Draft Initial Environmental Examination

September 2013

IND: North Karnataka Urban Sector Investment Program Tranche 4 – 24x7 Water Supply in Haveri CMC

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

CURRENCY EQUIVALENTS
(as of 01 September 2013)

Currency unit	**–**	**rupee (INR)**
INR1.00	=	$.015
$1.00	=	INR 66.314

Abbreviations

ADB	-	Asian Development Bank
CC	-	cement concrete
CFE	-	consent for establishment
CFO	-	consent for operation
CMC	-	city municipal council
CPCB	-	Central Pollution Control Board
CSS	-	consultant supervision specialist
DSC	-	design and supervision consultants
EA	-	executing agency
EIA	-	environmental impact assessment
EMP	-	environmental management plan
ES	-	environment specialist
GRC	-	grievance redress committee
GRM	-	grievance redress mechanism
HDPE	-	high density polyethylene
IA	-	implementing agency
IEE	-	initial environmental examination
km	-	kilometers
KSPCB	-	Karnataka State Pollution Control Board
KUIDFC	-	Karnataka Urban Infrastructure Development and Finance Corporation
lpcd	-	liter per capita per day
m	-	meters
MFF	-	multi-tranche financing facility
MLD	-	million liters per day
mm	-	millimeters
MoEF	-	Ministry of Environment and Forest
NGO	-	non-government organization
NKUSIP	-	North Karnataka Urban Sector Improvement Program
PIU	-	project implementation unit
PMU	-	project management unit
PVC	-	polyvinyl chloride
RCC	-	reinforced cement concrete
ROW	-	right of way
SEIAA	-	State Environmental Impact Assessment Authority
SPS	-	Safeguard Policy Statement
STP	-	sewage treatment plant
ULB	-	urban local body
WTP	-	water treatment plant

NOTES

In this report, "$" refers to US dollars.
and —INR‖ refers to Indian rupees

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EXECUTIVE SUMMARY

1. The North Karnataka Urban Sector Investment Program (NKUSIP) aims to improve the level, quality and sustainability of basic urban services in selected urban local bodies (ULBs), contributing to improved quality of life among the urban poor. NKUSIP will be implemented over a period of eight year beginning in 2008, and will be funded by a loan via the Multi-tranche Financing Facility (MFF) of the Asian Development Bank (ADB).

2. Haveri 24x7 water supply project is one of the projects proposed in Tranche-4. Water supply is currently intermittent, unreliable and suffers with huge losses and quality issues. 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 components proposed under Tranche 1 which includes water supply components.

3. **Categorization.** Haveri 24x7 water supply project 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 project.

4. **Project Scope.** The project is formulated under this investment program to address gaps in water infrastructure in a holistic and integrated manner. The main objective of the Investment Program is to improve water efficiency, security and have an important effect on public health. Investments under this project include (i) bulk water supply improvement works; (ii) rehabilitation of distribution network; and (iii) provision of house service connections. There are no new alignments proposed under this scheme.

5. **Implementation Arrangements.** Karnataka Urban Infrastructure Development & Finance Corporation (KUIDFC) is the Executing Agency (EA) responsible for overall technical supervision and execution of all projects funded under the investment program. Implementation activities will be overseen by a separate Program Management Unit (PMU). The investment program is divided into four packages, for ease of operation and monitoring. The PMU is headed by an executive program director based in Dharwad and have four deputy program directors, one for each package. A team of senior technical, administrative and financial officials, including a state-level environmental specialist and a regional-level environmental specialist, will assist the PMU in managing and monitoring program implementation activities. Consultant teams are responsible for project planning and management and assuring technical quality of design and construction; and designing the infrastructure and supervising construction; and safeguards preparation.

6. **Description of the Environment.** Project components are located in Haveri urban area or in its immediate surroundings which were converted into urban use for many years ago, and there is no natural habitat left at these sites. The project sites are located in existing right of ways (RoWs) and government-owned land. There are no protected areas, wetlands, mangroves, or estuaries in or near the project location. There are no forest areas within or near Haveri. Soils are deep, and do not require cutting of rocks for pipe laying.

7. **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 will be included in civil work bidding and contract documents.

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

9. Potential impacts were identified in relation to location, design, construction and operation of the improved infrastructure. During the construction phase, impacts mainly arise from the need to dispose of moderate quantities of waste soil and disturbance of residents, businesses, and traffic. Mitigation measures have been developed in generic way to reduce all negative impacts to acceptable levels.

10. During the construction phase, impacts mainly arise from the need to dispose of moderate quantities of waste soil; and from the disturbance of residents, businesses, and traffic. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation. 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. Traffic management will be necessary during pipe-laying on busy roads. In the operational phase, all facilities and infrastructure will operate with routine maintenance, which should not affect the environment. Facilities will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only.

11. 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.

12. 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 project. The IEE will be made available at public locations in the city and will be disclosed to a wider audience 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.

13. The citizens of the Haveