1 vertical to 2 horizontal. In order to increase the stability of the sides, the inner surface of the slopes and bases of the lagoon are proposed to be protected by a stone pitching in the concrete guide walls nominally reinforced concrete slab. The depth includes the water depth, depth for sludge storage and freeboard. A water depth of 5m, sludge depth of 0.5m and freeboard of 0.5m were selected. After a number of trials the following dimensions of the lagoon were firmed up. The lagoon shall be partly underground and partly above ground.2.5m high embankment shall be built on the ground and the lagoon excavated to 2.m below the ground level. The embankment shall be built using the excavated material. Outside slope of outer embankment is 1 vertical to 2 horizontal. It is proposed to line the inside of the lagoon as

well as the top of embankments and baffles with concrete. The outer embankment slope shall have to be protected by turf. Concrete weirs are planned on the incoming an outgoing bays to facilitate inlet and outlet. The overflow from outlet weir shall be collected by a leading channel that discharges on to the *nala*.

26. Following table (**Table 6)** shows the nature and size of the various components of this subproject. The descriptions shown in **Table 6** are as per the final project design that is being implemented. Location of sub project components and layout plans are shown in **Figure 1 to 12.** Final discharge point from STP at Harihar is shown in **Figure 12.** From STP treated effluent will discharge to local nallaha. Width of the nallaha is more than 2 m. Then it will travel for 1100 m for final discharge on Tungabhadra River at 4.27 km downstream of Harihara. Water Intake point at Kavalettu. Therefore no chance of pollution at intake point of Harihara. The industrial water intake point of Polyfiber plant is located 350 m downstream of Harihara STP discharge point on Tungabhadra River. **Figure 13** shows all intake and discharge locations in Google map.

Table 6: Proposed Subproject & Component Descriptions

Infrastructure	Function	Description	Location
Sewer network	Collect domestic wastewater from households not covered under ongoing KMRP project and convey it to Wastewater treatment plant	72.16 km of sewer pipeline 150-500 mm diameter, construction of 2640 nos. manhole, 7500 nos. house service connection and procurement of Jetting Machine	Sewers will be laid mostly in the outer medium and low density developed areas of the town, where sewers were not laid under KMRP; Sewers will be laid underground, along the roads in the vacant space between road and building
Pumping station 4 units	To collect sewage from sewerage network and conveying sewage to STP.	In South Sewerage District 2 and North Sewerage District 3,5 and 6	1. First lift station- Government Land for the PS for Sewerage District South 2 is within compound of APMC, a Dept. of Agriculture Producers Marketing, GoK, and site was transferred to the ULB. 2. Second station is located in North Sewerage district. A land parcel for North Sewerage District 3 in Keshav Nagar, this is CMC land within Govt. park 3.Third station is located in Amaravathi housing society land - Amaravathi housing society donated the land, 4. Fourth LS land at Guttur village. The land is purchased from private party for constructing the lift station
Sewage Treatment Plant	Treatment of underground sewage and drainage	Construction of 18 MLD STP – Facultative Aerated Lagoon (FAL) Type	20 acre Government land behind Kirloskar factory available for STP

C. Implementation Schedule

27. Subsequent to completion of DPR in December 2013, bids were invited in June 2014, and awarded in January 2015. The construction work of subproject started in the month of April 2015, and is currently ongoing, and is scheduled to completed by July 2018 (30 months construction period).

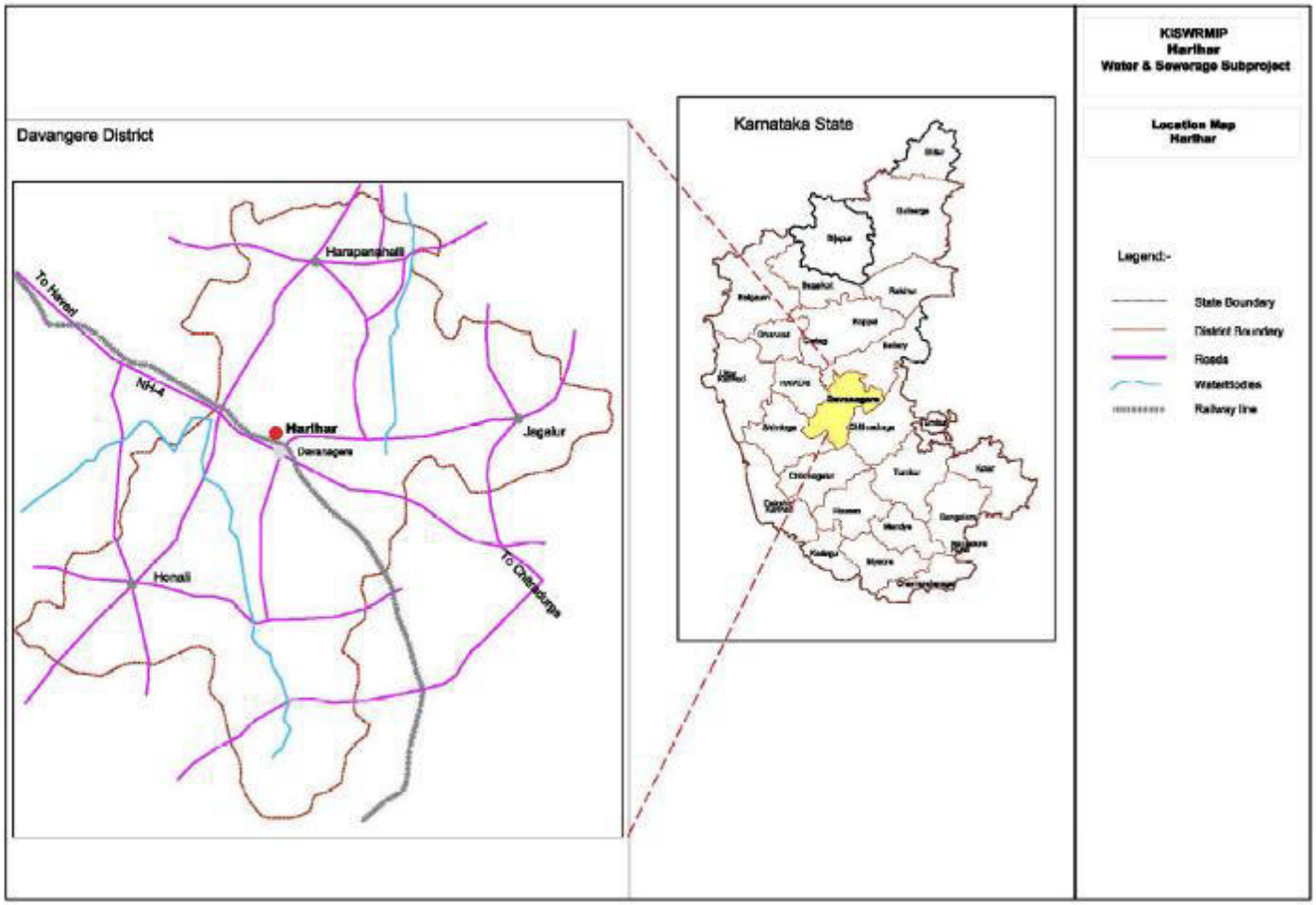

Figure 1: Location of Subproject Town - Harihar

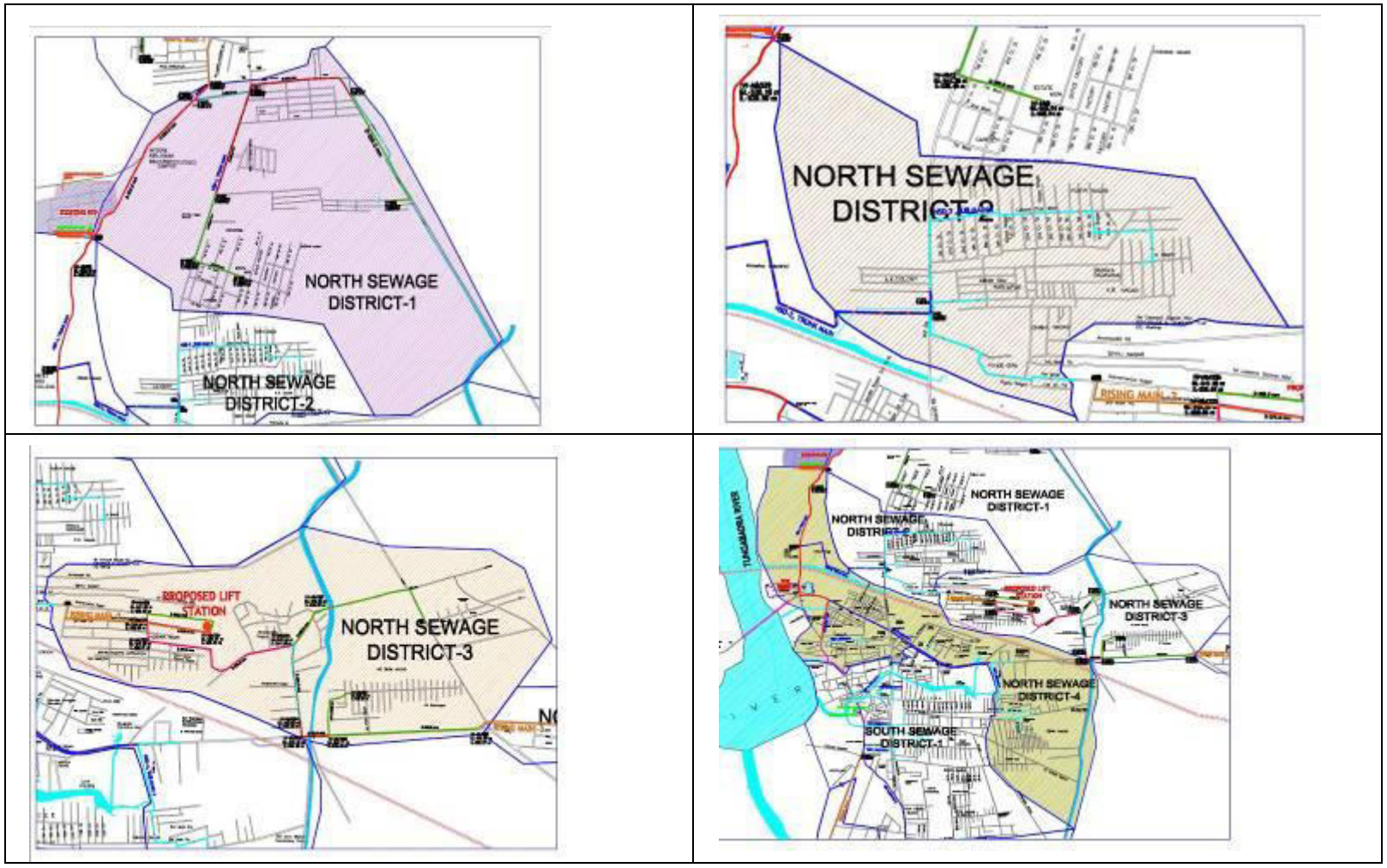

Figure 2: North Sewage District -1 to District 4 in Harihar City Municipal Council

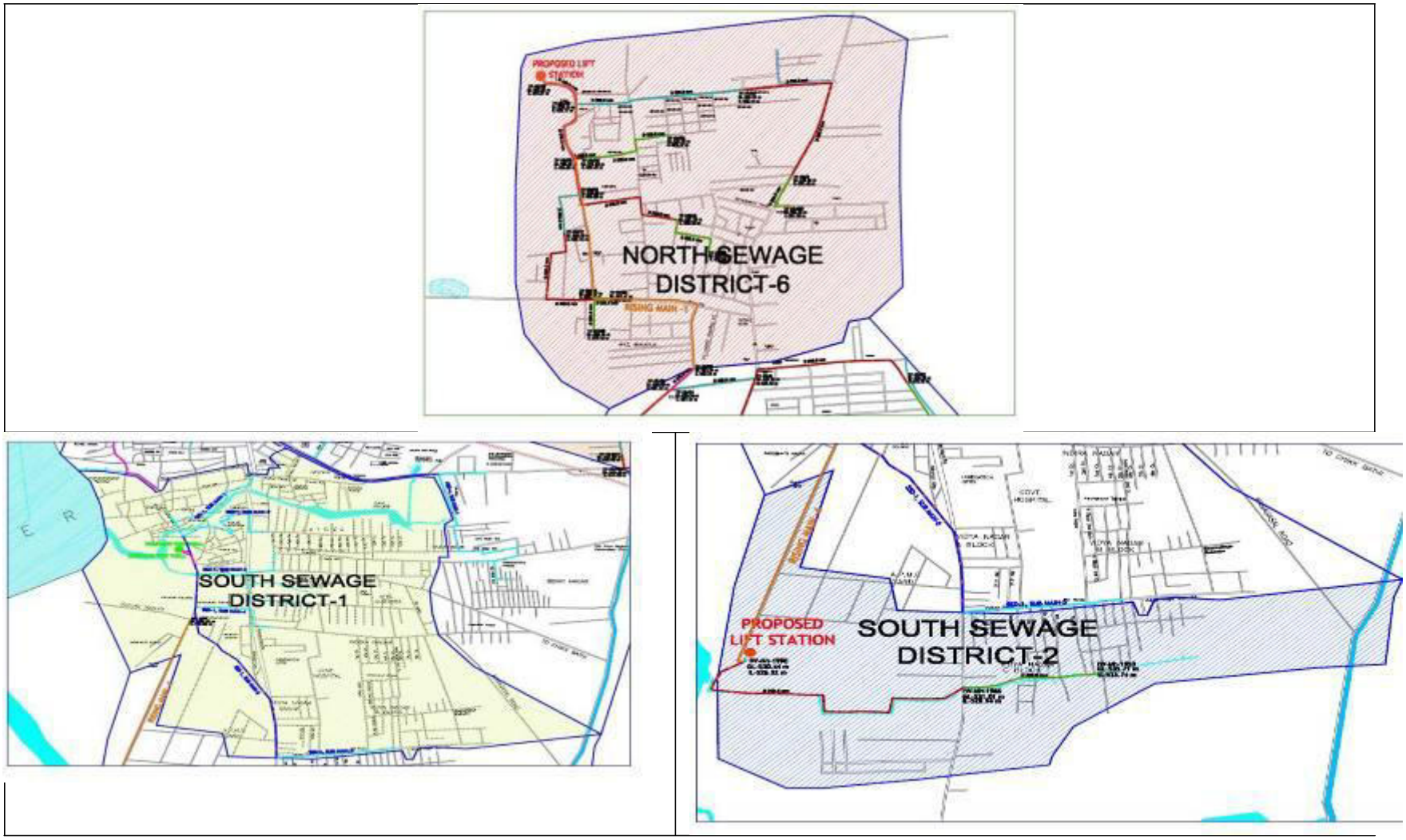

Figure 3: North Sewage District – 6, South Sewage District 1 and District 2 in Harihar City Municipal Council

Figure 4: Map showing sewerage network under KMRP

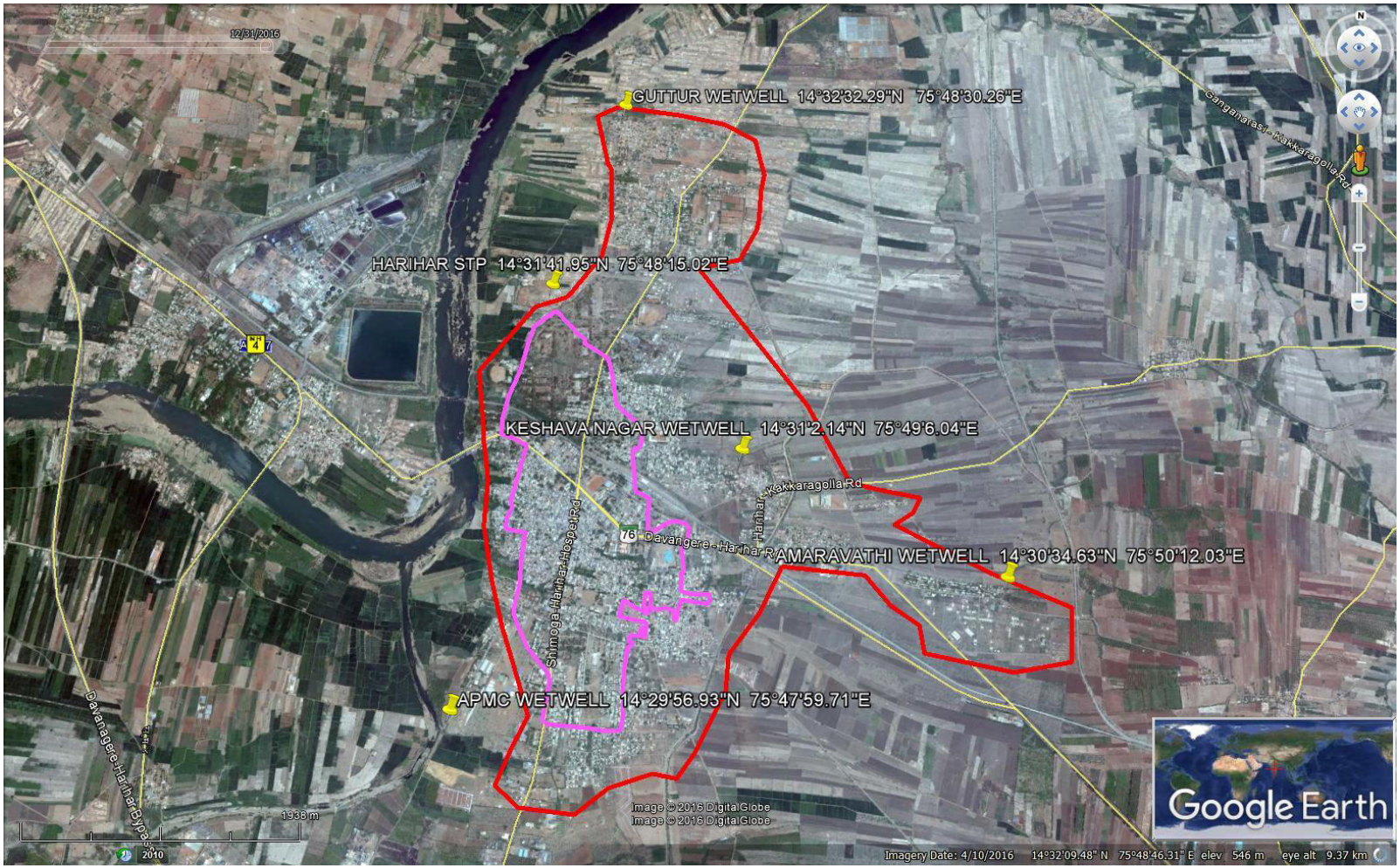

Figure 5: Map showing KMRP boundary and KIUWMIP boundary

Indicates KMRP boundary

Indicates KIUWMIP boundary

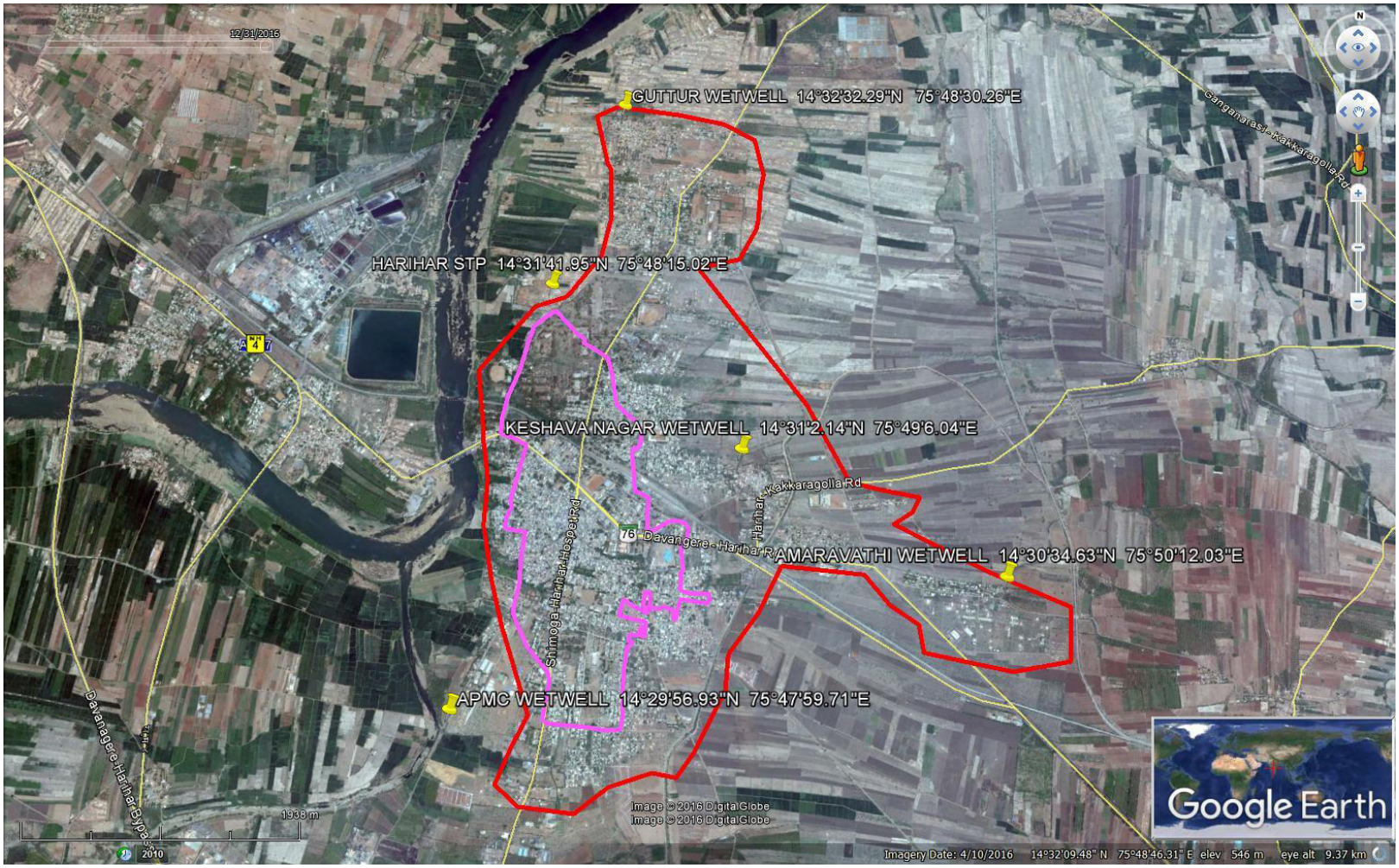

Figure 6: Map showing location of STP and sewage pumping stations at Harihar under the proposed project

Figure 7: Pumping station Amaravathi colony

Figure 8: APMC pumping station

Figure 9: Guttur Pumping Station

Figure 10: Keshavanagar Pumping station

Figure 11: Location and layout of Sewage Treatment Plant behind Kirloskar factory

Figure 12: Location of discharge from STP at Harihar

Figure 13:Location of different intake and discharge from STP within Tungabhadra River at Harihar

III. DESCRIPTION OF THE ENVIRONMENT

A. Physical Resources

1. Location

28. Harihar is situated in the central part of Karnataka. Harihar town is located at a distance of 275 km from Bangalore, the state capital. The town is located at a distance of 14 km from Davangere. The town lies at an altitude of 539 m above Mean Sea Level (MSL). The broad gauge railway line connecting Bangalore to Hubli passes through Harihar along the NH-4. The nearest airport is located at Hubli at a distance of 128 km.

2. Topography, Soil & Geology

29. The town is located at $14^{O}42'$ North latitude and $75^{O}8'$ East longitude. It is at an average altitude of +539 m above mean sea level. The ground levels varies from height of RL 557.3mt to lowest of RL 528.5mt from MSL. The predominant soil type is red sandy loams, while shallow to deep black clay in remaining areas certain Areas soft disintegrated rocks were observed below 3.0 to 3.5 m. Rock out croups can be seen on western part along river bed.

30. As per the seismic zoning map of India, Harihar Town falls under Zone II, which is the lowest earth quake risk zone in India. This zone is termed as “low damage risk zone”.

3. Climate & Rainfall

31. The town can be categorized central dry region of the state of Karnataka. The climate is characterized by dry weather during the major parts of the year and hot summer temperatures are experienced during the months of March to May when mercury level goes as high as $42^{0}C$.

32. The town receives southwest monsoon during the period of June to September and the months of October and November can be termed as post monsoon period. The period between Decembers to February can be classified as cold season and the minimum temperature is around $17.7^{0}C$ to $20^{0}C$. The average annual rainfall is about 644mm. The rainfall is mostly received during June to November and about 60 percent of the annual rainfall is received during the months of June to September, maximum rainfall is registered during the month of August. Rainfall pattern is shown below.

Table 7: Annual Rainfall in Harihar town from 1999 to 2009

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Rainfall in mm	517.2	526.6	456.5	540.7	350.8	470.3	1082.6	589.6	877.8	680.2	845.4
Normal rainfall in Harihar is 566.00 mm (Source: District Davanagere, Profile, http://davanagere.nic.in/)											

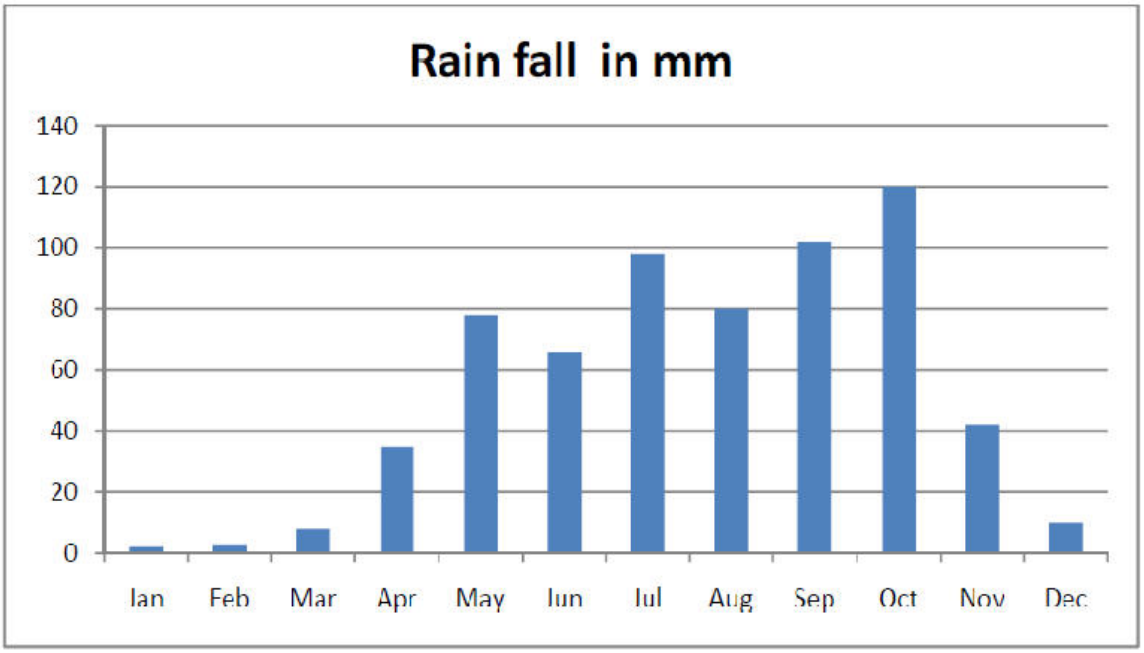

Figure 14: Average Monthly Rainfall & Temperature in Harihar

4. **Air Quality and Noise Level**

33. The major sources of sound pollution in the city are from the vehicles. Karnataka State Pollution Control Board (KSPCB) monitors air and noise pollution in the State in line with Air (Prevention and Control of Pollution) Act, 1981. KSPCB have monitoring stations located at various places across the state; however covers major cities, district headquarters and industrial locations. Data shows that particulate matter is high because of the dry atmosphere, dusty roads and surrounding land, and Respirable Suspended Particulate Matter (RSPM: particles < 10µm) and Suspended Particulate Matter (SPM) exceed National Ambient Air Quality Standards (NAAQS). In contrast, levels of chemical pollutants (oxides of sulphur and nitrogen) are below national standards.

Monitoring Station	SPM (µg/m3)	RSPM (µg/m3)	SO2 (µg/m3)	NOx (µg/m3)
Harihar	247	123	1	19
Ambient Air Quality Standard	200	100	80	80

Source: EIA Report of Grasim Industries Limited prepared by NEERI in 2007

34. Air and Noise Monitoring tests has been carried out by the Contractor at Harihar to check on the Environmental impacts caused due to the project . Results are shown below. Results shown that concentration of air quality parameters particularly PM_{10} and $PM_{2.5}$ are high and above the standard at Keshwapur near Railway Station. Maximum movement of vehicle may be the reason of higher value of air quality parameters.

Table 8: Ambient Air Quality Monitoring at Sites of construction

Town	Sampling Locations	Date of Monitoring	Parameters			
			SO_2 µg/m^3	NO_2 µg/m^3	$PM_{2.5}$ µg/m^3	PM_{10} µg/m^3
Harihar	Guttur Colony Near Panchyat office	05.05.2015	4.26	9.21	52.41	72.48
	Keshwapur Near Railway	05.05.2015	4.24	9.12	68.48	108.54

Town	Sampling Locations	Date of Monitoring	Parameters			
			SO_2 µg/m^3	NO_2 µg/m^3	$PM_{2.5}$ µg/m^3	PM_{10} µg/m^3
	Station					
	Vidyanagar Extension "C" Block	05.05.2015	4.14	9.25	48.15	86.76
	Standard as per CPCB		**80.0**	**80.0**	**60.0**	**100.0**

35. Noise level monitoring data included in table below. Day time noise monitoring has been carried out during 10.30-11 AM morning and night time after 10-30 PM. Day time noise level in Harihar is within the standard when comparing with commercial standard but above the limit when compared with residential area noise limit. Night time noise is always above the standard.

Table 9: Noise Quality Monitoring at Sites of construction

Town	Sampling Locations	Date of Monitoring	Average dB in Leq	
			Daytime	Night
Harihar	Near STP Site, Kirloskar	05.05.2015	63.0	62.4
	Near Anjaneya Temple, Amaravathi	05.05.2015	61.1	58.5
	Near Guttur Panchayat	05.05.2015	62.7	61.7

(Source Monitoring data by contractor of UGD project, 2015)

CPCB Limits for Industrial area: Day Time= 75 dB(A), Night Time (9 PM to 6 AM)= 70 dB(A)
Commercial area: Day Time= 65 dB(A), Night Time (9 PM to 6 AM)= 55 dB(A)
Residential area: Day Time= 55 dB(A), Night Time (9 PM to 6 AM)= 45 dB(A)
Silence Zone: Day Time= 50 dB(A), Night Time (9 PM to 6 AM)= 40 dB(A)

5. Surface Water

36. Harihar is situated on the right bank of Tungabhadra River. River flows north-south, and the town gently slopes towards the river on west. Tungabhadra is one of the two largest tributaries of River Krishna. The River is formed by the confluence of two rivers, Tunga and Bhadra, both of which originate in the Western Ghats in Karnataka. The length of Tunga is 147 km while Bhadra is 171 km, before they join together at Kudli near Holehonnur in Shimoga District. From this confluence point at Kudli, the River is called as Tungabhadra and flows down through the plains and meets River Krishna in Mahaboobnagar District of Andhra Pradesh. The length of the river is 531 km through Karnataka and Andhra Pradesh states. In Karnataka, it flows over a distance of 293 km through the districts of Chikmagalur, Shimoga, Davanagere, Haveri, Chitradurga, Bellary and Raichur, and drains are area of 57,671 sq km, which is nearly 81% of total Tungabhadra River Basin.

37. During its course in Karnataka, numerous small and big tributaries join the River. Varada and Heggari are the main tributaries of Tungabhadra in Karnataka State; while the former flows through Shimoga, Uttara Kannada and Haveri Districts, the later flows through Chitradurga and Bellary Districts. River Tunga, Bhadra and Tungabhadra are the main sources of drinking water supply. Almost all the towns depend directly on river (direct pumping, infiltration galleries, shallow wells in the river bed etc); during low flow season, the water supply is supplemented by groundwater. Tungabhadra Dam constructed across the River at Hospet in Bellary district is lifeline of Bellary, Raichur and Koppal districts in Karnataka and parts of Andhra Pradesh State. The river is the main source of water for Harihar and for major and small industries on the left bank side of the river. Besides, water is used for irrigation by farmers alongside river by lift pumps.

Figure 15: Tungabhadra Basin Map

38. Water quality monitoring of Tungabhadra River is conducted by Karnataka State Pollution Control Board (KSPCB) in Karnataka. The Tungabhadra water quality is classified as Category C "Drinking water source after conventional treatment and disinfection" in the upstream of Harihar town where the intake is situated. However, in the down steam, due to discharges from various industries and sewage from Harihar and Davanagere, the water quality on the downstream side of Harihar is poor. CPCB identified the stretch between the downstream (d/s) of Harihar to Haralahalli bridge as "polluted". Following table shows the water quality of the river. The intake for Harihar water supply was originally located near the town. Since this location was close to an industrial waste discharge point, it was decommissioned and a new intake was constructed at 7 km upstream at Kawalettu. The water is currently drawn from this intake.

Table 10: Tungabhadra River Water Quality

Parameters	**Water quality criteria**		**Kudli**	**Honnali**	**Haralahalli**	**Ullanur**
			u/s of Harihar		**d/s of Harihar**	
		Min	25.0	22.0	22.0	26.0
Temp, oC	-	Max	27.0	32.0	32.0	31.0
		Mean	26.0	25.5	25.1	28.0
		Min	5.2	7.3	7.1	6.0
DO, mg/l	> 4 mg/l	Max	7.0	7.5	7.6	8.0
		Mean	6.0	7.4	7.4	7.2
		Min	7.5	7.3	7.5	7.6
pH	6.5 – 8.5	Max	8.3	8.2	8.7	8.4
		Mean	8.0	7.9	8.0	7.9
		Min	116	120	136	270
Conductivity, µmhos/cm	< 2250	Max	400	500	560	1240
		Mean	259	330	381	847
		Min	2.3	1.2	1.2	1.7
BOD, mg/l	< 3 mg/l	Max	3.1	3.4	3.7	5.2
		Mean	2.7	2.6	2.4	3.1
		Min	0.21	0.08	0.1	0.2
Nitrate, mg/l	-	Max	0.54	0.7	0.63	1.4
		Mean	0.33	0.33	0.36	0.54

		Min	-	-	-	-
Nitrite, mg/l	-	Max	-	-	-	-
		Mean	-	-	-	-
	<2500 MPN/100 ml	Min	80	30	40	1100
Feacal Coliform, MPN		Max	240	170	170	9000
		Mean	155	114	82	6872
	<5000 MPN/ 100 ml	Min	110	50	60	2200
Total Coliform, MPN		Max	3000	2220	1300	16000
		Mean	1928	1176	932	13109

Source: PHED data source 2013

39. The stream/nallah that carries the effluent starts from the STP Disposal point and flows till the River. The approximate distance from disposal point to River is 1,100 metres and there are no abstraction points in the nallah (Figure 12).

6. Ground Water

40. In Harihar Taluk, schists are the main water bearing formation. Ground water occurs within the weathered and fractured rocks. Ground water exploration reveals that aquifer systems are encountered from depth of 21 m below ground level to 51 m below ground level. Yield ranged from 0.07 to 3.28 lps. Transmissivity ranged from 1.0 to 8.0 m^2/day. During May 2006 (pre-monsoon season), the minimum depth to water level and maximum water level was 2.37 m and 8.42 m respectively. During November 2006 (post monsoon), water level ranged from 2.27 m to 7.08 m. Major parts of Davangere, Harpanahalli, Harihar and Jagalpura fall under over exploited category. In Harihar Taluk, 98 percent area falls under over exploited and 2 percent of the area falls under semi critical category. The stage of development of ground water for the taluk is 47 percent, which is the lowest in the district. **Table 11** shows the summary of ground water estimation studies in Harihar. As per the Central Ground Water Board (CGWB), Flouride content in groundwater is present in excess in the district (Fluoride content more than 1.5 ppm). The Electrical conductivity values in the major part of the district are in the range between 1000 and 2000 micro mhos/cm.

Table 11: Ground Water Development in Harihar Taluk

Particulars	Details
Net Annual Ground Water availability (HAM)	6317.29
Existing gross GW draft for all uses (HAM)	2966.95
Allocation for domestic and industrial use for next 25 years (HAM)	537.23
Net GW availability for future irrigation development (HAM)	3503.09
Balance GW irrigation potential available (HA)	4319.48
Stage of development (%)	47

Source: Central Ground Water Board Report, November 2008

B. Ecological Resources

41. Harihar is an urban area surrounded by land that was converted for agricultural use many years ago. There is no remaining natural habitat in the town, and the flora is limited to artificially planted trees and shrubs, and the fauna comprises domesticated animals. There are no forests or any other environmentally sensitive areas in or near the town. Ranebennur Reserve Forest, located at 6 km from the town, is the nearest environmentally sensitive area.

42. Under the KIUWMIP Project, an 18 MLD FAL type STP is proposed behind

Kirloskar factory and four numbers of Sewage Pumping Stations are proposed at Amaravathi, Guttur, APMC and Keshavanagara areas of Harihara. No trees need to be cut for construction of STP and sewage pumping stations.

C. Economic Development

43. **Land Use:** The present town area comprises of 7.77 sq .km of which 6.95 sq. km is in the 'developed category' with an average density of 105 persons per hectare. Town Planning Department has demarcated proposed land use boundary of Harihar with a total area of 20.00 sq. km. Commercial development is mainly concentrated along the two main roads (NH 4 connecting Pune and Mumbai, and SH25 connecting Shimoga and Bellary) passing through the city. **Table 12** shows the existing land use of Harihar.

Table 12: Existing Land Use for Harihar CMC

Land Use	Existing Land Use (2001)	
	Area in Ha	Percent
Residential	128.88	18.52
Commercial	43.68	6.28
Industrial	131.05	18.83
Public Utilities	6.49	0.93
Transport and Communication	224.03	32.19
Vacant Land	89.39	12.85
Public & Semi Public	28.84	4.14
Parks, Play grounds, Open spaces	43.53	6.26
Total	420	100

44. **Industry:** Owning to its location and connectivity and availability of water, industrial development in Harihar is notable, and it is one of the important clusters in Karnataka. It is well known and important major industrial like - Grasim, Synthite, Shamanur Sugar's and Harihar poly-fiber, etc has contributed much for the economic growth of the town. Apart from these, there are a number of other engineering and small manufacturing units and brick kilns. There are vast agriculturally rich lands around the town, cultivated by Tungabhadra water. Maize, paddy, jowar and cotton are the major crops grown in and around Harihar.

1. Infrastructure

45. **Water Supply.** The town of Harihar is supplied by both surface water and ground water sources. The surface source is from Tungabhadra River at Kawalettu village which is located at a distance of 7 km from the city. KUWS&DB has implemented a comprehensive water supply scheme in the year 2003. The present water supply to the town is 9.55 MLD with per capita rate of water supply of 80 LPCD.

46. **Sewerage System.** Currently there is no underground sewerage system in the town. The system of soak pits and septic tanks is used for the disposal of sewage in the city. The wastewater, including sullage and sewage, generally enters into three major drains of the town. -Goudarageri *nala*, Matha *nala* and Kirloskar *nala.* Interception, diversion and treatment works were developed under National River Conservation Project by KUWSDB. The wastewater from the drains is intercepted, and diverted to a treatment plant (stabilization pond based). This interception system caters to about 35% of the town

47. **Transportation.** The National Highway No. 4 connecting Bangalore and Pune/Mumbai is the major regional road running in the midst of the city. The Shimoga – Bellary road is another important road passing through the city. The city has direct rail

connectivity with a broad gauge line connecting Bangalore – Hubli. This railway line contributes a major share in passenger and goods transportation. With a total length of 117.6 km, internal road network in the city is well developed, however are not in good in condition. Most of the roads in the central part are congested. All the major commercial, transport and administrative buildings are situated along NH-4.

48. **Power Supply**. Hydel power is the main source of energy in Karnataka, with 61% of total installed capacity. Remaining is mostly from thermal power stations. Contribution of wind and solar energy, although increasing, is negligible. Government run Karnataka Power Corporation Limited (KPCL) is responsible for power generation while Karnataka Power Transmission Corporation Limited (KPTCL) is responsible for power transmission. The distribution to users in Harihar is provided by regional company – Bangalore Electricity Supply Company Limited. Power is supplied from the central grid by overhead cables carried on metal and concrete poles, mainly located in public areas alongside roads. The power supply in Harhar is poor; there are frequent outages in warmer months, and fluctuations in voltage.

D. Socio Cultural Resources

49. **Demography.** Harihar population has grown from 73,047 in 2001 to 87,744 in 2011 with a growth rate of 20.12 percent, much higher than the previous decade's 9.6 percent. The decadal growth rates never showed a steady growth over the past few decades as shown in the following Table. Present area under CMC jurisdiction is 7.77 sq km. CMC area has remained unchanged from the last three decades. Overall population density of the city is 9401 persons per sq km. While the overall density is moderate, the core area of the city is densely populated as compared to fringe areas of the city.

Table 13: Population Growth of Harihar City

Year	Population	Decadal Growth Rate
	Nos.	%
1951	15290	
1961	22829	43.40
1971	33888	48.44
1981	52,334	54.43
1991	66,647	27.35
2001	73,047	9.60
2011	87,744	20.12

Source: Town Directory, Census of India 1981, 1991, 2001 & 2011.

50. **Sex Ratio.** As of 2011 census there are 968 females per 1000 male in the city. Sex ratio in general caste is 967, in schedule caste is 981 and in schedule tribe is 971. There are 920 girls under 6 years of age per 1000 boys of the same age in the city. Overall sex ratio in the city has increased by 18 females per 1000 male during the years from 2001 to 2011. Child sex ratio here has increased by 14 girls per 1000 boys during the same time.

51. **Household Size.** There are about 17000 numbers of households within the city as per Census 2011. The average household size is 4.9

52. **Slums.** There are 6 declared slums and 4 undeclared slums in the city.

53. **Literacy.** Total about 62 thousand people in the city are literate, among them about 33 thousand are male and about 29 thousand are female. Literacy rate (children under 6 are excluded) of Harihar is 85%. 89% of male and 80% of female population is literate here. Overall literacy rate in the city has increased by 2%. Male literacy has gone down by 1% and female literacy rate has gone up by 3%.

54. **Area and Population Density.** As per CDP the area is 20.99 Sq Km (including LPA Villages). But the present area under CMC jurisdiction is 7.77 sq km. CMC area has remained unchanged from the last three decades. Overall population density of the city is 9401 persons per sq km. While the overall density is moderate, the core area of the city is densely populated as compared to fringe areas of the city.

55. **History, Culture & Tourism.** Harihar is an ancient town located on the banks of Tungabhadra River. According to legend this spot was the capital or stronghold of a giant named Guha or Guhasura, whose extent was such that its eastern gate was at Uchchangidurga, the southern at Govinahalu, the western at Mudanur, and the northern at Airani. The giant, having by his penance obtained from Brahma the boom of exemption from death at the hands either of Hari (Vishnu) or of Hara (Siva), become in consequence such a tormentor of gods and men that Vishnu and Siva, in order to counteract the spell, combined into one form of Harihar and destroyed him. The descent of this incarnation was at Kudalur, the confluence of the Tungabhadra and the Haridra, where its footprints are still pointed out. The expiring giant prayed that the place might be named after him, whence it was called Guharanya Kshetra.

E. Environmental Settings of Investment Program Component Sites

56. Environmental features of the selected subproject sites are presented in the following table. There is no sensitive areas nearby the project site

Table 14: Project Site Environmental Features

Infrastructure	Location & Environmental Features	Site Photographs
STP	Proposed STP is located in a low lying area in the outskirts of the City and school/houses are at considerably far away from the STP. Site is not prone for flooding. The Effluent will be drained in to the local nallah which flows to the river covering an approximate distance of 1,100 metres. In between treated effluent will be utilized for cultivation One religious place Sri. Sadguru Samartha Narayana Ashram is located within 100 m of boundary of STP. Environmental features in and around STP is, N- Open Land(No Household) and agriculture land	 

	S- Road followed by Brick factories (30m) and ITI College(250m) E- Road then followed by Kirloskar Compound (11m from Boundary) W- Open site followed by Cow farm and Ashram (about 50m from Boundary of STP). Buffer zone will be maintained around STP to reduce any aesthetic impact on nearby Ashram	
Sewage lifting station 1	This Sewage Pumping Station is located at **Keshavanagara** and is located in a low lying area. Site is not prone for flooding. Environmental features in and around the sewage lifting station, N- Open Land and nearby household is more than 100m away. S- Open Land (No Household) E- Open Land(No Household) W- Open Land(No Household) There are no sensitive areas in and around the proposed site and nearby households are considerably far from the site and does not cause any harm or Environment Plantation will be maintained in and around lifting station to minimize visual impact and odour problem if any	
Sewage lifting station 2	This Sewage Pumping Station is located at **Amaravathi** and located in a low lying area. Site is not prone for flooding. There are no sensitive areas in and around the proposed site. Environmental features in and around the sewage lifting station, N- Road followed by Agricultural land (No Household) S- Open site 15 m Then household E- Road followed by Agricultural land (No	

	Household) W- Open site 20 m then house Plantation will be maintained in and around lifting station to minimize visual impact and odour problem if any	
Sewage lifting station 3	This Sewage Pumping Station is located at **Guttur** and is located in a low lying area. Site is not prone for flooding. There are no sensitive areas in and around the proposed site. Environmental features in and around the sewage lifting station, N- Agricultural land (No Household) S- Open Land (No Household) E- Open Land and nearby household is more than 70m away. W- Open Land (No Household) Since there is no nearby household it is expected that no as such impact Plantation will be maintained in and around lifting station to minimize visual impact and odour problem if any	
Sewage lifting station 4	This Sewage Pumping Station is located at **APMC** and is located in a low lying area. Site is not prone for flooding. Environmental features in and around the sewage lifting station, N- Open land (No Household) S- Open land and Nallah bed.(No Household) E- 22 m to APMC Wall and 20 m to household (Slum) W- Agriculture land followed by Sulekere nallah. There are no sensitive areas in and around the proposed site Only one slum population is located within 50 m from the site at one direction. Plantation will be maintained in and around lifting station	

	to minimize visual impact and odour problem if any	
Trunk main	Road width varies from 4m to 8m and most of the roads are Asphalt roads and mud roads with shoulders. and there will be no cutting of trees in any of the stretch.	 
Sewer line	Road width varies from 2m to 8m and most of the roads are Asphalt roads and mud roads with shoulders. and no tree cutting is expected for laying of the pipes	

		

IV. POTENTIAL ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

A. Introduction

57. 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.

58. As a general practice, an IEE should evaluate impacts due to the location, design, construction and operation of the project. Construction and operation are the two activities in which the project interacts physically with the environment, so they are the two activities during which the environmental impacts occur. In assessing the effects of these processes therefore, all potential impacts of the project should be identified, and mitigation is devised for any negative impacts. Following sections evaluate impacts of the proposed sewerage project in Harihar.

i) **Location Impacts**: Includes 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 Impact**: Includes 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**: Includes 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, disposal of sludge and occupational health and safety issues.

59. 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).

60. In this sub project component, new sewer lines, sewage lifting stations, STP are proposed. The proposed components are not falling in any environmentally sensitive area.

61. The ADB Rapid Environmental Assessment Checklist was used to screen the project for environmental impacts and to determine the scope of the IEE investigation.

B. Location Impact

62. **Location**. These Impacts are associated with planning particularly on the site selection. They include impacts due to encroaching on sensitive areas and impacts on the people who might lose their homes or livelihoods due to the development of the proposed site.

63. Proposed subproject sites are carefully selected to avoid encroachment into sensitive areas and minimise the impacts on people livelihoods and homestead. There is no other cultural heritage sites, protected area, wetlands, or mangroves within or adjacent to the project subproject locations. Most of the sewer pipes will be laid within the municipal boundary, along the roads. Larger diameter pipes will mostly be laid along wider roads where there is enough space between the road carriageway and the buildings.

64. The components of this sub project will not lead to any rapid urban population growth, commercial and industrial activity and / or increased waste generation to the point that both manmade and natural systems are overloaded and capacities to manage these systems are overwhelmed.

65. Locations of all project components including sewage lifting stations and STP are within the Govt. land. There is no further acquisition of land and displacement of habitation. There are no Environmental issues and impacts. The STP is located nearby the Tungabhadra river behind Kirlosakar factory and the effluent will be expected to discharge into the nearby nallah that flows in to the river. One religious place (Sri. Sadguru Samartha Narayana Ashram) is located at about 100 m from the STP site, some factories are located nearby (brick factory), and a college is located at about 250 m. Green buffer zone will be maintained around STP to reduce any aesthetic or odour impact on nearby Ashram. Sewage Pumping stations are proposed at four locations namely Amaravathi, Guttur, APMC and Keshavanagara. No sensitive locations are within the project influence area. Except Amaravathi area there are no as such major households in and around the lifting stations. To avoid any nuisance to the surrounding areas due to bad odour, and also to maintain the aesthetical value, following measures are integrated into the design and layout plan:

(i) Provision of green buffer area (with suitable long trees to arrest odour and as well as to provide a visual screen) around the STP and pumping stations

66. The CFE Conditions that are issued from KSPCB is listed below

(i) The treatment plant shall be used for the treatment of sewage only, at any point of time. The treatment plant shall be used for the treatment of sewage not exceed 18 MLD

(ii) There is requirement from the City Municipal Council (CMC) to ensure that there shall not be any odour nuisance in the surrounding area due to the operation of the STP. Sufficient green belt shall be developed around the STP site

(iii) The CMC shall utilize the treated sewage for irrigation purpose after treating the same to the stipulated standards

(iv) The solid wastes collected in the treatment plant premises in the form of

general garbage shall be disposed off sufficiently to the satisfaction of the Board so as not to cause fugitive emissions, dust problems or water pollution through leaching etc. of any kind

(v) The authority shall immediately report to the board of any accident or unforeseen act or event resulting in release of discharge of effluents or emissions or solid wastes etc., in excess of standards stipulated and the authorities shall immediately take appropriate corrective and preventive actions under intimation.

67. The effluent discharge standards as per KSPCB is mentioned in the below table.

Table 15: Effluent discharge standards

Sl no.	Characteristics	Tolerance limits
1	Suspended solids, mg/l max	30
2	pH Value	5.5-9.0
3	Oil and Grease, mg/l	10
4	Bio-Chemical Oxygen Demand mg/l (5 days at 20deg Celcius max)	20

68. Treated sewage meeting the above disposal limits will be disposed into a nallah (stream) flowing adjacent to the STP site. This nallah currently carries wastewater generated in the city area and flows downstream and meets River Tungabhadra at about 1.1 km from the STP site. This nallah flows through agricultural lands and therefore the treated water will be mostly utilized for irrigation. Where there is no irrigation demand, treated wastewater water may flow down and the river. Considering that the river flow is very high compared to the volume of treated water disposal and adequate treatment as per the discharge standards no negative impacts on river water quality envisaged. There is only one water abstraction point in the downstream proximity (about 350 m) . This is abstraction point is for an industry, and as per the information gathered, industry abstracts water only during monsoon high flows, and stores in the ponds located inside the industry.

69. **Utilities.** Water supply pipelines, telephone lines, electric poles, and wires within the proposed subproject locations may require to be shifted in few cases. To mitigate the adverse impacts due to relocation of the utilities, IA will:

- Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase;
- Conduct detailed site surveys with the construction drawings and discuss with the respective agencies during the construction phase, before ground clearance;
- Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.

70. **Site selection of construction work camps, stockpile areas, storage areas, and disposal areas.** Priority is to locate these near the subproject locations. However, if it is deemed necessary to locate elsewhere, sites to be considered will not result in destruction of property, vegetation, irrigation, and drinking water supply systems. Residential areas will not be considered for setting up 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 the forest, water bodies, swamps, or in areas which will inconvenience the community. All locations would be included in the design specifications and on plan drawings. Construction work camps shall be located at least 200 m from residential areas. Material stockpiles shall be protected by bunds during the monsoon to arrest the silt laden runoff into drains. The subproject is likely to generate

soil from excavations, which needs to be disposed safely. The following measures should be considered for disposal of surplus/waste soil:

- The excavated soil should be removed from construction area at the earliest for beneficial reuse such as land raising / filling of excavated areas.
- Soil should be covered with tarpaulin sheets during transportation.
- Soil transportation should not be done during peak hours and should be avoid narrow and heavy traffic routes and important religious or tourist sites etc.

71. **Site selection of sources of materials**. Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution. To mitigate the potential environmental impacts, locations of quarry site/s and borrow pit/s (for loose material other than stones) would be included in the design specifications and on plan drawings. Priority would be sites already permitted by Mines and Geology Department. If other sites are necessary, these would to be located away from population centers, drinking water intakes and streams, cultivable lands, and natural drainage systems; and in structurally stable areas even if some distance from construction activities.

72. For Harihar subproject, the quarry material required will be sand and stone aggregate, and the nearest quarries are at Chikka Kuruvatti, Harihar and Medleri (sand quarries along River Tungabhadra) and Chatra at Motebennur and Hunasikatte in Harihar Taluka for stone aggregate. These are existing quarries and are licensed by Mines and Geology Department. The material from the existing quarries will be adequate for the subproject construction, and therefore no new quarry sites will be developed for the purpose.

C. Design Impact

73. These impacts arise from the design of the subproject including the technology used, scale of operation/throughput, waste production, discharge specification, pollution sources, and ancillary services.

74. **Sewer system – collection & conveyance.** The sewerage system in construction in Harihar (under the World Bank funded KMRP) has been designed as a separate system of sewage collection (i.e. caters only wastewater). The underground gravity sewers will carry sewage from households to the STP. This system will be expanded to the new areas with the same principle. Harihar CMC should ensure that all existing septic tanks in the areas where sewers are being provided under the KIUWMIP are phased out by bypassing the inlet and connecting the toilet discharge from each house directly to sewerage system.

75. Accumulation of silt in sewers in low areas over time, overflows, blockages, power outages, harmful working conditions for the workers cleaning sewers etc. are some of the issues that needs to be critically looked into during the sewer system design. A properly designed system is a must for system sustainability. Measures such as the following have been included in sewer system design to ensure that the system provides the benefits as intended:

(i) Limit the sewer depth where possible.
(ii) Sewers shall be laid away from water supply lines and drains (at least 1 m, wherever possible);
(iii) In all cases, the sewer line should be laid deeper than the water pipeline (the difference between top of the sewer and bottom of water pipeline should be at least 300 mm)

(iv) In unavoidable, where sewers are to be laid close to storm water drains or canals or natural streams, appropriate pipe material shall be selected (stoneware pipes shall be avoided)

(v) For shallower sewers, use small inspection chambers in lieu of manholes;

(vi) Design manhole covers to withstand anticipated loads & ensure that the covers can be readily replace if broken to minimize silt/garbage entry

(vii) Ensure sufficient hydraulic capacity to accommodate peak flows & adequate slope in gravity mains to prevent buildup of solids and hydrogen sulphide generation

(viii) Equip pumping stations and STP with a backup power supply, such as a diesel generator, to ensure uninterrupted operation during power outages, and conduct regular maintenance to minimize service interruptions. Consider redundant pump capacity in critical areas.

(ix) Establish routine maintenance program, including:

- Regular cleaning of grit chambers and sewer lines to remove grease, grit, and other debris that may lead to sewer backups. Cleaning should be conducted more frequently for problem areas.
- Inspection of the condition of sanitary sewer structures and identifying areas that need repair or maintenance. Items to note may include cracked/deteriorating pipes; leaking joints or seals at manhole; frequent line blockages; lines that generally flow at or near capacity; and suspected infiltration or ex-filtration; and
- Monitoring of sewer flow to identify potential inflows and outflows

(x) Conduct repairs prioritized based on the nature and severity of the problem. Immediate clearing of blockage or repair is warranted where an overflow is currently occurring or for urgent problems that may cause an imminent overflow (e.g. pump station failures, sewer line ruptures, or sewer line blockages);

(xi) Review previous sewer maintenance records to help identify “hot spots” or areas with frequent maintenance problems and locations of potential system failure, and conduct preventative maintenance, rehabilitation, or replacement of lines as needed;

(xii) When a spill, leak, and/or overflow occurs, keep sewage from entering the storm drain system by covering or blocking storm drain inlets or by containing and diverting the sewage away from open channels and other storm drain facilities (using sandbags, inflatable dams, etc.). Remove the sewage using vacuum equipment or use other measures to divert it back to the sanitary sewer system

(xiii) Develop an Emergency Response Plan (ERP) for the sewerage system leaks, burst and overflows, etc. A Template for ERP is provided in **Appendix 6**.

76. **Sewage lifting station and sewage treatment plant**. The STP is proposed to be developed on Facultative Aerated Lagoon process within the govt. land.

77. The nuisance due to mosquito breeding and bad odour from the STP. To mitigate this impact, development of physical separation and visual screen around the facility is recommended. A green buffer zone in the form of landscaping and earth work shall be created by Harihar City Municipal Corporation around the STP. The banks of the ponds

shall be kept clear of grasses and bushes etc. No development zone will be declared around the STP sites.

78. The FAL based STP will require uninterrupted power supply for operation of aerators within the pond. Disruption in power supply will lead to process upset, may affect the efficiency of treatment, and result in treated effluent quality not meeting the disposal standards. The above issues need to be considered in design and operation of STP. Appropriate measures, such as the following, shall be integrated into planning and design of the STP.

(i) Continuous uninterrupted power supply should be provided for the facility
(ii) ;
(iii) Provide an operating manual with all standard operating procedures (SOPs) for operation and maintenance of the facility; this should include guidance on the follow up actions in case of process disruptions, inferior quality of treated water; etc. Necessary training (hands-on and class room / exposure visits) shall be provided to the ULB staff dealing with STP.
(iv) .
(v) Design should include monitoring system for at the minimum BOD, pH and Ammonia at the inlet and outlet of the plant.
(vi) Prohibit/prevent disposal of wastewater/effluent from industrial units in the sewers; ensure regular checking to ensure no illegal entry of industrial wastewater into sewers

79. The FAL being an aerobic process and ponds will be constructed; chances of bad order can't be avoided. Besides operating the plant as per the standard operating procedures, the following measure should be included in the designs:

- Provide a green buffer zone of 10-15 m wide around the STP; this should be planted with trees in multi-rows. This will act as a visual screen around the facility and will improve the aesthetic appearance.
- Further 100 meter around the STP site should be declared as 'no development zone'.

80. **Sludge Management**. Sewage sludge generally consists of organic matter, pathogens, metals and micro pollutants. The concentration of parameters such as metals can be influenced by input to the sewers system from industry. However, there are no industries with problematic wastewater discharges in the catchment area of the proposed wastewater treatment plant. Most importantly, as provided above, no industrial discharges are allowed into municipal sewer system.

81. A sludge management plan shall be developed by the STP facility designer. Sludge shall be periodically tested for presence of heavy metals.

82. Proper sludge handling methods should be employed to mitigate pollution due to improper sludge disposal methods. Personal Protection Equipment should be provided to the workers. A sludge management plan should be prepared.

83. Testing of sludge will be conducted to ensure that it does not contain heavy metals that make it unsuitable for food crops. Tests will be conduct to confirm the concentrations below the following standards. As there are no specific standards notified for sludge reuse, the compost quality standards notified under the Municipal Solid Waste Management & Handling Rules, 2000 and Solid Waste Management Rule 2016 have been adopted here. The MSWMH Rules stipulate that "In order to ensure safe application of compost, the following specifications for compost quality shall be met,

Parameters	Concentration not to exceed (mg/kg dry basis, except pH value and C/N ratio)
Arsenic	10.00
Cadmium	5.00
Chromium	50.00
Copper	300.00
Lead	100.00
Mercury	0.15
Nickel	50.00
Zinc	1000.00
C/N ratio	20-40
pH	5.5-8.5
Arsenic	10.00

*Compost (final product) exceeding the above stated concentration limits shall not be used for food crops. However, it may be utilized for purposes other than growing food crops.
Source: Municipal Solid Waste (Management & Handling) Rules, 2016, Government of India

84. The frequency of sludge removal is once in four year when the plant runs it full capacity of 18 MLD. If the plant is not running to its full capacity, the sludge removal rate will decrease. The sludge to be removed for every four years is 69.88 tons.

85. As per the recommendations of CPHEEO Manual, November 2013 (Central Public Health and Environmental Engineering Organization), section 5, page 81, the sludge from Facultative aerated lagoon can be used as good agriculture soil filler.

86. All 4 sewage lifting stations are designed such that there is no impact on neighboring property.

D. Construction Impacts

87. **Construction Method**. The project involves construction of manholes and lift stations, laying of sewer network and construction of sewage treatment plant. Following table (**Table 16**) shows the details of construction activities involved in the subproject.

Table 16: Construction Activities for the Subproject

Component	Construction method	Likely waste generated
Sewer lines	Trench excavation along the identified main roads shall be excavated to the maximum depth of 6 m. Trench will be excavated using backhoe and where it is not feasible will be done manually. Excavated soil will be placed along the trench. A bed of sand of 100 mm thick will be prepared at the bottom and pipes will be placed and joined. Excavated soil will be replaced and compacted. Where the pipes are laid in the roadway, handheld pneumatic drill will be used to break the road surface. Construction activity will be conducted along the roads in the town and mostly in the outer areas which are not covered under NKUSIP project; these are comparatively wide and less traffic. The work will be conducted by a team of 5 workers at each site	Out of total excavated soil quantity of 1,44,819 cum; about 1,34,728 cum shall be utilized for refill; remaining soil (10,091 cum) need to be disposed off safely
Sewage lifting/	**Sewage Treatment Plant**- The lagoon shall be partly	All excavated earth will

Component	Construction method	Likely waste generated
Pumping stations and STP	underground and partly above ground.2.5m high embankment shall be built on the ground and the lagoon excavated to 2.m below the ground level. Excavation will be done b y backhoe digger. The embankment shall be built using the excavated material. Outside slope of outer embankment is 1 vertical to 2 horizontal. It is proposed to line the inside of the lagoon as well as the top of embankments and baffles with concrete. The outer embankment slope shall have to be protected by turf. Concrete weirs are planned on the incoming an outgoing bays to facilitate inlet and outlet. Lifting station will be constructed through excavation of soil. Excavation for well will be done through excavator and manual digging	be utilized at site for construction of embankment and land development

88. As detailed above, except linear components like pipes and sewers, construction activities of all other components will be confined to selected isolated sites. However, the material and waste transport to and from the site will use public roads.

89. Although construction of the pipelines involves quite simple techniques of civil works, the invasive nature of excavation will result to impacts to the sensitive receptors of sub project locations such as residents, business and community in general.

90. These anticipated impacts are temporary and for short duration. Physical impacts will be reduced by the method of working and scheduling of work, whereby the project components will be (i) constructed by small teams working at a time; (ii) any excavation done near sensitive area like school, religious places and house will be protected as per standard construction practices. These are discussed in detail in the following sections.

91. Prior to starting of work, the contractor should prepare a method statement for pipeline and sewer works. This should be simple and explain the contractor's work process that is actually conducted on site, with safety and safeguard concerns. Method Statement is very important, particularly for pipeline/sewer works along the roads. Method Statement can be prepared for each stretch (say 1 km) /specific site based on the project area. Method Statement should be in a Table format with appended site layout map and cover the following:

- Work description
- No. of workers (skilled & unskilled)
- Details of Plant, equipment & machinery, vehicles
- Work duration (total, and activity-wise, for example for pipe laying, from excavation to road resurfacing/testing)
- PPE (helmet, gloves, boots, etc.) details for each type of work
- Details of materials at each site (type & quantity)
- Risks/hazards associated with the work (for example, Trench excavation will have risks such as trench collapse, persons/vehicles falling into trench, structural risk to nearby buildings, damage to buildings, infrastructure etc.)
- Construction waste/debris generated (details & quantity)
- Detail the sequence of work process (step-by-step) including specific details of each work
- Contractor's supervision & management arrangements for the work
- Emergency: Designate (i) responsible person on site, and (ii) first aider
- Typical site layout plan including pipe trenching, placement of

material, excavated earth, barricading etc.

- The pipeline/sewers are to be laid along the roads. The excavated soil, placed along the trench may get disturbed due to wind, rain water and the movement of workers, vehicles and pedestrians, and spill onto road way – disturbing road users, creating dust, road safety issues, etc., and also into nearby open drains. The following should be included in the site layout plan:
  - Provide barricading/security personnel at the site to prevent entry/trespassing of pedestrian/vehicles into the work zone
  - Location of temporary stockpiles and provision of bunds
  - Separation of stockpiles areas with workers/vehicle movement paths to avoid disturbing the stockpiled soil
  - Wetting of soil to arrest dust generation by sprinkling water
- Waste/surplus soil utilization and disposal plan – indicate expected duration of temporary stockpiling along the trench at each site and identify final surplus soil utilization/disposal site in consultation with PIU.

92. **Topography, Soils & Geology.** Subproject activities are not large enough to affect these features; so there will be no impacts. However movement of heavy construction vehicles may disturb and consolidate the soil, which will negatively affect soil environment. The following measures will be required:

(i) Prepare a plan for use and movement of construction vehicles within the area based on the nature of soil;
(ii) Vehicles/equipment movement shall be confined to dry areas with hardened soil; no vehicle/equipment shall enter the damp areas, water areas, vegetative areas and areas with soft soil.

93. **Sources of Materials**. Significant amount of gravel, sand and aggregate, will be required for this subproject. The construction contractor will be required to:

(i) Use quarry sites and sources permitted by Mines & Geology Department only
(ii) No new quarry sites shall be developed for the subproject
(iii) Verify suitability of all material sources and obtain approval of implementing agency
(iv) Submit on a monthly basis documentation of sources of materials.

94. **Air Quality**. It is most certain that work will be conducted during the dry season, so there is potential for creating dust from the excavation of dry soil, backfilling, transportation to disposal, and from the import and storage of sand/gravel for bedding. Emissions from construction vehicles, equipment, and machinery used for excavation and construction will also induce impacts on the air quality in the construction sites. Anticipated impacts include dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulphur oxides, particulate matter, nitrous oxides, and hydrocarbons) but temporary and during construction activities only. To mitigate the impacts, construction contractors will be required to:

(i) Consult with PIU on the designated areas for stockpiling of clay, soils, gravel, and other construction materials;
(ii) Damp down exposed soil and any stockpiled on site by spraying with water when necessary during dry weather;
(iii) Bring materials (aggregates, sand, gravel, etc.) as and when required;
(iv) Use tarpaulins to cover sand and other loose material when transported by vehicles;
(v) Clean wheels and undercarriage of vehicles prior to leaving construction site
(vi) Fit all heavy equipment and machinery with air pollution control devices

which are operating correctly; ensure valid Pollution Under Control (PUC) Certificates for all vehicles and equipment used in the construction activity

95. **Noise Levels.** The soils are shallow in some parts of the subproject area, and therefore activities like rock cutting for trenching will be required in those areas. This requires using of pneumatic drills and there will be high noise during the activity. Also, where the pipelines are required to be laid in the roadway, pneumatic drills will be used to break open the road surface. Pneumatic drills typically generate an equitant noise of 82-98 dBA, at 1 m distance from the activity. The sensitive receptors are the general population and socio-cultural institutions in the area. Noise will be for a short term (about 2-3 days at each location) thus impact is minimal and short-term. The construction contractor will be required to:

(i) Plan activities in consultation with the 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) Construction work shall be limited to day light hours (6 AM to 6 PM) for all the works located within the town; for facilities outside the town and habitations, the timings may be relaxed with the permission of Harihar CMC and PIU, however no work should be conducted between 10 PM – 6 AM at any site.
(iii) Provide prior information to the local public about the work schedule;
(iv) Ensure that there are no old and sensitive buildings that may come under risk due to the use of pneumatic drills; if there is risk, cut the rocks manually by chiselling;
(v) Minimize noise from construction equipment/pneumatic drills by using silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and
(vi) Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s.

96. **Surface Water Quality**. Harihar topography generally sloping from the South towards the North, and East to western boundaries and is primarily plain; the town receives moderate rainfall. Most of the rainfall occurs during southwest monsoon between July and September. Due to these reasons and also that excavation will not certainly be conducted during rains, there is no impact on drainage and surface water quality is envisaged. In unavoidable case of excavation during rains, there may be temporary impacts like flooding of construction sites, mixing of construction waste and material within the runoff, etc. This may lead to silting and blockage of drains and water bodies. These potential impacts are temporary and short-term duration only and to ensure these are mitigated, construction contractor will be required to:

(i) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets
(ii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with Implementing Agency on designated disposal areas
(iii) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies
(iv) Provide temporary bunds for stockpiles and materials
(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

97. **Groundwater.** Subproject activities do not interfere with groundwater regime, no groundwater abstraction proposed nor do the activities affect groundwater quality.

98. **Landscape and Aesthetics**. The construction work is likely to generate considerable quantities of waste soil. The pipe laying work will generate surplus soil; as small diameter pipes/sewers are proposed it will generate only 15-20% as surplus as most of the soil will be used for refilling after the pipe is laid in trench. The surplus soil needs to be disposed safely. Excavated earth from lifting stations and STP will be utilized at working sites. Indiscriminate disposal of the soil and waste may affect the local environment at the disposal location. These impacts are negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

(i) Prepare and implement Waste Management Plan – it should present how the surplus waste generated will temporarily stocked at the site, transported and disposed properly
(ii) Avoid stockpiling of excess excavated soils as far as possible
(iii) Avoid disposal of any debris and waste soils in the forest areas and in or near water bodies/rivers;
(iv) Coordinate with PIU for beneficial uses of excess excavated soils or immediately dispose to designated areas

99. **Impact on Ecological Resources**. Subproject sites are located within the city area and in the areas converted for agricultural use long back. There is no natural habitat left in these sites, and therefore no impacts on ecological resources envisaged.

Impact on Economic Development

100. **Land Use.** Subproject activities will not affect the land use. All subproject activities are being conducted along the road ways; and other facilities are being developed on government owned vacant lands to the extent possible.

101. **Accessibility**. Transport infrastructure will be affected by the pipe laying work, as in the narrower streets; there is not enough space for excavated soil to be piled off the road. The road itself may also be excavated. Traffic will therefore be disrupted, and in some very narrow streets the whole road may need to be closed for short periods. Potential impact is negative but short term and reversible by mitigation measures. The construction contractor will be required to:

(i) Plan pipeline work in consultation with the traffic police
(ii) Plan work such that trench excavation, pipe laying, and refilling including compacting, at a stretch is completed in a minimum possible time;
(iii) Provide for immediate consolidation of backfilling material to desired compaction this will allow immediate road restoration and therefore will minimise disturbance to the traffic movement;
(iv) Do not close the road completely, ensure that work is conducted onto edge of the road; allow traffic to move on one line;
(v) In unavoidable circumstances of road closure, provide alternative routes, and ensure that public is informed about such traffic diversions;
(vi) At all work sites public information/caution boards shall be provided – information shall inter-alia include: project name, cost and schedule; executing agency and contractor details; nature and schedule of work at that road/locality; traffic diversion details, if any; entry restriction information; competent official's name and contact for public complaints.
(vii) Prepare a Traffic Management Plan – a template is provided for reference at **Appendix 7.**

102. **Impacts on social sensitive areas**. Since the work is being conducted in an urban sensitive areas like schools, hospitals and religious centre, the excavation of trenches and pipe/sewer laying activity will create nuisance and health hazard to children

and people with ailments. The measures suggested under various heads in this section will minimize the impact in general in all areas, however, special attention is necessary at these locations. Following measures shall be implemented in 250 m around the sensitive locations (schools, hospitals, and religious centres):

(i) No material should be stocked in this area; material shall be brought to the site as and when required
(ii) Conduct work manually with small group of workers and less noise; minimize use of equipment and vehicles
(iii) No work should be conducted near the religious places during religious congregations
(iv) Material transport to the site should be arranged considering school timings; material should be in place before school starts;
(v) Notify concerned schools, hospitals etc. 2 weeks prior to the work; conduct a 30 minute awareness program on nature of work, likely disturbances and risks and construction work, mitigation measures in place, entry restrictions and dos and don'ts
(vi) Implement all measures suggested elsewhere in this report – dust and noise control, public safety, traffic management, strictly at the sites.

103. **Socio-Economic – Income.** Excavation of trenches and pipe/sewer laying work in the town will obstruct access to residences/commercial buildings adjacent to the pipeline. Disruption of access to commercial establishments may affect livelihood. Since many of the roads are narrow, construction activities may also obstruct traffic and pedestrian movement. The potential impacts are negative and moderate but short-term and temporary. The construction contractor will be required to:

(i) Leave space for access between mounds of excavated soil
(ii) Provide wooden planks/footbridges for pedestrians and metal sheets for vehicles to allow access across trenches to premises where required
(iii) Consult affected businesspeople to inform them in advance when work will occur
(iv) Address livelihood issues, if any; implement the Resettlement Plan (RP) to address these issues
(v) Provide sign/caution/warning boards at work site indicating work schedule and traffic information; prevent public entry into work sites through barricading and security; and
(vi) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.

104. **Socio-Economic – Employment.** Manpower will be required during the 30-months construction period. This can result to generation of contractual employment and increase in local revenue. Thus potential impact is positive and long-term. The construction contractor will be required to:

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

105. **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) Develop and implement site-specific Health and Safety (H & 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) H &

S Training[1] for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;

(ii) All trenches deeper than 2 m shall be protected with wooden bracing to avoid safety risks to workers, public and nearby buildings/structures

(iii) Ensure that qualified first-aid can be 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 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;

(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 a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.

(xiv) Overall, the contractor should comply with IFC EHS Guidelines on Occupational Health and Safety (this can be downloaded from http://www1.ifc.org/wps/wcm/connect/9aef2880488559a983acd36a6515bb18/2%2 BOccupational%2BHealth%2Band%2BSafety.pdf?MOD=AJPERES)

106. **Community Health and Safety.** Hazards posed to the public, specifically in high-pedestrian areas may include traffic accidents and vehicle collision with pedestrians. In most of the cases location of project sites are along the road ways, hence safety risk to community is to be considered. The sewer line work may require deep trenches including in narrow streets; unprotected trench excavation may endanger the stability of nearby buildings/structures. Potential impact is negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

(i) Provide wooden bracing for all deep excavations that may require especially for sewer lines (> 2m); identify buildings at risk prior to start of excavation work and take necessary precautions for safe conduct of work

(ii) Plan material and waste routes to avoid times of peak-pedestrian activities

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

(iii) Liaise with IA/Harihar CMC in identifying risk areas on route cards/maps
(iv) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure
(v) Provide road signs and flag persons to warn of dangerous conditions for all the work sites along the roads
(vi) Overall, the contractor should comply with IFC EHS Guidelines Community Health and Safety (this can be downloaded fromhttp://www1.ifc.org/wps/wcm/connect/dd673400488559ae83c4d36a6515bb18/3 %2BCommunity%2BHealth%2Band%2BSafety.pdf?MOD=AJPERES)

107. **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. Provision of proper living facilities and basic amenities (water, sanitation, fire safety, health and safety, etc.) shall be ensured.

108. The construction contractor will be required to comply with the following. Overall, the contractor should follow the IFC EHS guidelines specific to workers accommodation (this can be downloaded from http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_gpn_workersaccommodation or http://www.ifc.org/wps/wcm/connect/c8f524004a73daeca09afdf998895a12/IFC_Performance_Standards.pdf?MOD=AJPERES

(i) Consult with PIU before locating workers camps/sheds, and construction plants; as far as possible located within reasonable distance of work site.
(ii) Minimize removal of vegetation and disallow cutting of trees.
(iii) Living facilities shall be built with adequate materials, and should be in good condition and free from rubbish and other refuse.
(iv) The camp site should be adequately drained to avoid the accumulation of stagnant water.
(v) Provide water and sanitation facilities; water, meeting Indian drinking water standards shall be provided, in adequate quantities (supply of 60- 80 LPCD); all water storage structures must be cleaned regularly and covered properly to avoid any contamination.
(vi) Provide separate facilities for men and women; sanitary facilities shall be properly build and well maintained; toilet and bath facilities should be provided on basis of 1 per 15 or less number of persons.
(vii) Train employees in the storage and handling of materials which can potentially cause soil contamination;
(viii) Recover used oil and lubricants and reuse or remove from the site;
(ix) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
(x) Remove all wreckage, rubbish, or temporary structures which are no longer required; and
(xi) Report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.

109. **Social and Cultural Resources – Chance Finds**. For this subproject, excavation will occur at specific isolated location, so it could be that there is a low risk of such impacts. Nevertheless, the construction contractor will be required to:

- Stop work immediately to allow further investigation if any finds are suspected
- Inform PIU if a find is suspected and take any action they require

ensuring its removal or protection in situ
- Request PIU or any authorized person with archaeological/historical field training to observe excavation.

E. Operational & Maintenance Impacts

110. **Sewer system.** The new sewerage system will need regular maintenance during operation to avoid overflow of sewer line; with a few simple precautions this can be conducted without major environmental and health impacts.

111. The main requirement for maintenance of the new infrastructure will be for the detection and repair of leaks. Generally flat topography and the usage of good quality HDPE / GSW / concrete pipes should mean that pipeline breaks are very rare, and that leaks are mainly limited to joints between pipes.

112. The sewerage system, provided under the subproject, will collect and treat domestic wastewater and sewage from the areas that are not covered under the ongoing KMRP. Combining with this subproject, the entire town will have the sewerage system, except the low density fringe areas.

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

114. It is suggested to develop an Emergency Response Plan (ERP) for the sewerage system leaks, burst and overflows, etc. A Template for ERP is provided in **Appendix 6.** Sensitize and train staff in implementation of ERP.

115. **Sewage Treatment Plant**. The STP is proposed to be constructed on Facultative Aerated Lagoon process. The frequency of sludge removal is once in four year when the plant runs it full capacity of 18 MLD. If the plant is not running to its full capacity, the sludge removal rate will increase. The sludge to be removed for every four years is 69.88 tons. As per the recommendations of CPHEEO Manual, November 2013 (Central Public Health and Environmental Engineering Organisation), section 5, page 81, the sludge from Facultative aerated lagoon can be used as good agriculture soil filler. Accordingly it is proposed to provide this sludge to the nearby agricultural fields to use as agricultural soil filler.

116. **Sewage lifting station**: Plantation will be maintained around sewage lifting station to minimize visual impact and odour problem if any.

117. **Surface Water Quality:** Adequate capacity sewerage facility is considered under KIUWMIP, hence this sub project won't cause any impairment of downstream water quality due to release of untreated or raw sewerage. The ULB will be required to restrict any discharge of raw sewer to the drains prior to commissioning of the sewer network. Occupational Health and Safety: There are no source of hazardous material that will discharge hazardous materials into the sewers, resulting in damage to sewer system and danger to workers. Waste water, other than municipal (i.e., industrial) entering the sewerage system shall meet the stipulated standards.

118. The Implementing Agency/Harihar CMC needs to prepare Operation and Maintenance (O&M) Manual and operate and maintain the system as per the manual. Measures to minimize the disturbance to general public/ business and dust control, as followed during the construction, is to be implemented during maintenance as well. The O & M plan for sewer network is given as **Appendix 8**. O & M manual for STP and sewage lifting station will be prepared by O & M agency.

119. The provision of an improved and expanded sewerage is expected to have indirect economic benefits from the expected improvement in the health, environment and economic well-being.

120. The citizens of the Harihar city will be the major beneficiaries of this subproject. The sewerage system will remove the human waste from those areas served by the network rapidly and treated to an acceptable standard. Diseases of poor sanitation, such as diarrhoea and dysentery, should be reduced, so people should spend less on healthcare and lose fewer working days due to illness, so their economic status should also improve.

V. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Project Stakeholders

121. Most of the main stakeholders have already been identified and consulted during the preparation of this IEE and any others that are identified during the project implementation will be brought into the process in the future. Primary stakeholders are:

(i) Residents, shopkeepers and business people near the work sites;
(ii) Public representatives and prominent citizens of the town
(iii) Harihar City Municipal Council
(iv) KUIDFC, GoK

122. Secondary Stakeholders are:

(i) Other concerned government institutions (utilities, regulators etc.)
(ii) NGOs and CBOs working in the affected communities
(iii) Other community representatives (prominent citizens, religious leaders, elders, women's groups)
(iv) The beneficiary community in general and
(v) ADB as the funding agency.

B. Consultation & Disclosure Till Date

123. A series of public consultation meetings were conducted during the project preparation. Various forms of public consultations (consultation through ad hoc discussions on site) have been used to discuss the project and involve the community in planning the project and mitigation measures.

124. A public consultation workshop was conducted on October 3, 2012 at Davangere for all the four project towns to discuss the proposed project and likely environmental issues and mitigation measures. Key stakeholders – public representatives, officials from various agencies, district level officers, from each project town, including Harihar, were participated in the workshop. Minutes of this consultation meeting is appended at **Appendix 9.**

125. Various public consultations held in Harihar and photographs attached as

Appendix 10 for making all the concerned people involved in this project. The people residing along the project activity areas were consulted and due discussions were made regarding the proposals. It was observed that people are willing to extend their cooperation as the proposed activities are supposed to enhance the living standard of the public. The public expressed their concern regarding the traffic management activities during the construction stage which can have impact on their day to day activities. Public demanded for advance notice before construction and proper warning signs along the construction area to avoid accidents and inconvenience. It was demanded for a strong operation and maintenance system in place for the proposed sewer network for its best functioning to have the maximum health and aesthetic benefits.

126. Recently public consultation has been done at Sri. Sadguru Samartha Narayana Ashram just outside the STP site at Harihara on 22nd Nov 2016. Minutes of the consultation is also attached in **Appendix 10.**

C. Future Consultation & Disclosure:

127. EA and IA shall extend and expand the consultation and disclosure process significantly during implementation of the Investment Program.

(i) Consultation during construction:
- Public meetings with affected communities (if any) to discuss and plan work program and allow issues to be raised and addressed once construction has started; and
- Smaller-scale meetings to discuss and plan construction work with individual communities to reduce disturbance and other impacts, and provide a mechanism through which stakeholders can participate in subproject monitoring and evaluation;

(ii) Project disclosure:
- Public information campaigns (via newspaper, TV and radio) to explain the project to the wider town population and prepare them for disruption they may experience once the construction program is underway;
- Public disclosure meetings at key project stages to inform the public of progress and future plans, and to provide copies of summary documents in Kannada and
- Formal disclosure of completed project reports by making copies available at convenient locations in the town, informing the public of their availability, and providing a mechanism through which comments can be made.

128. The IEE has already been disclosed via posting on ADB and KUIDFC websites. This updated, reflecting changes in the Project during implementation, will also be posted on the websites. Corrective action plan, if any, prepared during the Project implementation to address unanticipated environmental impacts and to rectify non-compliance to EMP provisions; and environmental monitoring reports, will also be disclosed. Documents will also be available on the website of Harihar CMC.

D. Redress of Grievance

129. A project specific grievance redress mechanism (GRM) will be established to receive, evaluate and facilitate concerns of, complaints and grievances of the displaced persons (DPs) in relation to project's social and environmental performances. The main

objective of the GRM will be to provide time bound action and transparent mechanism to resolve social and environment concerns.

130. A project GRM will cover the project's towns for all kinds of grievances and will be regarded as an accessible and trusted platform for receiving and facilitating project related complaints and grievances. The multi-tier GRM for the program will have realistic time schedules to address grievances and specific responsible persons identified to address grievances and whom the DPs have access to interact easily.

131. Awareness on grievance redress procedures will be created through Public Awareness Campaign with the help of print and electronic media and radio. The resettlement NGO will ensure that vulnerable households/shops are also made aware of the GRM and assured of their grievances to be redressed adequately and in a timely manner.

132. There will be multiple means of registering grievances and complaints by dropping grievance forms in complaint/ suggestion boxes at accessible locations, or through telephone hotlines, email, post or writing in a complaint registrar book in ULB's project office. There will be complaint register book and complaint boxes at construction site office to enable quick response of grievances/ complaints for urgent matters. The name, address and contact details of the persons with details of the complaint / grievance, location of problem area, date of receipt of complaint will be documented. The RPMU's Social development / Resettlement Officer will be responsible at the project level for timely resolution of the environmental and social safeguards issues and registration of grievances, and communication with the aggrieved persons.

E. Grievance Redress Process

133. There will be several tiers for grievance redress process immediate redress will first be resolved at site by Contractor. If unaddressed for up to 7 days the complainants may go to PIU officer in ULB responsible for resettlement/social issues. Project engineer and the resettlement NGO will assist in resolving the issues. Name, designation and contact number of personnel responsible for grievance redress at ULB and RPMU, will be posted at Contractor's and PMDSC's site office in full visibility of public. NGO will be involved in community mobilization and awareness campaign among the communities. Grievances of immediate nature should be resolved at site/ within ULB/PIU level within 15 days of registration of grievances.

134. All grievances that cannot be resolved by ULB/PIU within 15 days will be forwarded to RPMU's Social safeguards/R&R Officer and PMDSC specialist who will review and resolve within 15 working days of grievance registration with the assistance of the Resettlement NGO and concerned PIU/ULB personnel, if required.

135. The grievances of critical nature and those cannot be resolved at RPMU level should be referred to Grievance Redress Committee (GRC)/Steering Committee (SC) set up at district level to be settled within 30 days. All documents related to grievances, follow up action taken to resolve along with explanatory note on nature, seriousness and time taken for grievance redress shall be prepared by RPMU Social safeguard / R&R Officer and circulated to GRC/SC members at least a week prior to scheduled meeting. The decision taken at the GRC/SC level will be communicated to the DPs by RPMU Social safeguards/R&R officer through ULB/PIU and resettlement NGO.

136. For any issues that remain unresolved by the GRC or SC or the decision taken at such meetings are not acceptable, the complainants /DPs can approach the Court of Law as per Govt. of Karnataka legal procedure.

F. GRC / SC composition and selection of members

137. The GRC/SC for the project will be headed by Dy. Commissioner (DC) of the district with members as followed: (1) ULB Commissioners of project towns, (2) Revenue Department (Registrar) official, (3) RPMU Social safeguard/ R&R Officer of KIUWMIP, (4) ULB officer who will convene the periodic meeting of GRC and will shoulder responsibility of keeping records of grievances/ complaints in details with help from resettlement NGO. Other members, such as, NGO/CBO representatives, wards council representatives, DPs' representatives will be selected by the ULB Commissioner to represent in the GRC/SC meeting. NGO should also deploy one person in the team who will be responsible for coordinating with all GRC members and the DPs for grievance redress.

138. In the event when the established GRM is not in a position to resolve the issue, Affected Person also can use the ADB Accountability Mechanism (AM) through directly contact (in writing) to the Complaint Receiving Officer (CRO) at ADB headquarters or to ADB Indian Resident Mission (INRM). The complaint can be submitted in any of the official languages of ADB's DMCs. The ADB Accountability Mechanism information will be included in the PID to be distributed to the affected communities, as part of the project GRM. A Grievance Redress Mechanism is shown in the **Figure 16.**

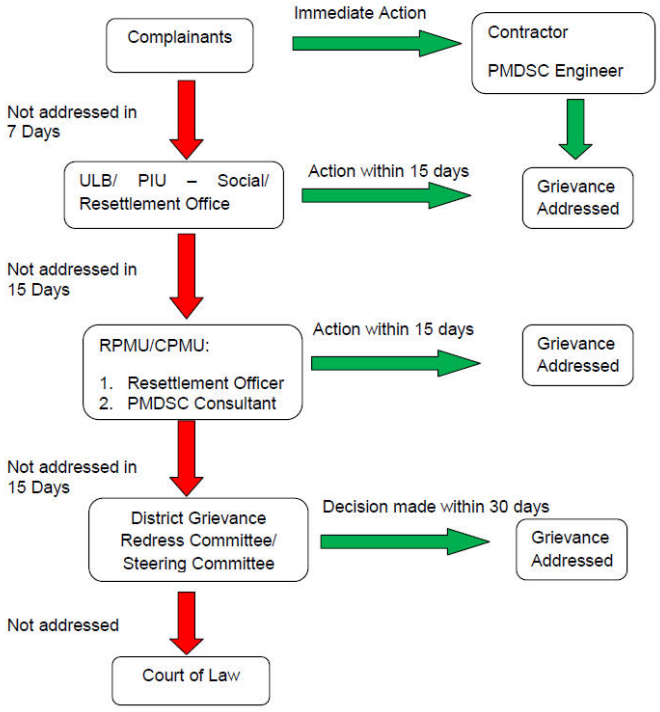

Figure 16: Grievance Redress Process

VI. ENVIRONMENTAL MANAGEMENT PLAN

A. Environmental Management Plan

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

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

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

142. **Table 17 to 19** shows the potential adverse environmental impacts, proposed mitigation measures, responsible parties, and estimated cost of implementation. This EMP included in the bid documents and will be further reviewed and updated during implementation.

Table 17: Environmental Management Plan for Anticipated Impacts – Pre-Construction

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Fund
Utilities	Disturbance/ damage to existing utilities on the sites (Telephone lines, electric poles and wires, water lines within proposed project sites)	• Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase • Conduct detailed site surveys with the construction drawings and discuss with the respective agencies during the construction phase before ground clearance; and • Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.	PIU / Consultant Team	Review & check the inclusion / provision in DPR as appropriate	Part of project cost
STPs and Sewage Lifting stations	Nuisance to surrounding areas due to operation sewage lifting and treatment plants	• Provision of green buffer area (with suitable long trees to arrest odour and as well as to provide a visual screen) around the STP and pumping stations	PIU / Consultant Team	Review & check the inclusion / provision in DPR as appropriate	Part of project cost
Design	Sewer network – contamination to water supply or water bodies, leak, block or overflow	• Limit the sewer depth where possible. • Sewers shall be laid away from water supply lines and drains (at least 1 m, wherever possible); • In all cases, the sewer line should be laid deeper than the water pipeline (the difference between top of the sewer and bottom of water pipeline should	PIU / Consultant Team	Review & check the inclusion / provision in DPR as appropriate	Part of project cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Fund
		be at least 300 mm) • In unavoidable, where sewers are to be laid close to storm water drains or canals or natural streams, appropriate pipe material shall be selected (stoneware pipes shall be avoided) • For shallower sewers, use small inspection chambers in lieu of manholes; • Design manhole covers to withstand anticipated loads & ensure that the covers can be readily replace if broken to minimize silt/garbage entry • Ensure sufficient hydraulic capacity to accommodate peak flows & adequate slope in gravity mains to prevent build up of solids and hydrogen sulphide generation • Equip pumping stations and sewage treatment plant with a backup power supply, such as a diesel generator, to ensure uninterrupted operation during power outages, and conduct regular maintenance to minimize service interruptions. Consider redundant pump capacity in critical areas • Establish routine maintenance program, including: • Regular cleaning of grit chambers and sewer lines to			

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Fund
		remove grease, grit, and other debris that may lead to sewer backups. Cleaning should be conducted more frequently for problem areas. • Inspection of the condition of sanitary sewer structures and identifying areas that need repair or maintenance. Items to note may include cracked/deteriorating pipes; leaking joints or seals at manhole; frequent line blockages; lines that generally flow at or near capacity; and suspected infiltration or ex-filtration; and • Monitoring of sewer flow to identify potential inflows and outflows • Conduct repairs prioritized based on the nature and severity of the problem. Immediate clearing of blockage or repair is warranted where an overflow is currently occurring or for urgent problems that may cause an imminent overflow (e.g. pump station failures, sewer line ruptures, or sewer line blockages); • Review previous sewer maintenance records to help identify "hot spots" or areas with frequent maintenance problems and locations of potential			

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Fund
		system failure, and conduct preventative maintenance, rehabilitation, or replacement of lines as needed; • When a spill, leak, and/or overflow occurs, keep sewage from entering the storm drain system by supply, such as a diesel generator, to ensure uninterrupted operation during power outages, and conduct regular maintenance to minimize service interruptions. Consider redundant pump capacity in critical areas • Establish routine maintenance program, including: • Regular cleaning of grit chambers and sewer lines to remove grease, grit, and other debris that may lead to sewer backups. Cleaning should be conducted more frequently for problem areas. • Inspection of the condition of sanitary sewer structures and identifying areas that need repair or maintenance. Items to note may include cracked/deteriorating pipes; leaking joints or seals at manhole; frequent line blockages; lines that generally flow at or near capacity; and suspected infiltration or ex-filtration; and			

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Fund
		• Monitoring of sewer flow to identify potential inflows and outflows • Conduct repairs prioritized based on the nature and severity of the problem. Immediate clearing of blockage or repair is warranted where an overflow is currently occurring or for urgent problems that may cause an imminent overflow (e.g. pump station failures, sewer line ruptures, or sewer line blockages); • Review previous sewer maintenance records to help identify "hot spots" or areas with frequent maintenance problems and locations of potential system failure, and conduct preventative maintenance, rehabilitation, or replacement of lines as needed; • When a spill, leak, and/or overflow occurs, keep sewage from entering the storm drain system by covering or blocking storm drain inlets or by containing and diverting the sewage away from open channels and other storm drain facilities (using sandbags, inflatable dams, etc.). Remove the sewage using vacuum equipment or use other measures to divert it back to the			

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Fund
		sanitary sewer system • Disposal of sludge (approx. generation of 69.88 tons in four year). It is proposed that sludge will be used in nearby agricultural fields as agricultural soil filler. • Develop Emergency Response Plan for all emergencies such as leaks, overflows, bursts; a template of ERP is provided at **Appendix 6**			

Table 18: Environmental Management Plan for Anticipated Impacts –Construction

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Fund
• Construction Impacts	• Impacts due to excess excavated earth, excess construction materials, solid waste etc. • Occupational hazards which can occur to workers and public during work.	• Prepare and submit a Method Statement for pipeline and sewer works in a Table format with appended site layout map and cover the following: • Work description; No. of workers (skilled & unskilled); Details of Plant, equipment & machinery, vehicles • Work duration (total, and activity-wise, for example for pipe laying, from excavation to road resurfacing/testing) • PPE (helmet, gloves, boots, etc.) details for each type of work • Details of materials at each site (type & quantity) • Risks/hazards associated with the work (for example, Trench excavation will have risks such as trench collapse, persons/vehicles falling into trench, structural risk to nearby buildings, damage to buildings, infrastructure etc.) • Construction waste/debris generated (details & quantity) • Detail the sequence of work process (step-by- step) including specific details of each work • Contractor's supervision & management arrangements for	• Construction Contractor	• Site inspection and record verification; • Site specific OH & S plan; • Spoil and waste management plan • Complaints from sensitive receptors and public	• Good construction practice to be followed by contractor – no additional costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Fund
		the work • Emergency: Designate (i) responsible person on site, and (ii) first aider • Typical site layout plan including pipe trenching, placement of material, excavated earth, barricading etc. • The pipeline/sewers are to be laid along the roads, Roads are provided with side drains to carry rain water. The excavated soil, placed along the trench may get disturbed due to wind, rain water and the movement of workers, vehicles and pedestrians, and spill onto road way – disturbing road users, creating dust, road safety issues, etc., and also into nearby open drains. The following should be included in the site layout plan: • Provide barricading/security personnel at the site to prevent entry/trespassing of pedestrian/vehicles into the work zone • Location of temporary stockpiles and provision of bunds • Separation of stockpiles areas with workers/vehicle movement paths to avoid disturbing the stockpiled soil • Wetting of soil to arrest dust generation by sprinkling water • Waste/surplus soil utilization and disposal plan – indicate expected duration of temporary stockpiling along the trench at each site and identify final surplus soil utilization/disposal site in consultation with PIU			
Utilities	• Disturbance/ damage to existing utilities on the sites • (Telephone lines, electric poles and wires, water lines within proposed project sites)	• Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase	• PIU	• Review & check the inclusions / provisions in the DPR as appropriate	• Part of project cost
		• Prepare a contingency plan to include actions to be done in case of unintentional interruption of services. • Conduct detailed site surveys with the construction drawings and discuss with the respective agencies during the construction phase before ground clearance; • In case of disruption of water supply, alternative supply	• Construction Contractor	• Utility Contingency Plan	• Part of project cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Fund
		through tankers, shall be provided; water may be made available by the Harihar CMC, but it will the responsibility of contractor to supply to affected people			
• Construction work camps, stockpile areas, storage areas, and disposal areas	• Disruption to traffic flow and sensitive areas and receptors	• Prioritize areas within or nearest possible vacant space in the subproject location; • Construction work camps shall be located at least 200 m from residential areas • Do not consider residential areas; for stockpiling the waste/surplus soil; • Material stockpiles shall be protected by bunds during the monsoon to arrest the silt laden runoff into drains	• Construction Contractor	• List of selected sites for construction work camp, storage area and disposal area. • Complaints from sensitive receptors	• Good construction practice to be followed by contractor –no additional costs
Source of construction 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	• Contractor should obtain material from existing mines approved/licensed by Mines and Geology Department/ Revenue Department. • Verify suitability of all material sources and obtain approval of implementing agency • No new quarry sites shall be developed for the subproject purpose • Submit a monthly statement of construction material procured indicating material type, source and quantity.	• Construction Contractor	• Check Sources and approval	• Good construction practice to be followed by contractor –no additional costs
Air quality	• Dust and emissions from construction activity may	• Consult with PIU on the designated areas for stockpiling of clay, soils, gravel, and other construction materials; • Damp down exposed soil and any stockpiled on site by spraying with water when necessary during dry weather; • Bring materials (aggregates, sand, etc. gravel) as and when required; • Use tarpaulins to cover sand and other loose material when transported by vehicles;	• Construction Contractor	• Site observations • Informal	• Good construction practice to be followed by contractor • Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Fund
		• Clean wheels and undercarriage of vehicles prior to leaving construction site • Fit all heavy equipment and machinery with air pollution control devices which are operating correctly; ensure valid Pollution Under Control (PUC) Certificates for all vehicles and equipment used in the construction activity • Carry out air quality monitoring			’s cost – air quality monitoring
Noise Level	• High noisy construction activities may have adverse impacts on sensitive receptors and structures	• Plan activities in consultation with the PIU so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance; • Construction work shall be limited to day light hours (6 AM to 6 PM) for all the works located within the town; Provide prior information to the local public about the work schedule; • Ensure that there are no old and sensitive buildings that may come under risk due to the use of pneumatic drills; if there is risk, cut the rocks manually by chiselling; • Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and • Maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at a distance of 10 m or more from the vehicles	Construction Contractor	• Complaints from sensitive receptors • Site observations • Noise level records	• Good construction practice to be followed by contractor • Contractor ’s cost – noise level monitoring
• Water Quality	• Impacts on surface drainage and water quality due to contaminated runoff from construction areas in monsoon	• Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets • Stockpiles shall be provided with temporary bunds • Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with Implementing Agency on designated disposal areas • Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies • Place storage areas for fuels and lubricants away from any drainage leading to water bodies • Dispose any wastes generated by construction activities in	• Construction Contractor	• Site observations • Records of water quality	• Good construction practice to be followed by contractor –no additional costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Fund
		designated sites			
Landscape and aesthetics	• Impacts on landscape and aesthetics due to construction activity	• Prepare and implement Waste Management Plan – it should present how the surplus waste generated will temporarily stocked at the site, transported and disposed properly • Avoid stockpiling of excess excavated soils as far as possible • Avoid disposal of any debris and waste soils in the forest areas and in or near water bodies/rivers; • Coordinate with PIU for beneficial uses of excess excavated soils or immediately dispose to designated areas	• Construction Contractor	• Work site inspection • Complaints from public	• Good construction practice to be followed by contractor – no additional costs
Construction works	• Hindrance to traffic movement	• Plan pipeline (sewer lines) work in consultation with the traffic police • Plan work such that trench excavation, pipe religious places during religious congregations • Material transport to the site should be arranged considering school timings; material should be in place before school starts; • Notify concerned schools, hospitals etc. 2 weeks prior to the work; conduct a 30 minutes awareness program at on nature of work, likely disturbances and risks and construction work, mitigation measures in place, entry restrictions and dos and don'ts • Implement all measures suggested elsewhere in this report – dust and noise control, public safety, traffic management, strictly at the sites.	• Construction Contractor	• Work Program Review	• Good construction practice to be followed
Nuisance/ disturbance to sensitive areas	Schools, hospitals and religious places) due construction work in the proximity (within 250 m of such place)	• No material should be stocked in this area; material shall be brought to the site as and when required • Conduct work manually with small group of workers and less noise; minimize use of equipment and vehicles • No work should be conducted near the religious places during religious congregations • Material transport to the site should be arranged considering school timings; material should be in place before school starts;	Construction Contractor	• Complaints from sensitive receptors • Work program	Good construction practice to be followed by contractor – no additional costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Fund
		• Notify concerned schools, hospitals etc. 2 weeks prior to the work; conduct a 30 minutes awareness program at on nature of work, likely disturbances and risks and construction work, mitigation measures in place, entry restrictions and dos and don'ts Implement all measures suggested elsewhere in this report – dust and noise control, public safety, traffic management, strictly at the sites.			
Socio-Economic	Impediment of access to houses and business	• Leave space for access between mounds of excavated soil • Provide wooden planks/footbridges for pedestrians and metal sheets for vehicles to allow access across trenches to premises where required • Consult affected businesspeople to inform them in advance when work will occur • Address livelihood issues, if any; implement the Resettlement Plan (RP) to address these issues • Provide sign/caution/warning boards at work site indicating work schedule and traffic information; prevent public entry into work sites through barricading and security; and • Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.	Construction Contractor	• Number of walkways, wooden planks and foot bridges. • Complaints from public • Spoil Management Plan	Good construction practice to be followed by contractor – no additional costs
Socio-Economic Employment	Impact on local employment generation	• Employ at least 50% of the labour force, or to the maximum extent, local persons if manpower is available • Secure construction materials from local market.	Construction Contractor	Employment Records Compliance to labour laws	NA
Occupational Health and Safety	Workers occupational health & safety	• Develop and implement site-specific Health and Safety (H and 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) H & S Training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work- related accidents; • All trenches deeper than 2 m shall be protected with wooden bracing to avoid safety risks to workers, public and	Construction Contractor	Site specific OH &S Equipped first aid station Potable water supply and clean eating area. PPE and	Good construction practice to be followed by contractor – no additional costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Fund
		nearby buildings/structures • Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site; • Provide medical insurance coverage for workers; • Secure all installations from unauthorized intrusion and accident risks; • Provide supplies of potable drinking water; • Provide clean eating areas where workers are not exposed to hazardous or noxious substances • Provide H & S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; • Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; • Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; • Ensure moving equipment is outfitted with audible back-up alarms; • Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; • 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. • Overall, the contractor should comply with IFC EHS Guidelines on Occupational Health and Safety (this can be		medical insurance	

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Fund
		downloaded from http://www1.ifc.org/wps/wcm/connect/9aef2880488559a983acd36a6515bb18/2%2BOccupational%2BHealth%2Band%2BSafety.pdf?MOD =AJPERES)			
Community Health and Safety	Danger due to deep excavations, hindrance to traffic and chances of accident,	• Provide wooden bracing for all deep excavations (> 2m); identify buildings at risk prior to start of excavation work and take necessary precautions for safe conduct of work • Plan material and waste routes to avoid times of peak-pedestrian activities • Liaise with IA/Harihar CMC in identifying risk areas on route cards/maps; identify buildings at risk prior to start of excavation work and take necessary precautions for safe conduct of work • Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure • Provide road signs and flag persons to warn of dangerous conditions, for all the sites along the roads • Overall, the contractor should comply with IFC EHS Guidelines Community Health and Safety (this can be downloaded from http://www1.ifc.org/wps/wcm/connect/dd673400488559ae83c4d36a6515bb18/3%2BCommunity%2BHealth%2Band%2BSafety.pdf?MOD • =AJPERES	Construction Contractor	Traffic Management Plan Complaints from public	Good construction practice to be followed by contractor – no additional costs
Worker Camp	Temporary worker camps	• The contractor should establish and operate the temporary worker camps in compliance with IFC EHS Guidelines specific to workers accommodation ((this can be downloaded from http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_gpn_workers accommodation), including the following: • Consult with PIU before locating workers camps/sheds, and construction plants; as far as possible located within	Construction Contractor	List of selected sites . Written consent of land owner Waste Management plan	Good construction practice to be followed by contractor – no additional costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Fund
		reasonable distance of work site • Minimize removal of vegetation and disallow cutting of trees • Living facilities shall be built with adequate materials, should be in good condition and free from rubbish and other refuge • The camp site should be adequately drained to avoid the accumulation of stagnant water. • Provide water and sanitation facilities; water, meeting Indian drinking water standards shall be provided, in adequate quantities (supply of 60- 80 LPCD); all water storage structures must be cleaned regularly and covered properly to avoid any contamination • Provide separate facilities for men and women; sanitary facilities shall be properly build and well maintained; toilet and bath facilities should be provided on basis of 1 per 15 or less persons • 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 following preference hierarchy: reuse, recycling and disposal to designated areas; • Remove all wreckage, rubbish, or temporary structures which are no longer required • Report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.			

Table 19: Environmental Management Plan for Anticipated Impacts – Operation and Maintenance

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Fund

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Fund
Sewerage	General maintenance and repair work of sewer system (nuisance and disturbance to people, disruption services etc.)	• Follow standard procedures as prescribed by O&M Manual • Ensure that all necessary equipment and tools are available for regular maintenance, especially for sewer network • Ensure there is no overflow of sewers due to blockages or leaks; in case of occurrence, attend to these at the earliest • Implement all necessary mitigation measures suggested during construction (to avoid disturbance and inconvenience to people, business and traffic) • Ensure operation and maintenance of sewer network as per the standard operating procedures to avoid, over flows, blockages, etc. and immediately conducting the maintenance work in case of such occurrences • Implement Emergency Response System (ERS template is provided in **Appendix 6** for reference) for burst/leaks/overflows of sewers etc.)	Harihar CMC	O & M Manual, Inspection of site and record	Part of project O&M cost
Sludge	Disposal from Sewage treatment plant	The sludge to be removed for every four years is 69.88 tons. As per the recommendations of CPHEEO Manual, November 2013 (Central Public Health and Environmental Engineering Organisation), section 5, page 81, the sludge from Facultative aerated lagoon can be used as good agriculture soil filler.	Harihar CMC	O & M Manual, Inspection of site and record	Part of project O&M cost

B. Institutional Arrangements

143. **Executing Agency (EA):** Karnataka Urban Infrastructure Development & Finance Corporation (KUIDFC) is the executing agency (EA) responsible for implementing the Investment Program. Investment Program implementation activities will be monitored by Program Management Unit (PMU) of KIUWMIP, headed by Task Manager KIUWMIP Head Office Bangalore.

144. A new Regional Program Management Unit (RPMU) established at Davangere. A Consultant Team (PMDCSC) appointed by EA and the team work under the Deputy Project Director (DPD) and they involved in project planning, preparation of subproject and cost estimates, co-ordination, technical guidance and supervision, financial control, training and overall subproject management.

145. Interactions with GoK, GoI and ADB shall be conducted through the KUIDFC office at Bangalore.

146. **Implementing Agency (IA):** The ultimate implementation responsibility lies with respective ULBs (in this case Harihar City Municipal Corporation).A Programme Implementation Unit (PIU) established in each ULB.

147. Other than the above institutional setup, District Level Implementation Committee set up in each district to monitor implementation of subprojects and institutional reforms. The District Level Implementation Committee shall consist of Deputy Commissioner of District, Deputy Project Director from concerned RPMU, Municipal Commissioners' / Chief Officers of ULB and PMDCSC representative.

148. At the Executing Agency (i.e. KUIDFC), environmental issues coordinated centrally by an Environmental Specialist (designated as Assistant Executive Engineer-Environment), reporting to the Task Manager. Assistant Executive Engineer – Environment will ensure that all subprojects comply with environmental safeguards. The IEE/EIA reports prepared by PMDCSC and will be reviewed by the Assistant Executive Engineer-Environment as per the ADB's Environmental Guidelines and forwarded to ADB for review and approval. The Assistant Executive Engineer-Environment, KUIDFC, Head office will be assisted by an Environment Specialist of PMDCSC, stationed at Davangere.

149. The responsibility fulfilling environmental requirements of GoI/GoK and conducting required level of environmental assessment as per ADB guidelines lies with the implementing agency, i.e. Harihar CMC. The PMDCSC will assist the CMC in this regard.

150. The mitigation measures identified through IEE/are incorporated into the Investment Program cycle. Mitigation measures, which are to be implemented by the Contractor, shall form part of the Contract Documents. The other mitigation measures are undertaken by the IA (itself or in assistance with the Consultant Team) as specified in the IEE. During the construction phase, environmental Consultant team will monitor the implementation of the EMP and report to the PMU. The Implementation of EMP and other environmental related measures and the results of environmental monitoring conducted during implementation will be reported to ADB through semi-annual Environmental Monitoring Reports. These will also be made available on executing agency (KUIDFC) website for wider public access.

151. Consultants: Deputy Project Director is being assisted by a consultant team (PMDCSC) in project planning, preparation of project and cost estimates, coordination, technical guidance and supervision, financial control, training and overall project management. The consultant team includes an environment specialist to supervise the implementation of environmental safeguards at the RPMU level. The consultant team also

includes a Resident Engineer (RE) at each ULB/TMC responsible for the supervision of project implementation including environmental safeguards at each ULB/CMC level.

152. Contractor: The contractor shall appoint one supervisor who will be responsible on a day-today basis for i) ensuring implementation of EMP ii) Coordinating with the RE and environment specialists (all levels) iii) community liaison, consultation with interested / affected parties and grievance redressal and iv) reporting.

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

154. The following figure and table summarizes the institutional responsibility of environmental safeguards at all stages of the project.

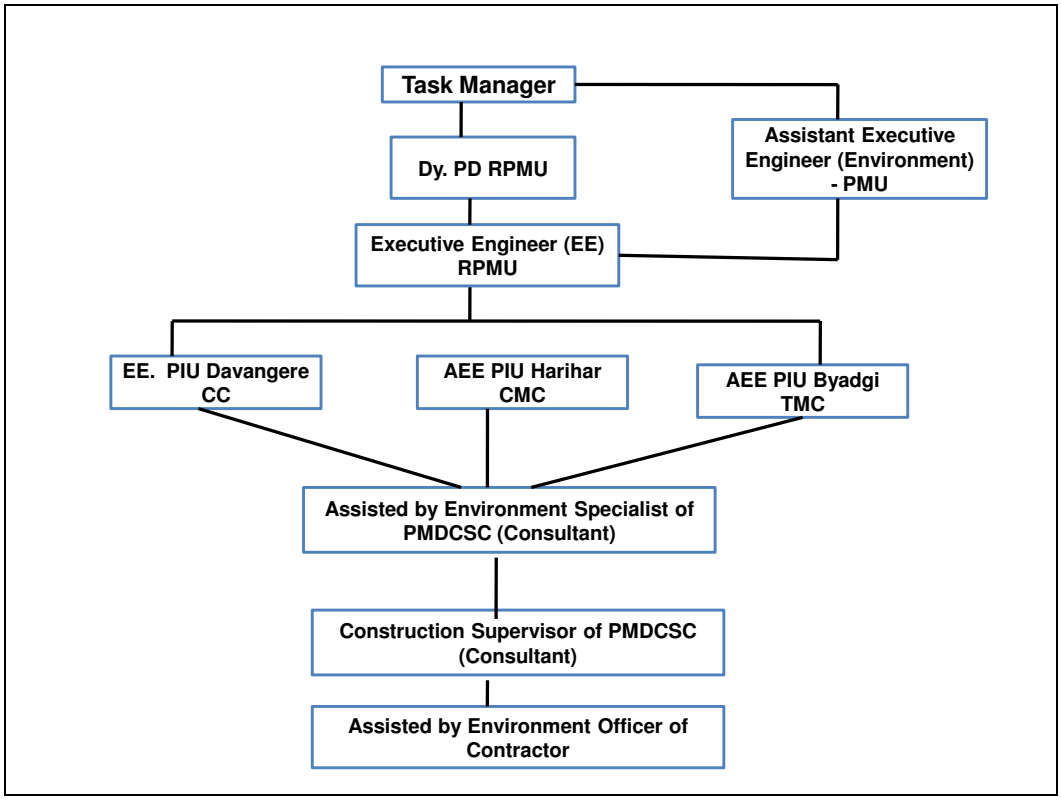

Figure 17: Environmental Safeguard Implementation Arrangements

Table 20: Activity and Responsibility – safeguard Implementation

Investment Program Phase	Activity	Details	Responsible Agency
Pre construction phase	Investment Program Categorization	Conduct Rapid Environmental Assessment (REA) for each subcomponents using REA checklists	ULB
		Reviewing the REA and assigning	PMU

Investment Program Phase	Activity	Details	Responsible Agency
		Investment Program category (A/B/C) based on KIUWMIP Environmental Assessment Guidelines and ADB Guidelines	
	Conducting EA	Conducting IEE/EIA based on the Investment Program categorization Conducting Public Consultation and information disclosure Preparation of IEE/EIA	Investment Program Consultants
	Investment program clearances	Fulfilling GoK/GoI requirement such as clearances from other Government Agencies	ULB
	Review of EIA/IEE	Reviewing the EIA/IEE Reports to ensure compliance of the report as per ADB Guidelines and approval of the same	PMU
	Disclosure of EIA/IEE	Information disclosure -IEE/EIA reports should be made available to the public, and on request IEE/EIA also made available.	ULB
	Incorporation of mitigation measures into Investment Program design	Incorporation of necessary mitigation measures identified in IEE/EIA in Investment Program design and in contract documents.	Investment Program Consultants
	Review of design documents	Review of design and contractual documents for compliance of mitigation measures	PMU
Construction Phase	Implementation of mitigation measures	Implementation of necessary mitigation measures	Contractor
	Environmental Monitoring	Environmental monitoring as specified in monitoring plan during construction stage; monitoring of implementation of mitigation measures	Investment Program Consultants
	Preparation of progress reports	Preparation of monthly progress reports to be submitted to PMU including a section on implementation of the	Investment Program Consultants

Investment Program Phase	Activity	Details	Responsible Agency
		mitigation measures	
	Review of progress reports	PMU to review the progress reports, consolidate and send to ADB review	PMU
Operation Stage	Environmental Monitoring	Conducting environmental monitoring, as specified in the environmental monitoring plan.	ULB/ Contractor
	Compliance Monitoring	Compliance monitoring to review the environmental performance of sub-project component, if required and as specified in Monitoring Plan	KSPCB

C. Training Needs

155. The following table (**Table 21**) presents the outline of capacity building program to ensure EMP implementation. The estimated cost (under PMU cost) is Rs. 6, 00,000.00 (excluding trainings of contractors which will be part of EMP implementation cost during construction) 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.

Table 21: Outline of Capacity Building Program on EMP Implementation

Description	Target Participants	Estimate (INR) – (Lump sum)	Cost and Source of Funds
1. Introduction and sensitization to environment issues (1 day) - ADB Safeguards Policy Statement - Government of India and Karnataka 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	Rs.75,000.00	PMU cost

Description	Target Participants	Estimate (INR) – (Lump sum)	Cost and Source of Funds
2.EMP implementation (3 days) - Roles and responsibilities - OH&S planning and implementation - Wastes management (water, hazardous, solid, excess construction materials, spoils, etc.) - Working in congested areas, - Public relations - Consultations - Grievance redress - Monitoring and corrective action planning - Reporting and disclosure - Post-construction planning	All staff and consultants involved in the project All contractors prior to award of contract	Rs. 2,25,000.00	PMU cost
3. Plans and Protocols (3 days) - Construction site standard operating procedures (SOP) - AC pipe protocol - Site-specific EMP - Traffic management plan - Spoils management plan - Waste management plan - Chance find protocol - O&M plans - Post-construction plan	All staff and consultants involved in the project All contractors prior to award of contract or during mobilization stage.	Rs. 2,25,000.00 Rs. 75,000.00	PMU cost Contractors cost as compliance to contract provisions on EMP implementation (refer to EMP tables)
4. Experiences and best practices sharing - Experiences on EMP implementation - Issues and challenges - Best practices followed	All staff and consultants involved in the project All contractors All NGOs	Rs.75,000.00	PMU Cost
5. Contractors Orientation to Workers on EMP implementation (OH&S, core labor laws, spoils management, etc)	All workers (including manual laborers) of the contractor prior to dispatch to worksite	Rs. 40,000.00	Contractors cost as compliance to contract provisions on EMP implementation (refer to EMP tables)

D. Monitoring and Reporting

156. Prior to commencement of the work, the contractor will submit a compliance report to ULB/CMC ensuring that all identified pre-construction environmental impact mitigation measures as detailed in the EMP will be undertaken. ULB/CMC with the assistance of the consultant environment specialist will review the report and thereafter PMU will allow commencement of works.

157. During construction, results from internal monitoring by the contractor will be reflected in their weekly EMP implementation reports to the Construction Supervision Specialist. These weekly report will be retained in PMDCSC office for reference. Construction Supervision Specialist will review and advise contractors for corrective actions if necessary. Monthly report summarizing compliance and corrective measures taken will be prepared by Construction Supervision Specialist to be reviewed and endorsed by ULB/CMC to PMU.

158. Based on monthly reports and measurements, PMU will draft, review, and submit to ADB, 6-monthly (twice a year) EMP implementation progress report (Appendix 9). Once concurrence from the ADB is received the report will be disclosed in the Project website.

159. ADB will review project performance against the KUIDFC's 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.

160. Monitoring and reporting format is attached as **Appendix 11.**

E. EMP Implementation Cost

161. 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. Regardless of this, any costs of mitigation by the construction contractors or consultants are included in the budgets for the civil works and do not need to be estimated separately here. Mitigation that is the responsibility of ULBs/CMCs will be provided as part of their management of the project, so this also does not need to be duplicated here. Cost for the capacity building program is included as part of the project. The EMP cost includes the cost for providing water supply and sanitation facilities for the workers. In addition to this, hard barricades need to be provided at the work sites to prevent any entry of the public or animals into the worksite and to prevent any possible accidents.

Table 22: Cost Estimates to Implement the EMP – Sewerage Network, lifting stations and STP

	Particulars	Stages	Unit	Number	Rate	Cost (INR)	Costs Covered
A.	**Monitoring Measures**						
1	Air quality monitoring	Construction	Per location	35	9000	3,15,000	Civil works contract
2	Noise levels monitoring	Construction	Per location	35	2500	87,500	Civil works contract
	Subtotal (A)					**4,02,500**	
B.	**Capacity Building**						
1	Introduction and sensitization to environment issues	Pre-construction	Lump sum			75,000	PMU
2	EMP Implementation	Construction	Lump sum			225,000	PMU
3	Plans and Protocols	Construction	Lump sum			225,000	PMU
			Lump sum			75,000	Civil works contract
4	Experiences and best practices sharing	Construction/ Post-Construction	Lump sum			75,000	PMU
5	Contractors Orientation to Workers on EMP implementation (OH&S, core labor laws, spoils management, etc)	Prior to dispatch to worksite	Lump sum			40,000	Civil works contract
	Subtotal (B)					**7,15,000**	
C.	**Civil Works**						
1	Construction of shelters for workers.	Construction	Lump sum			10,00,000	Civil works contract
2	Providing Water Supply Facility for the workers	Construction	Lump sum			1,00,000	Civil works contract
3	Providing Sanitation Facility for the workers	Construction	Lump sum			1,00,000	Civil works contract
4	Barricades at the worksite (MS Sheet of 20 gauge of size 5 x 3 meters, having vertical support by MS flat (65 x 65 x 6 mm) along the sides and at 1.5 m and 3.5m, horizontal support by MS flat (65 x 65 x 6 mm) along the sides and at the center, supported by 50mm MS hollow pies of 4 meter height at the ends and at the center.	Construction	Per unit	20	70,000	14,00,000	Civil works contract

	Particulars	Stages	Unit	Number	Rate	Cost (INR)	Costs Covered
5	Retro reflectorized Traffic Signs as per IRC:67, M 15 grade, 80 x 60 mm rectangular; fixed over Aluminum sheeting supported on MS angle iron.	Construction	Per unit	6	3362	20172	Civil works contract
6	Retro reflectorized Traffic Signs as per IRC:67, M 15 grade, 60 x 60 mm square; fixed over Aluminum sheeting supported on MS angle iron.	Construction	Per unit	3	2968	8904	Civil works contract
	Sub Total (C)					26,29,076	
	Total (A+B+C) (INR)		Thirty seven lakh forty six thousand five hundred seventy six only			**37,46,576**	

VII. FINDINGS AND RECOMMENDATIONS

A. Findings and Recommendation

162. The process described in this document has assessed the environmental impacts of all elements of the infrastructure proposed under the Harihar Sewerage system Subproject. Potential negative impacts were identified in relation to design, location, construction and operation of the improved infrastructure. Mitigation measures have been developed in generic way to reduce all negative impacts to acceptable levels. These were discussed with specialists responsible for the engineering aspects, and as a result some measures have already been included in the outline designs for the infrastructure. This means that the number of impacts and their significance has already been reduced by amending the design.

163. Most of the subproject sites are either situated on government owned vacant land parcels or along the public roads. The sites for STP and sewage lifting stations are identified at suitable locations, away from habitation as far as possible. One religious place and some factories are located near the STP site (~100 m from). Green buffer zone will be maintained around STP to reduce any aesthetic or odour impacts. Sewage Pumping stations are proposed at four locations namely Amaravathi, Guttur, APMC and Keshavanagara. Except Amaravathi area there are no as such major households in and around the lifting stations. To avoid any nuisance to the surrounding areas due to bad odour, and also to maintain the aesthetical value, green buffer area will be developed around the pumping stations. STP is designed to meet the specified disposal limits, and therefore no impacts due to treated water disposal is envisaged. Treated waste water will be disposed into a nallah (stream) flowing adjacent to the STP site. This nallah currently carries wastewater generated in the city area and flows downstream and meets River Tungabhadra at about 1.1 km from the STP site. This nallah flows through agricultural lands and therefore the treated water will be mostly utilized for irrigation.

164. During the construction phase, impacts mainly arise from the need to dispose waste soil and from the disturbance of residents, businesses, traffic and important buildings by the construction work. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation. Since the sewer work are conducted along the roads, this great potential to create disturbance. To minimize this, the contractor should

develop a Method Statement, which should be approved by the PIU prior to start of work, and should conduct the work strictly in line with the Method Statement.

165. There were limited opportunities to provide environmental enhancements, but certain measures were included. For example it is proposed that the project will employ in the workforce people who live in the vicinity of construction sites to provide them with a short-term economic gain and ensure that people employed in the longer term to maintain and operate the new facilities are residents of nearby communities.

166. Once the system is operating, the facilities will operate with routine maintenance, which should not affect the environment. As far the sewer network is concerned, the operation and maintenance will comply with the standard operating procedures. SOPs / O&M Manual will be developed during the construction stage and the staff will be provided with necessary training.

167. The citizens of the Harihar Town will be the major beneficiaries of this subproject. In addition to improved environmental conditions, the subproject will improve the over-all health condition of the town.

168. Mitigation will be assured by a program of environmental monitoring conducted during construction and operation to ensure that all measures are implemented, and to determine whether the environment is protected as intended. This will include observations on- and off- site, document checks and interviews with workers and beneficiaries and any requirements for remedial action will be reported to the PMU.

169. Finally, stakeholders were involved in developing the IEE through face-to-face discussions and on site meetings, after which views expressed were incorporated into the IEE and the planning and development of the project. A city level consultation workshop was conducted for larger public participation in the project. The IEE will be made available at public locations in the city and will be disclosed to a wider audience via the ADB website. 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.

VIII. CONCLUSION

170. The subproject is unlikely to cause significant adverse impacts. The potential adverse 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.

171. Based on the findings of the IEE, the classification of the Project as Category “B” is confirmed, and no further special study or detailed EIA needs to be undertaken to comply with ADB SPS (2009) or GoI EIA Notification (2006).

APPENDICES

Appendix 1: RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST

Sewerage Subproject:

Instructions:

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

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

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

Country/Project Title: **India/ Karnataka Integrated Urban Water Management Investment Program(KIUWMIP)**

Sector Division: **Urban Development: Waste Water – UG Sewerage system development for Harihar city municipal council**

Screening Questions	Yes	No	Remarks
B. Project Siting Is the project area…			
▪ Densely populated?	✓		Subproject activities extend to the entire town including the densely populated areas including local planning area villages. There are no major negative impacts envisaged, because major part of the sewer network will be located in unused government lands along the center of 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?	✓		Harihar is a developing town; urban expansion is considerable
▪ Adjacent to or within any environmentally sensitive areas?		✓	None of the proposed subproject components are located in environmentally sensitive areas.
• Cultural heritage site		✓	

Screening Questions	Yes	No	Remarks
• Protected Area		✓	
• Wetland		✓	
• Mangrove		✓	
• Estuarine		✓	
• Buffer zone of protected area		✓	
• Special area for protecting biodiversity		✓	
• Bay		✓	
A. Potential Environmental Impacts Will the Project cause…			
▪ impairment of historical/cultural monuments/areas and loss/damage to these sites?		✓	Harihareshwara Temple is located within the town and the aerial distance between the Sewage Treatment Plant (STP) and the temple is around 2.5 km The project shall not cause any damage to these sites.
▪ interference with other utilities and blocking of access to buildings; nuisance to neighboring areas due to noise, smell, and influx of insects, rodents, etc.?		✓	No blocking/interference with other utilities expected; subproject include only sewer network; necessary measures are included in the EMP for smooth operation and maintenance
▪ dislocation or involuntary resettlement of people?		✓	All the project components are in the government land and along the roadside.
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		✓	No such possibilities; sewerage system will cover entire population including urban poor; In fact, it will have positive health impact due to improved sanitation condition.
▪ impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage?		✓	Adequate capacity of sewage treatment facility (capacity 18 MLD) is being proposed with advanced FAL (Facultative Anaerobic lagoon) technology wherein the effluent from STP shall meet the norms laid out by the Karnataka State Pollution Control Board.
▪ overflows and flooding of neighboring properties with raw sewage?		✓	Sewerage system has been designed considering the population growth. It has been designed to accommodate sewage until year 2046. Design considers standard peak factors and therefore no such impact envisaged.

Screening Questions	Yes	No	Remarks
▪ environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers?		✓	Sludge will be utilized as manure in Agricultural field
▪ noise and vibration due to blasting and other civil works?	✓		No blasting activities envisaged. Temporary nuisance/disturbance due to construction activities will be minimized with appropriate mitigation measures.
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, and biological hazards during project construction and operation?		✓	Not anticipated. The EMP ensures occupational health and safety measures are included. Chemicals will not be used during construction and operation activities.
▪ discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers?		✓	There are no sources of hazardous material that will find its way into the sewers. Wastewater other than municipal, i.e. industrial, entering the sewerage system must meet the stipulated standards, and therefore it is unlikely that problematic waste will be discharged into the sewers.
▪ inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances, and protect facilities?		✓	All around the STP site and Lift stations minimum of 5 meters width of Green belt at STP and 3 meters width at Lift Stations are being carried out by CMC using their own funds
▪ road blocking and temporary flooding due to land excavation during the rainy season?	✓		Road blocking and Traffic re-routing will be required during construction stage of sewer lines. Temporary flooding is not anticipated as there is no deep excavation or filling of low laying area envisaged in the project. Construction activities will be conducted during non-monsoon season.
▪ noise and dust from construction activities?	✓		Anticipated during construction activities. However, impacts are temporary and short in duration. The EMP ensures measures are included to mitigate the impacts. It is suggested in the EMP that all the construction machineries should comply with the noise standards as suggested by Central Pollution Control Board. Sprinkling of water should be done along the construction area for dust suppression

Screening Questions	Yes	No	Remarks
▪ traffic disturbances due to construction material transport and wastes?	✓		Anticipated during construction activities. However, impacts are temporary and short in duration. The EMP ensures measures are included to mitigate the impacts. Construction contractors will be required to coordinate with the local traffic police.
▪ temporary silt runoff due to construction?	✓		Run-off during construction will be more. However, impacts are temporary and short in duration. The EMP ensures measures are included to mitigate the impacts. Construction contractors will be prohibited from stockpiling loose materials along drain channels and will be required to immediately dispose any waste materials.
▪ hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?		✓	Regular maintenances of sewer line have to be carried out to avoid over flow of sewer lines and related impact of public health due to pollution. There is no possibility for groundwater pollution due to failure in sewerage system as the ground water table is sufficiently deep (10 to 15 m)
▪ deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?		✓	Not applicable because sludge cakes are proposed to be utilized as manure
▪ contamination of surface and ground waters due to sludge disposal on land?		✓	Not anticipated. The EMP ensures measures are included to manage sludge.
▪ health and safety hazards to workers from toxic gases and hazardous materials which maybe contained in confined areas, sewage flow and exposure to pathogens in untreated sewage and unstabilized sludge?		✓	Not anticipated. The EMP ensures measures are included to mitigate the impacts.
▪ large population increase during project construction and operation that causes increased burden on social infrastructure (such as sanitation system)?		✓	Priority in employment will be given to local residents. Construction contractors will be required to provide workers camp with water supply and sanitation. Harihar CMC will provide manpower to operate the improved system.
▪ social conflicts between construction workers from other areas and community workers?		✓	Priority in employment will be given to local residents.
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		✓	Not applicable. Construction will not involve use of explosives and chemicals. Trenching will be done manually.

Screening Questions	Yes	No	Remarks
▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		✓	Operational area will be clearly demarcated and access will be controlled. Only worker and project concerned members will be allowed to visit the operational sites.

A Checklist for Preliminary Climate Risk Screening

Country/Project Title: India/ Karnataka Integrated Urban Water Management Investment Program (KIUWMIP)
Sector : Urban Development

Subsector: Waste water, Sewage treatment plant

Division/Department: Urban Development

Screening Questions		Score	Remarks[2]
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	0	
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	0	
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	0	
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

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

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

Other Comments:_____

Prepared by: Karnataka Urban Infrastructure Development and Finance Corporation, Government of Karnataka

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

Appendix 2: Consent to Establish – Harihar STP Expansion

File in Harihara

ಫ್ಯಾಕ್ಸ್ / Fax : 080-25586321
ಈಮೇಲ್ / E-mail : ho@kspcb.gov.in
ವೆಬ್‌ಸೈಟ್ / Website : http://kspcb.gov.in

25581383, 25589112
25588151, 25588270
25588142, 25586520

ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮಾಲಿನ್ಯ ನಿಯಂತ್ರಣ ಮಂಡಳಿ

Karnataka State Pollution Control Board

"ಪರಿಸರ ಭವನ", 1 ರಿಂದ 5ನೇ ಮಹಡಿಗಳು, ನಂ.49, ಚರ್ಚ್ ಸ್ಟ್ರೀಟ್, ಬೆಂಗಳೂರು - 560 001, ಕರ್ನಾಟಕ, ಭಾರತ
"Parisara Bhavana", 1st to 5th Floor, # 49, Church Street, Bengaluru - 560 001, Karnataka, INDIA

/By RPAD/

No.PCB/038/STP/2012/Reg. No. **70469** /1555

Date: 22 JAN 2015

To,
The Municipal commissioner,
City Municipal council (CMC),
Harihara, Davangere Dist

1185/14-15
21-1-15

Sir,

Sub: Consent for Establishment (CFE) under Water Act, 1974 for the **establishment of** expansion of Sewage Treatment Plant of capacity 8.84 MLD to 18 MLD from **City Municipal Council, Harihara, Davangere Dist**. Sy No 52/1, 62/1, 55/P3, 55/P2. 55/P1, **62/3, 62/2, 61/2, 52/P2**, **Harlapur** Village Harihara taluk , Davangere Dist under the Water (Prevention & Control of Pollution) Act, 1974- reg.

Ref: 1. Your CFE application filed at Regional Office-Davangere dated: 15.02.2014
2. Inspection of proposed STP location by the RO- on 05.04.2014.
3. Proceedings of Consent Committee Meeting held on 05.06.2014.
4. Proceedings of personal Hearing, dtd: 25.08.2014

******

M/s. City Municipal Council Harihara, have applied for CFExp of the **Board for the** expansion of Sewage Treatment Plant (STP) of capacity from 8.84 MLD to 18 MLD **at 52/1, 62/1, 55/P3, 55/P2, 55/P1, 62/3, 62/2, 61/2, 52/P2**, Harlapur Village **Harihara taluk** , Davangere Dist for the purpose of treating sewage generated from City **Municipal Council Harihara**

The Board hereby accords Consent for Establishment (Expansion) under **Water Act, 1974, subject to the following conditions:**

1. This Consent for Establishment is valid for Five years from date of issue.
2. **The consent** is related only to the pollution aspects of the said project **with respect to said location and this consent** is in no way construed to give any right, **in any nature to the applicant** what so ever in this regard, and shall obtain all **statutory clearances before commencement of the project**.
3. **The CMC shall** not undertake expansion/ diversification/ **modernization/ change of sites etc.**, without prior clearance from this Board.
4. **The CMC shall** obtain necessary license/ clearance from other **relevant statutory agencies before** taking up construction.
5. **There shall** not be any complaints against the establishment of **STP from surrounding public in respect** of any kind of pollution.

I/W (31)

SENIOR ENVIRONMENTAL OFFICER

Page 1 of 4

ಪ್ಲಾಸ್ಟಿಕ್ ಬಳಕೆ ನಿಲ್ಲಿಸಿ, ಪರಿಸರ ಸ್ನೇಹಿಯಾಗಿ   AVOID USE OF PLASTICS BE 'ECO' FRIENDLY

6. The applicant shall submit the land documents of the proposed site to the Board, before commissioning the establishment work of the proposed STP.

I. SPECIFIC CONDITIONS:

1. The CMC shall up-grade the STP system including advanced technologies after 5 years from the date of commissioning of the present STP system.
2. The CMC shall provide UGD facility for the entire City Municipal Council and report to the Board.
3. The CMC shall maintain 100 mts buffer zone around the Sewage Treatment Plant area.
4. The CMC shall take adequate measures to avoid any entry of treated/untreated sewage into nearby nalla.
5. The responsibility to execute, commission, operation and maintenance of the STP will be taken by CMC authorities only.
6. The CMC shall ensure that, there shall not be any odour nuisance in the surrounding area due to the operation of the STP. Sufficient green belt shall be developed around the STP site.
7. This consent is issued without prejudice to the Court Cases pending in any Hon'ble Court.
8. The CMC shall pay balance cess under The Water (Prevention and Control of Pollution) Cess Act, 1977 within three months.

II. WATER POLLUTION CONTROL:

1. The treatment plant shall be used for the treatment of sewage only, at any point of time.
2. The quantity of sewage treated shall not exceed 18 MLD
3. The CMC shall treat the sewage in the STP as per the proposals submitted to the Board. The CMC shall provide the STP as follows,
   a) Inlet Chamber: 2.2m x 29.mx 2.1m (SWD)
   b) Medium Screen chamber(Mechanical): 5mx 1.30m x 1.3m (SWD)
   c) Medium screen chamber(manual): 5mx 1.30mx 1.3m (SWD)
   d) Grit removal unit: 2No's: 7mx 7mx 2.3m (SWD)
   e) Flow distribution chamber: 3.2mx 3.2 mx 1.1m (SWD)
   f) Inlet Chamber: 1.7mx 1.7mx 0.6m depth+ 0.30 m FB
   g) Facultative aerated lagoon:4 No's: Size of each lagoon: 40mx 120 mx 5.5m (SWD)
   h) Effluent Chamber connecting each lagoon: 2No's
      Size of effluent chamber: 1.7mx 1.7 m x 0.6mdepth
   i) Polishing Pond: 4 No's
      Size of polishing pond: 40mx 100mx 2.0m (SWD)
   j) Outlet Chamber: 5.15mx 5.15mx 0.6m (SWD)
4. The CMC shall utilize the treated sewage for irrigation purpose after treating the same to the standards stipulated in **Annexure-I.**
5. All the treatment units shall be made totally impervious.
6. The CMC is liable to reinstate/ restore, damaged or destroyed elements of environment at its cost, failing which the applicant/ occupier as the case may be/shall be liable to pay the entire cost of remediation or restoration and pay in advance an amount equal to the cost estimated by competent agency or committee
7. The separate flow meter shall be installed to record hourly inflow & outflow of domestic effluent into the STP and maintain logbooks for hourly recording for verification of inspecting officers.

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III. SOLID WASTE (OTHER THAN HAZARDOUS WASTE) DISPOSAL:

The solid wastes collected in the treatment plant premises in the form of sludge, screenings shall be disposed off scientifically to the satisfaction of the Board so as not to cause fugitive emissions, dust problems or water pollution through leaching etc., of any kind.

IV. GENERAL:

1. The authority shall immediately report to the Board, of any accident or unforeseen act or event resulting in release of discharge of effluents or emissions or solid wastes, etc., in excess of the standards stipulated and the authorities shall immediately take appropriate corrective and preventive actions under intimation.
2. Exact date of commissioning of the Sewage Treatment Plant shall be informed to this Board 45 days in advance so as to make necessary inspection of the plant and the pollution control measures provided by the authorities.
3. The applicant shall comply with all the rules and guidelines issued from time to time.
4. The Board reserves right to review and impose additional condition or conditions, revoke, change or alter the terms and conditions
5. This CFE does not give any right to the Party/Project Authority/Industry to forego any requirement that is necessary for starting operation of the plant.
6. The CMC shall furnish point-wise compliance to the conditions given under Consent for Establishment within 30days.

Please note that, this is only Consent for Establishment issued to you to proceed with establishment of STP and does not give right for proceeding with operation of the said plant. For the purpose of the operation after establishment, a separate Consent of the Board for discharge of domestic effluent and emissions to the air shall have to be obtained by filing prescribed consent applications along with consent fees under the Air (Prevention & Control of Pollution) Act, 1981 and the Water (Prevention & Control of Pollution) Act, 1974. The application for consent has to be made 45 days in advance to commissioning for trial of STP.

The receipt of this letter may please be acknowledged.

For and on behalf of
Karnataka State Pollution Control Board

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ANNEXURE-I

ON LAND FOR IRRIGATION

Sl. No.	Characteristics	Tolerance limits
1.	Colour and Odour	See Note
2.	Suspended Solids, mg/l. max	30
3.	pH value.	5.5 to 9.0
4.	Oil and Grease, mg/l, Max	10
5.	Bio-chemical Oxygen Demand, mg/l. (5 days at 20°C max)	20

Note: All efforts should be made to remove colour and unpleasant odour as far as practicable.

HYDRAULIC LOADING APPLICABLE FOR DIFFERENT SOILS

Sl. No.	Soil Texture	Loading rate in m^3/hec/day
1	Sandy	225 to 280
2	Sandy Loam	170 to 225
3	Loam	110 to 170
4	Clay Loam	055 to 110
5	Clayey	035 to 055

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Appendix 3: 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) µg/m^3	Annual 24 hours	50 80	20 80	Improved West and Geake-Ultraviolet fluorescence
2	Nitrogen Dioxide (NO_2) µg/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 µg/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 µg/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 4: Applicable Noise Standards

Area code	Category of area/zone	Limit in dB (A)	
		Day time	Night time
1	Industrial area	75	70
2	Commercial area	65	55
3	Residential area	55	45
4	Silence zone	50	40

Appendix 5: Salient Features of Major Labor Laws

Including Amendments Issued From Time To Time Applicable To Establishments Engaged In Construction of Civil Works

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

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

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

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

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

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

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

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

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

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

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

conditions of employment by the employer on matters provided in the Act and get the same certified by the designated Authority.

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

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

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

(xv) **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 6: Emergency Response Plan Template - Sewer Network

Section 1
System Information

Keep this basic information easily accessible to authorized staff for emergency responders, repair people, and the news media.

System information

System Name and Address	Harihara City Sewerage Network	
Directions to the System		
Basic Description and Location of System Facilities		
Population Served and Service Connections	_____ people	_____ connections
System Owner	Harihara CMC	
Name, Title, and Phone Number of Person Responsible for Maintaining and Implementing the Emergency Plan		_____Phone _____Mobile

Section 2
Chain of Command – Lines of Authority

The first response step in any emergency is to inform the person at the top of this list, who is responsible for managing the emergency and making key decisions.

Chain of command – lines of authority

Name and Title (as required)	**Examples of Responsibilities During an Emergency**	**Contact Numbers**
Mr/Ms……. Asst. Executive Engineer (Sewerage Manager)	Responsible for overall management and decision making for the Sewer Systems. The Manager is the lead for managing the emergency, providing information to regulatory agencies, the public and news media. All communications to external parties are to be approved by the manager.	Phone: Mobile:
Mr/Ms …….. (Junior Engineer) Sewerage System Operator	In charge of operating the Sewer systems, performing inspections, maintenance and providing recommendations to the system manager.	Phone: Mobile:

Name and Title (as required)	Examples of Responsibilities During an Emergency	Contact Numbers
Mr/Ms..... Sewer Inspector (Sewerage System Operator)	In charge of performing inspections, maintenance assessing facilities, and providing recommendations to the system manager.	Phone: Mobile:
Mr/Ms…….. Office Administrator	Responsible for administrative functions in the office including receiving phone calls and keeping a log of events. This person will provide a standard carefully pre-scripted message to those who call with general questions. Additional information will be released through the Sewer system manager.	Phone: Mobile:
Mr/Ms…… Field Staff (crew)	Delivers door hangers, posts notices, and supports Sewer system operator.	Phone: Mobile:

Section 3
Events that Cause Emergencies

The events listed below may cause Sewerage system emergencies. They are arranged from highest to lowest probable risk.

Events that cause emergencies

Type of Event	Probability or Risk (High-Med-Low)	Comments
Burst of sewer line		
Leak of sewer line		
Overflow of sewer line		

Section 4
Emergency Notification

Notification call-up lists - Use these lists to notify first responders of an emergency.

Emergency Notification List				
Organization or Department	**Name & Position**	**Telephone**	**Night or Cell Phone**	**Email**
Harihara, CMC	..... Sewer System Inspector			
Harihara, CMC	..... Junior Engineer			
Harihara, CMC	..... Asst. Exe. Engineer			

Priority Customers				
Organization or Department	**Name & Position**	**Telephone**	**Night or Mobile Phone**	**Email**
Hospitals or Clinic(s)				

Public or Private Schools				

Notification List				
Organization or Department	**Name & Position**	**Telephone**	**Night or Mobile Phone**	**Email**
Police				
Regulatory Agency				

Service / Repair Notifications				
Organization or Department	**Name & Position**	**Telephone**	**Night or Mobile Phone**	**Email**
Hubli Electricity Supply Company				
Electrician				
Sewerage System operator/manager				
Plumber				
Pump Supplier				
“Call Before You Dig”				
Rental Equipment Supplier				
Pipe Supplier				

Notification procedures

Notify Sewerage Network system customers

Who is Responsible:	
Procedures:	

Alert local law enforcement, or regulatory officials, and local health agencies

Who is Responsible:	
Procedures:	

Contact service and repair contractors

Who is Responsible:	
Procedures:	

Procedures for issuing a health advisory

Who is Responsible:	
Procedures:	

Other procedures, as necessary

Who is Responsible:	
Procedures:	

Section 5
Effective Communication

Designated public spokesperson

Designate a spokesperson (and alternate) and contact regulatory agency for delivering messages to the news media and the public.

Designate a spokesperson and alternates

Spokesperson	Alternate

Section 6
The Vulnerability Assessment

This is an evaluation of each Sewerage system component to identify weaknesses or deficiencies that may make them susceptible to damage or failure during an emergency. It also assesses facilities for security enhancements that may guard against unauthorized entry, vandalism, or terrorism.

Facility vulnerability assessment and improvements identification

System Component	Description and Condition	Vulnerability	Improvements or Mitigating Actions	Security Improvements
Collection System				
Sewage Pumping				
Other Considerations				

Section 7
Response Actions for Specific Events

In any event there are a series of general steps to take:

1. Analyze the type and severity of the emergency;
2. Take immediate actions to save lives;
3. Take action to reduce injuries and system damage;
4. Make repairs based on priority demand; and
5. Return the system to normal operation.

The following tables identify the assessment, set forth immediate response actions, define what notifications need to be made, and describe important follow-up actions.

A. Power outage

Assessment	
Immediate Actions	
Notifications	
Follow-up Actions	

B. Collection system blockage or line break

Assessment	
Immediate Actions	
Notifications	
Follow-up Actions	

C. Collection system pumping facilities failure

Assessment	
Immediate Actions	
Notifications	
Follow-up Actions	

D. Vandalism or terrorist attack

Assessment	
Immediate Actions	
Notifications	
Follow-up Actions	

E. Flood

Assessment	
Immediate Actions	
Notifications	
Follow-up Actions	

F. Earthquake

Assessment	

Immediate Actions	
Notifications	
Follow-up Actions	

G. Hazardous materials spill into collection system

Assessment	
Immediate Actions	
Notifications	
Follow-up Actions	

H. Electronic equipment failure

Assessment	
Immediate Actions	
Notifications	
Follow-up Actions	

I. Other

Assessment	
Immediate Actions	
Notifications	
Follow-up Actions	

Section 8
Returning to Normal Operation

Returning to normal operations

Action	Description and Actions

Section 9

Plan approval
This plan is officially in effect when reviewed, approved, and signed by the following people:

Name/Title	Signature	Date

Section 10
Certificate of Completion

I certify to the Government of Karnataka that this Sewerage Network system – Harihara City Sewerage Network system, has completed an Emergency Response Plan (ERP).

I certify that this document was prepared under my direction or supervision.

Sewerage Systems: _____

System Name: _____

Address: _____

Print Name of Person Authorized to Sign this Certification on behalf of the System:

Title: _____

Signature: _____

Phone: _____ Fax: _____ Email: _____

Completion of the following:

- ☐ Security Vulnerability Assessment
- ☐ Emergency Response Plan

Source: www.rcap.org (modified)

Appendix 7: Traffic Management Planning (TMP)

A. Principles for TMP around the Sewerage Network 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 every 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 14 to Figure 19** illustrates the operating policy for TMP for the construction of 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:

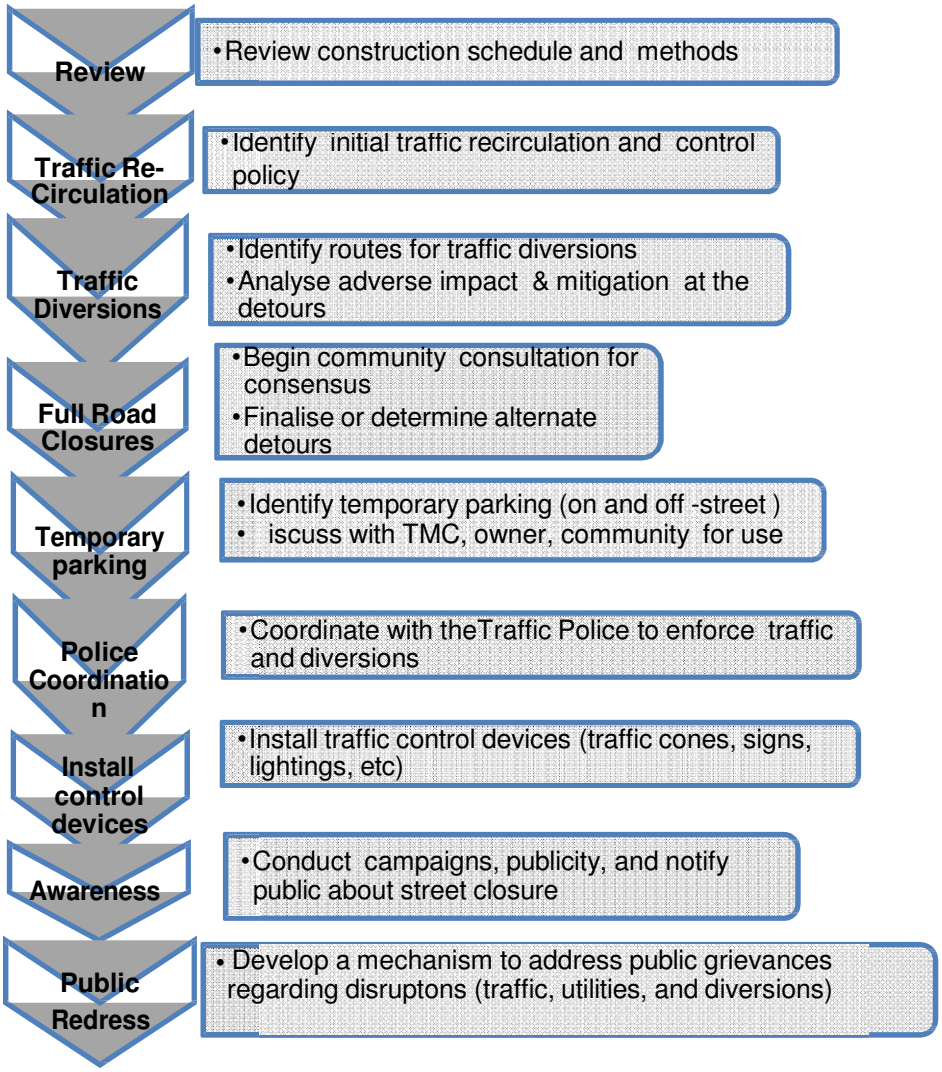
(i) approval from the Harihara CMC / Public Works Department (PWD) to use the local streets as detours;
(ii) consultation with businesses, community members, traffic police, PWD, etc., regarding the mitigation measures necessary at the detours where the road is diverted during the construction;
(iii) 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.

Policy Steps for the TMP



D. Public awareness and notifications

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

6. The awareness campaign and the prior notification for the public will be a continuous activity which the project will carry out to compensate for the above delays and minimize public claims as result of these problems. These activities will take place sufficiently in advance of the time when the roadblocks or traffic diversions take place at the particular streets. The reason for

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

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

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

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

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

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

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

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

- Signs
- Pavement Markings
- Channelizing Devices
- Arrow Panels
- Warning Lights

11. Procedures for installing traffic control devices at any work zone vary, depending on road configuration, location of the work, construction activity, duration, traffic speed and volume, and pedestrian traffic. Work will take place along major roads, and the minor internal roads. As such, the traffic volume and road geometry vary. The main roads carry considerable traffic; internal roads are narrow but carry very less traffic. However, regardless of where the construction takes place, all the work zones should be cordoned off, and traffic shifted away at least with traffic cones, barricades, and temporary signs (temporary “STOP” and “GO”).

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

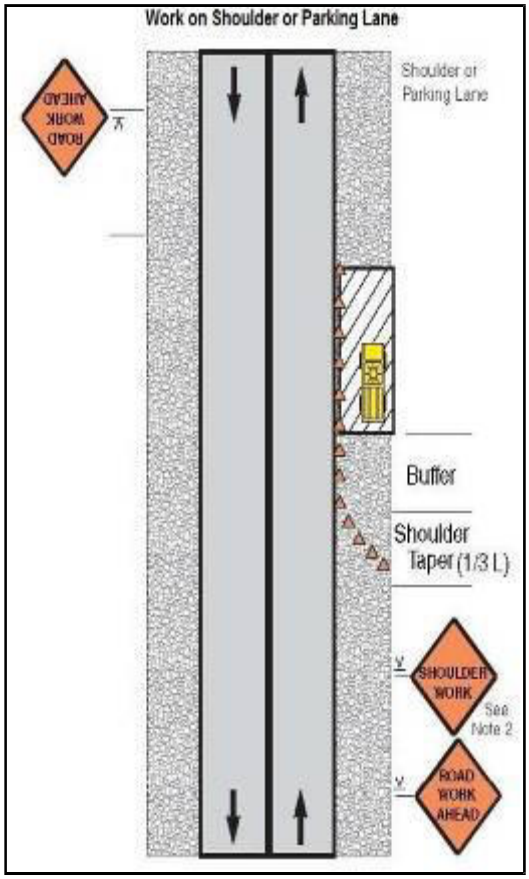
- Work on shoulder or parking lane
- Shoulder or parking lane closed on divided road
- Work in Travel lane
- Lane closure on road with low volume
- Lane closure on a two-line road with low volume (with yield sign)
- Lane closure on a two-line road with low volume (one flagger operation)
- Lane closure on a two lane road (two flagger operation)
- Lane closure on a four lane undivided Road
- Lane closure on divided roadway
- Half road closure on multi-lane roadway
- Street closure with detour

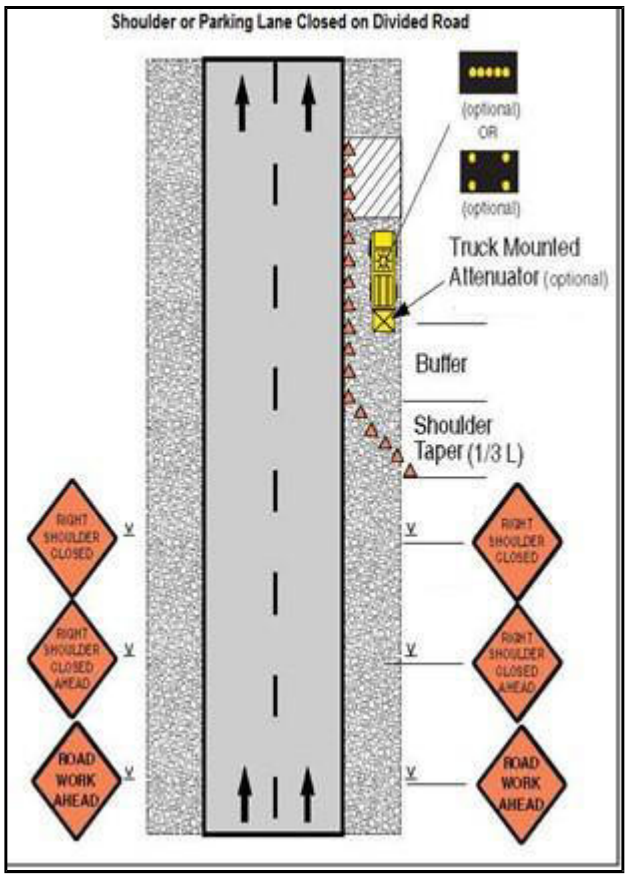
13. The work zone should take into consideration the space required for a buffer zone between the workers and the traffic (lateral and longitudinal) and the transition space required for delineation, as applicable. For the works, a 30 cm clearance between the traffic and the temporary STOP and GO signs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

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

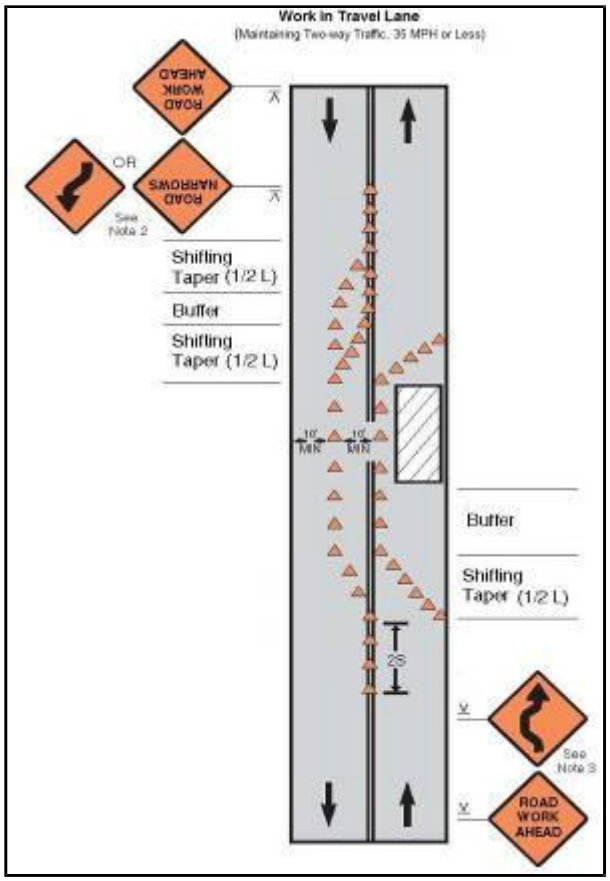
16. In addition to the delineation devices, all the construction workers should wear fluorescent safety vests and helmets in order to be visible to the motorists at all times. There should be provision for lighting beacons and illumination for night constructions.

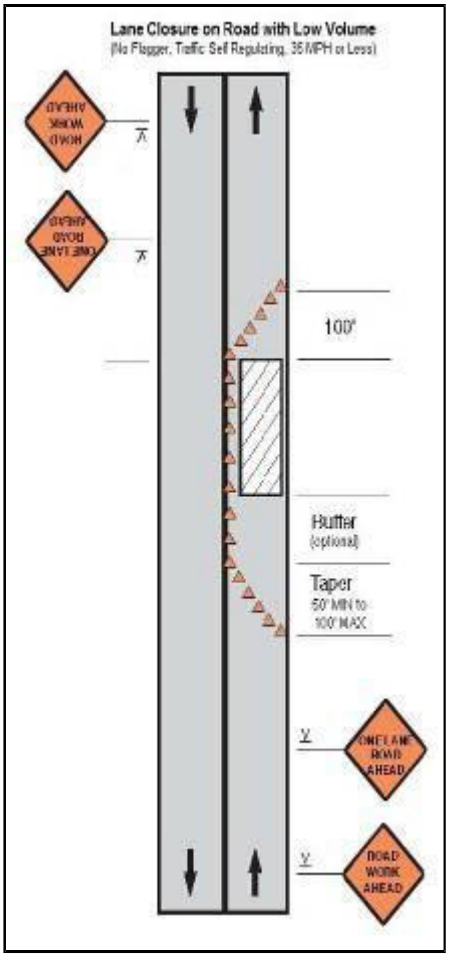
Work on shoulder or parking lane & Shoulder or parking lane closed on divided road)



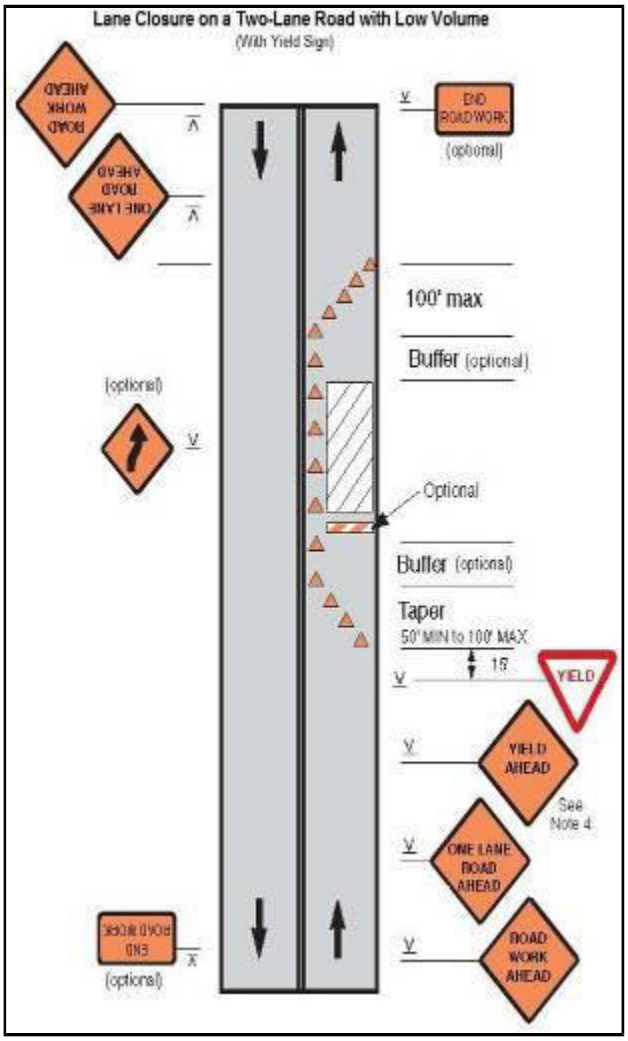


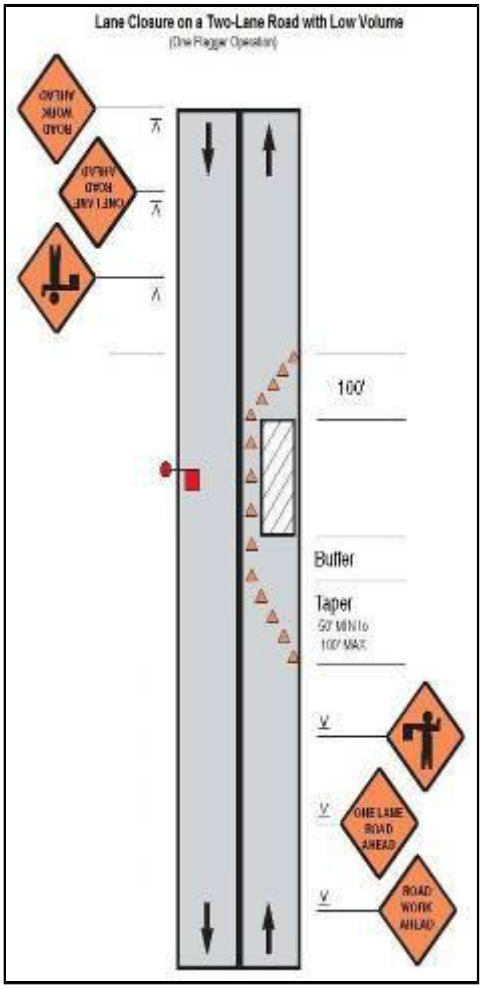
Work in Travel lane & Lane closure on road with low volume



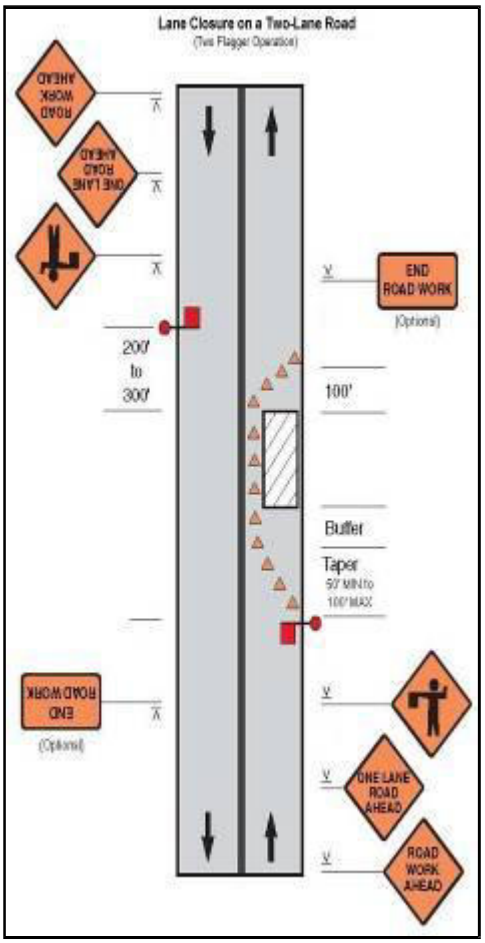


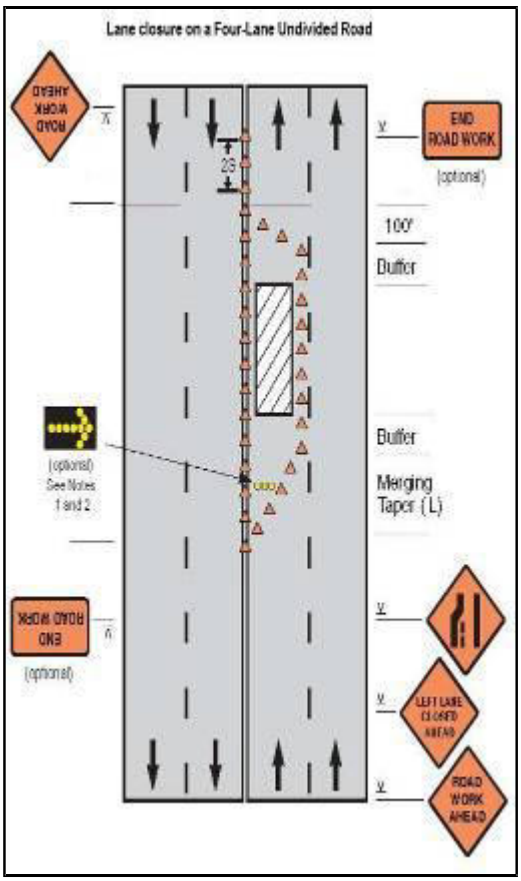
Lane closure on a two-line road with low volume (with yield sign) & Lane closure on a two-line road with low volume (one flagger operation)



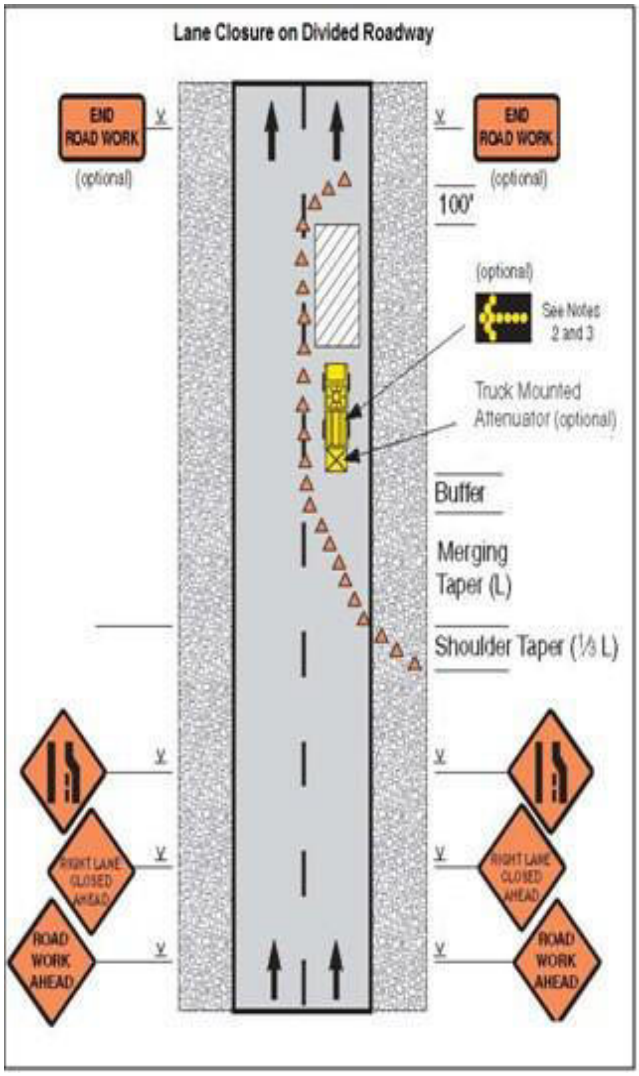


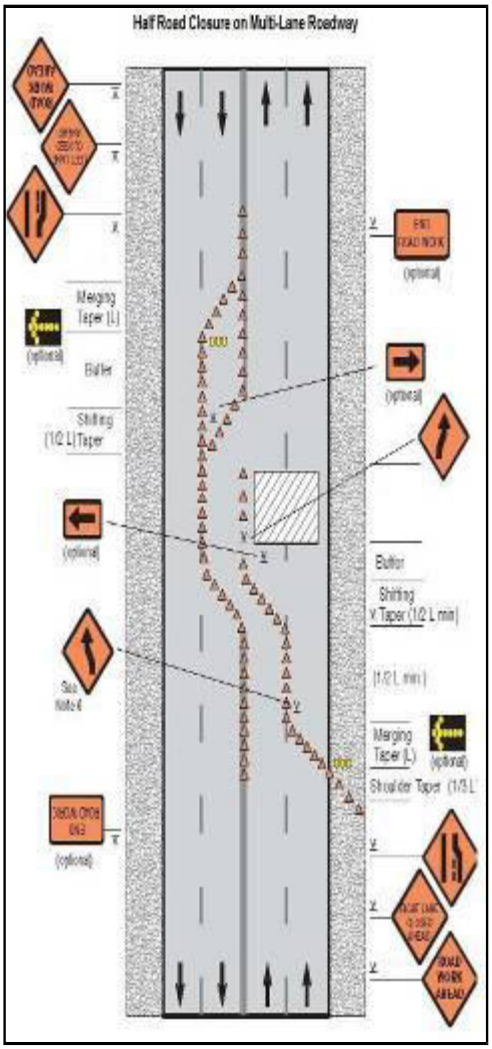
Lane closure on a two lane road (two flagger operation) & Lane closure on a four lane undivided Road



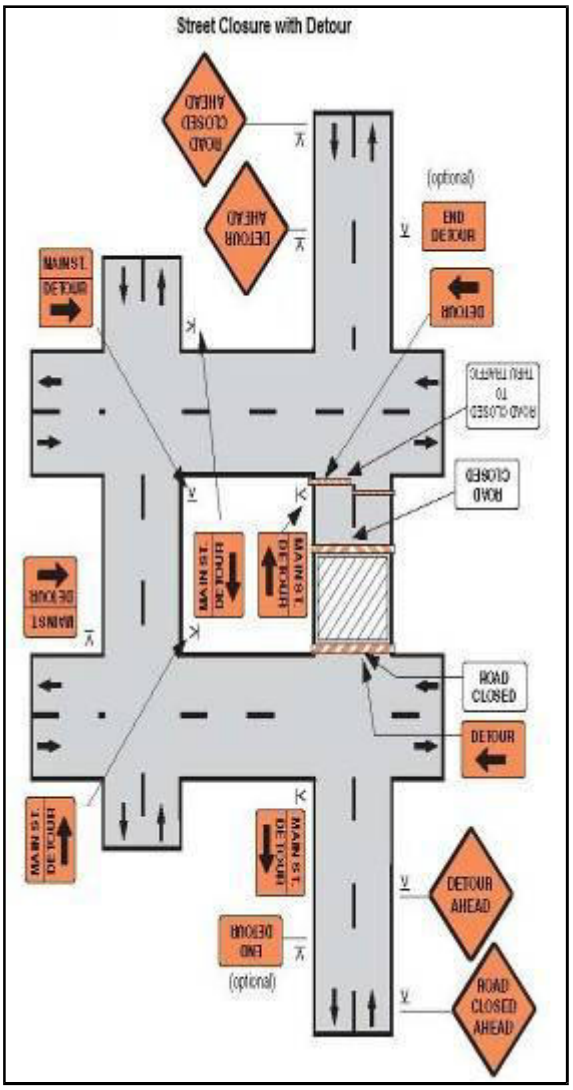


Lane closure on divided roadway &Half road closure on multi-lane roadway





Street closure with detour



Appendix 8: Operation and Maintenance Plan – Sewer Network

Quality maintenance shall be the most important step in smooth functioning of the proposed sewers. This includes the optimum use of labour, equipment and material to keep the system in good condition. The following sessions deals with methods of sewer cleaning, staff pattern, organizational set-up for proposed sewerage system and the duties, powers and responsibilities of the staff dealing with proposed system for the town. The following recommendations are made for the smooth maintenance of the sewerage system in the town.

General

Quality maintenance of sewerage system consists of the optimum use of labour, equipment and materials to keep the system in good condition, so that it can accomplish efficiently its intended purpose of collection and transportation of wastewater to the treatment plant.

Types of Maintenance

There are two types of maintenance of a sewerage system - preventive and emergency. It is necessary that preventive or routine maintenance are to be carried out to prevent any breakdown of the system and to avoid emergency situations like clogged sewer lines, over flowing manholes or backing up of sewage into a house or structural failure of the system. Preventive maintenance is more economical and provides for reliability in operations of the sewer facilities .Emergency repairs, which would be rare if proper maintenance is carried out. Proper inspection and preventive maintenance is a necessity.

The primary effort of the staff is to maintain sewers free flowing and un obstructed. The sewer system with its components properly designed and installed is handed over to the person in charge of maintenance who assumes the responsibility to make it function satisfactorily for the benefit of the community. One should have sufficient experience of the system to enable him to perform his task efficiently with an understanding and appreciation of the problems that may arise during maintenance. One has not only to be a technical man but has also to deal with human relations in order to be successful in his work. Service training shall be imparted to the maintenance personnel to improve upon the methods adopted based on the latest trends. Failure to develop a better understanding of human relations and also lack of development of the concept of service to the community generally results in the maintenance part becoming unpopular. The general public is also to be made aware of do's and don'ts to help in keeping the sewers free flowing and un obstructed. Steps to be taken for operation and maintenance of the sewerage network detailed in this section are aimed at:

- Regular maintenance of the system for proper functioning
- Preventing any breakdown of the system
- Emergency operations to deal with clogged sewer lines or over flowing manholes
- Preventing backflow of sewage into residences and
- Preventing structural failure of the system.

Institutional Structure

A separate Operations and Maintenance Wing is proposed for an effective maintenance of sewerage system. A sewer maintenance crew comprising of a gang leader and four workers shall be set up in each sector comprising 20 km of sewer network for regular cleaning and maintenance of the sewer lines. There will be three such crews under one sewer inspectors. The supervisors report to the Junior Engineer who in turn reports to Assistant Executive Engineer. The Junior Engineer, Sewerage Inspectors and the crew can look after the sewerage, drainage and other solid waste management activities in the town. The Crew works as per the instructions of the supervisors. The supervisors hold the charge of the particular sectors or districts under their jurisdiction and will follow up the works like cleaning of sewers. They shall be assigned the work to take care of the sewerage network and the sewage treatment plant proposed. Care should however be taken to ensure that the debris, brickbats, mortar, etc. is removed immediately after the repair work. A record of daily works done by the sewer maintenance team has to be maintained in a logbook in order to identify the chronic trouble spots, take extra care of these spots and necessary remedial action.

Man power and cost for the maintenance of sewer network

Position	No. of Staff	Per month Salary / Cost (Rs)	Total (Rs)
Driver for sewer cleaning vehicle	2	8,000	16,000

Cleaner for sewer cleaning vehicle	4	5,000	20,000
Sewer Workers	10	6,000	60,000
Sanitary Inspector	1	15,000	15,000
Maintenance of sewer cleaning vehicle	Lump	25,000	25,000
Total (per month)			1,36,000
Total (per year)			16,32,000

The following list gives the duties that are to be performed for proper sewer maintenance:

- Inspection of sewers, sewer appurtenances etc.
- Cleaning of sewers and sewer appurtenances.
- Checking manhole conditions for deposition of silt etc.
- Replacing broken manhole covers.
- Raising the manhole cover for the construction of culverts, resurfacing etc.
- Approval of sewer connection applications and executing connections
- Maintaining records of sewers including:
    - Permanent construction
    - Daily operation and maintenance report
    - Complaints register
    - Stock of equipment
- Disposal of silt, garbage removed after cleaning sewer, manholes and treatment plants.
- Removal of debris, brickbats etc. after any repair work.
- Identifying locations where regular maintenance is needed (problem areas) in sewers.
- Ensuring work is carried out correctly and safely with due regards to health and safety regulations.
- Adopting preventive maintenance within the sub division as a whole,
- Conducting periodic staff meeting and record of the proceedings.

Sewer Cleaning Equipment and Procedures

General Practice

In addition to the routine sewer cleaning equipments such as pick-axes, manhole guards, tripod stands, danger flags, lanterns, batteries, safety lamps, lead acetate paper, silt drums, ropes, iron hooks, handcarts, plunger rods, observation rods, shovels, etc., a Pull through Disc with Rope, Jetting Machine (Velocity Cleaners) and Hand Operated Winching Machine are also recommended for effective maintenance.

- For small diameters (150 to 400 mm dia), Jetting machines are used.
- For larger diameters (400 to 1100 mm dia), bucket cleaning equipment is used.
- For larger diameters (Above 1100 mm dia), manual de-silting of sewers is practiced.

Manual Cleaning

In manual cleaning method, the silt is collected manually from manholes and large sewers where man-entry is possible. This is however a very slow and risky operation. Proper artificial ventilation and adequate safety precautions are required before the men enter the sewers. The depth of most of the sewers, are considerable in some cases; the velocity can also be expected to be low leading to generation of gases. All personnel entering the manhole should have proper safety equipment. There should be forced ventilation by using air blowers on manholes upstream of the concerned length. All such personnel should use safety harness fastened at the other end and another crew member should monitor crew who has entered the manhole.

Passing Rope Knots and Discs

In this method of sewer cleaning, solid split bamboos are passed through sewers from one manhole to the other to create a link. Ropes are attached to this link and a rope link is created between two manholes. A wooden disc with rubber gasket ring or a series of knots of rope are formed and pulled through the sewer to and fro. The inside of the sewer (sewer fabric) gets scrubbed due to this procedure and dislocates the encrusted silt. The freed silt flows away downstream and in this way the sewer can be cleaned from upstream to downstream. This method is labor intensive and hence expensive. Further such vigorous scrubbing sometimes breaks the joints and damages the sewer fabric. This method is therefore no longer adopted in modern sewer maintenance practices.

Bucket Cleaning Equipment

In the method of utilizing the bucket cleaning equipment, two winches are installed on two manholes. A rope link is established. A bucket is attached to the rope and pulled from one end to the other. The silt deposited in the sewer is collected in the bucket and is taken out from a manhole. This method can cause damage to manholes and sewer fabric due to heavy pulling if not done properly.

Jetting & Suction Equipment

Jetting and suction equipment is mounted on a truck chassis. Water is stored in a tank(usually 6000 lit capacity) mounted on the truck. This water is jetted in the sewer line using a high-pressure pump and a nozzle system. Fine jets with high velocity are generated. On the forward and the backward pass of the jet, the deposited silt is loosened and gets was heddown and is collected in the downstream manhole. From this manhole, it is sucked out in a slurry form to a silt tank mounted on the chassis. Various sizes of jets and suction can be used to clean various diameter sewers. The Indian equipment available is usually effective for sewer up to 300mm diameter and can be used up to 450 mm diameter with some modifications. For larger diameter sewers, imported heavy-duty suction and jetting machines can be used. In the latest sewer maintenance programs, these machines are preferred by all and could be conveniently used.

Hand Operated Winch Machine

This is used to clean sewer pipes larger than 300 mm. diameter which are blocked to a significant extent.

Safety & Precautions

Adequate safety measures and precautions are most important while maintaining the sewer systems. These precautions should necessarily comprise of:

- Ventilating sewer line by opening two or three manholes on both sides of working sewer line for about one hour
- Using gas masks while entering the sewer line
- Placing at least two helpers at the top and sending signals at every few minutes to the person in the manhole
- Testing manhole rungs or steps for structural safety before using
- Lowering all the tools to the workman in bucket and ensuring that no tools are located near the manhole edge that could fall in to the manhole and injure the workman
- Using lighting equipment that are explosion and fire proof
- Adequate and easily readable warning signs to the traffic well ahead of the work area
- Posting flagman at the two ends of the working sewer line to avoid traffic jams
- Avoiding infections by using rubber gloves, gum boots, separate cloths while working and
- By keeping records of injury with description of accident, corrective actions taken and the accident analysis.

In addition to the above, an up-to-date record of maps and profiles have to be maintained duly incorporating any changes made, if any, during construction and repair works. This will help in proper maintenance of the system.

Appendix 9: Minutes of the Stakeholder Consultation Meeting (October 3, 2012, Davangere)

The meeting was attended by key stakeholders from four project towns of Byadgi, Ranebennur, Harihar and Davangere including public/elected representatives from each town, ULB officials, officials from other line departments and executing agency KUIDFC, and NGOs/CBOs. The meeting was chaired by Davangere District Deputy Commissioner,

The PPTA consultants made detailed presentations – in Kannada and English on overall program, pilot towns, technical studies, poverty social development aspects, and environmental and social safeguard issues related to proposed subprojects in respective towns.

KUIDFC

- Task Manager (NKUSIP) stated that, the Draft Feasibility Studies (DFSs) are subject to change to address stakeholder comments and concerns.
- Task Manager (NKUSIP) suggested to use Ashraya Scheme Government Order(GO) for land acquisition in Byadgi and other ULB, if required. (GO states that, compensation for land acquisition can be paid at 3 times to the guidance value of the land)

Other discussions

- Provision for Sewer Connections – include connection cost as a separate item. Check with project staff of KMRP/KUIDFC.
- Surrounding areas of ULBs and gaps in the existing sewerage system of the town – Check whether the villages and settlements are within the ULB's jurisdiction/ boundary and also population densities.
- Demarcate the roads where larger diameter sewers and WS mains are proposed in all ULBs, to carryout sample surveys and to check impacts during construction. Identify streets where complete road closure is required?
- Maps or drawings to be prepared to show proposals/ options for water supply and wastewater system, sewerage network and public sanitation.
- Refine the cost estimates to show following items separately: Laying of sewer network: Road restoration cost; Construction of collection chambers and connections from individual properties to collection chambers; Land cost for STPs and Pumping Stations; Construction cost of STP
- Identify industrial demand and location for recycling treated wastewater
- Preparation of comparison table for the selection of pipe material for sewerage and water supply system
- Assess existing sewerage system (about 22 km) in Ranebennur to identify need for the sewer renovation or replacement.
- Plan awareness program for the sanitation in each ULB

Appendix 10: PUBLIC CONSULTATION – HARIHARA

Name of the ULB: Harihara

Date: 21.06.2011

Project Components: Rehabilitation of Water Supply Scheme and upgrading to 24x7 Water Supply Scheme to Harihara Town, CMC Harihara in Davanagere District

Table 5.2 : Public consultation

Sl	Name, Ward No. and address of the person consulted	Present condition of Water supply	What improvement is required in the present condition	Proposed project is beneficial Yes/No	May proposed project cause any social issue	Any suggestion for the proposed project
1	Sanaulla, baig ward no-[illegible] Gandhi ngr HRR	poor	pipe dia change	yes	NO	Road Both side pipe laying
2	Ravikumar. B. ward no13 [illegible]	Drinking water not quality	pressure is low	yes	Small gallis in This ward	fast completing project
3	[illegible] & Team Ambedkar [illegible] Temple rd ward-3	weekly 3 times	Daily They want water	yes	poor people water Bill problem	water Bill amount yearly paid.
4	Sangmesh. Kale [illegible] college ward-5	good	Removing old pipe	yes	NO	meter adapting is ok.
5	Nagaraj. ward-30 [illegible] ngr HRR	good	Higher dia pipe laying	yes	Road cutting problem	wide road so, Both side pipe laying
6	parvez M. ward-15 Imam mohalla HRR	poor	weekly 3 times water They want	yes	Small roads in this area	water should reach 3rd floor.
7	Ramesh. Simpi ward no-5, [illegible]	Low quality water	Avoid public Taps.	yes	poor people living here	They want pressure flow
8	Saleem. kazi ward-no-10 Tippu ngr HRR	old [illegible] pipe used	Treated water supply.	yes	-NO-	Need over public [illegible]
9	Samimbanu. H.M ward-23 [illegible] ngr HRR	weekly Two times	24 hours water They want	yes	NO	Continuous water flow They want
10	Manjunath. V. [illegible] ward no-26 J.C. Colony	Small gallis not sufficient water	Quality pipe laying	yes	Concrete road cutting problem	meter proposal is good
11	Mailarappa ward no-4 [illegible] HRR	over Dia pipe used	no control valves	yes	NO	good quality meter use for project
12	Ashok. Kurbar ward-no-22 [illegible] ngr	water not flow properly	adopt valves for pressure	yes	NO	They want quality water
13	[illegible] ward-no-16 [illegible] HRR	old pvc pipes	Stop leakaging water	yes	NO	now they getting sufficient water
14	Sankar. [illegible] ward-no-11 [illegible] HRR	pipe leakages.	Full ward pipe changes	yes	Slum people lived here They want cisterns	Good pipe used for project
15	Hanumant. Bidari ward-27 [illegible]	pipe leakage	pipe should be changes	yes	NO	water Bill amount should Be in budget
16						
17						
18						

Recd By mail 23/9/2012

Report on Public consultation

Venue: Sri. Sadguru Samartha Narayana Ashram just outside the STP site at Harihara
Date: 22.09.2016
Participants:

01. Dr. A Mitra, Environment Specialist PMDCSC
02. Mr. Balakrishna M. R, Social Development Officer, PMDCSC
03. Mr. Shivakumar K, Social Development Officer, RPMU, KIUWMIP Davanagere
04. Mr. Prakash Abbigere, R. E, PMDCSC Harihar
05. Mr. Madesh, A. E, PIU Harihar
06. Mr. Gunashekar, A. R. E, PMDCSC Harihar
07. Mr. Narayana, Secretary and 2 priests of Sri. SadguruSamartha Narayana Ashram, Harihar
08. Mr. R. S Goudar, 2nd cross, Chintamani Nagar Harihar- Local resident
09. Pradumna Bishwal, Safety Officer, Sriramepc Ltd (Contractor)

Objective of the public consultation:

The objective of the public consultation was to provide complete information (including application of mitigation measures) of the proposed STP and its functions and also the possible impacts for the temple authorities of Sri. SadguruSamartha Narayana Ashram, Harihar, Davanagere District

Understanding views of Ashram authority and locals in respect to proposed development of STP nearby the Ashram.

Sri.SadguruSamartha Narayana Ashram: Sri. Sadguru Samartha Narayana Ashram is located outside the boundaries of the STP but near the STP site of Harihar. There is a temple and also a Goshala (Shelter for cows) in the Ashram. There are 20 people staying in the Ashram including the Ashram Secretary, priest, cooks and also the labourers who maintains the temple and the Goshala. Annual festival will be during the month of July and the fair will be for a week.

The public consultation was conducted in the premises of Sri. SadguruSamartha Narayana Ashram and Social Development Officers explained about the purpose of construction of STP in Harihar which is nearby their Ashram. They also explained that how sewerage will flow from the households to STP through the network. The Environment Specialist of PMDCSC explained about the treatment technology and the process of treatment of waste water in the STP. He also explained the possibility of smell coming out from the STP when sewerage water collected for treatment. It was explained that buffer zone plantation has been considered in and around the STP. The Secretary of Sri.SadguruSamartha Narayana Ashram, Harihar appreciated the efforts of City Municipal Council for construction of STP for treatment of waste water in the public interest and in continuation he also told that they will support the CMC in this regard. The Ashram authorities clearly expressed that they have no objection for construction of STP near their Ashram. They also requested to connect the sewerage network to the Ashram to treat the waste water generated in the Ashram.

The contact details of Sri. SadguruSamartha Narayana Ashram, Harihar is as follows:

Mr. Narayana, Secretary
Sri.SadguruSamartha Narayana Ashram
Harihar
Davanagere District, Karnataka State
Mob: 9440246104,Phone: 08192- 242293

Photographs of consultation with Sri.SadguruSamartha Narayana Ashram, Harihar

Explaining the STP map and functions of STP to the Ashram authorities

Ashram authorities with KIUWMIP team during consultation

Location of Ashram just outside the STP

Appendix 11: Monitoring and Reporting Formats

1. SAMPLE MONTHLY REPORTING FORMAT FOR CONSTRUCTION SUPERVISION SPECIALIST This template must be included as an appendix in the EIA / IEE that will be prepared for the project. It can be adapted to specific project as necessary.

a. Introduction
   - Overall project description and objectives
   - Description of sub Projects
   - Environmental Category of the sub projects.
   - Details of site personnel and / or consultants responsible for environmental monitoring Overall project and sub project progress and status.

No.	Sub Project Name	Status of the Sub Project			List of works	Progress of works
		Pre-Construction	Construction	Operational Phase		

b. Compliance Status with National / State / Local Statutory Environmental Requirements

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

c. Compliance Status with Environmental Loan Covenants

No (List schedule and Paragraph Number of Loan Agreement)	Covenant	Status of Compliance	Action Required

d. Compliance Status with the Environmental Management and Monitoring Plan
   - Provide the monitoring results as per the parameters outlined in the EMP. Append supporting documents where applicable, including Environmental Site Inspection Reports.
   - 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 the routine site inspection needs to note and record the following
   - What are the dust suppression techniques followed for site and if any dust was noted to escape the site boundaries.
   - If muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads
   - Adequacy of type of erosion and sediment control measures installed on site, condition of erosion and sediment control measures including if these were intact following heavy rain.
   - Are their designated areas for concrete works and refuelling
   - Are their spill kits on site and if there are site procedure for handing 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

Approach and methodology for environmental monitoring of the project

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

Monitoring of environmental IMPACTS on PROJECT SURROUNDINGS (ambient air, water quality and noise levels)

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

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

Air Quality Results

Site	Date of Testing	Site Location	Parameters (Government Standards)		
			PM10 µg/m3	SO2 µg/m3	NO2 µg/m3

Site	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM10 µg/m3	SO2 µg/m3	NO2 µg/m3

Noise Quality Results

Site No.	Date of Testing	Site Location	LAeq (dbA) (Government Standard)	
			Day Time	Night Time
Site No.	Date of Testing	Site Location	LAeq (dbA) (Monitoring Results)	
			Day Time	Night Time

SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

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

APPENDIXES

- Photos
- Summary of consultations
- Copies of environmental clearances and permits
- Sample of environmental site inspection report
- Other

SAMPLE ENVIRONMENTAL SITE INSPECTION REPORT

Project Name

Contract Number

NAME: _____ DATE: _____

TITLE: _____ DMA: _____

LOCATION: _____ GROUP: _____

WEATHER CONDITION:

_____

INITIAL SITE CONDITION: _____

CONCLUDING SITE CONDITION:

Satisfactory _____ Unsatisfactory _____ Incident _____Resolved _____ Unresolved _____

INCIDENT:

Nature of Incident:

_____

Intervention Steps:

_____

Incident Issues

Project Activity Stage	Survey	
	Design	
	Implementation	
	Pre-Commissioning	
	Guarantee Period	

Inspection

Emissions	Waste Minimization
Air Quality	Reuse and Recycling
Noise pollution	Dust and Litter Control
Hazardous Substances	Trees and Vegetation

Site Restored to Original Condition Yes

Signature

Sign off

Name
Position

Name
Position

SAMPLE CHECKLIST FOR CONSTRUCTION SAFETY

Sl. No.	Safety Issues	Yes	No	Non-Compliance	Corrective Action	Penalty	Remarks
1	Appointment of qualified construction safety officers						
2	Approval for construction safety management plan by the SC						
3	Approval for traffic management/control plan in accordance with IRC: SP: 55-2001						
4	Maintenance of the existing road stretches handed over to the contractor.						
5	Provision of temporary traffic barriers/barricades/cauti on tapes in construction zones						
6	Provision of traffic signboards						

7	Provision for flags and warning lights						
9	Providing plastic crash barrier						
10	Provision of adequate staging, form work, and access (ladders with handrail) for works at a height of more than 3 m						
11	Provision of adequate shoring/ bracing/ barricading/lighting for all deep excavations of more than 3 m depth.						
12	Demarcations (fencing, guarding, and watching) at construction sites						
13	Provision for sufficient lighting, especially for nighttime work						
14	Arrangements for controlled access and entry to construction zones						
15	Safety arrangements for road users/ pedestrians						
16	Arrangements for detouring traffic to alternate facilities						
17	Regular inspection of work zone traffic control devices by authorized contractor personnel						
18	Construction workers' safety - Provision of personnel protective equipment						
19	A. Helmets						
	B. Safety shoes						
	C. Dust masks						

	D. Hand gloves						
	E. Safety belts						
	F. Reflective jackets						
	G. Earplugs for labor						
20	Workers employed on bituminous works, stone crushers, concrete batching plants, etc. provided with protective goggles, gloves, gumboots, etc.						
21	Workers engaged in welding work shall be provided with welder protective shields						
22	All vehicles are provided with reverse horns.						
23	All scaffolds, ladders, and other safety devices shall be maintained in safe and sound condition.						
24	Regular health check up for labor/ contractor's personnel						
25	Ensuring sanitary conditions and all waste disposal procedures and methods in the camps.						
26	The contractor shall provide adequate circuit for traffic flow around construction areas, control speed of construction vehicles through road safety and training of drivers, provide adequate signage, barriers, and flag persons for traffic control						
27	Provision of insurance coverage for the contractor's personnel						

Contractor Consultant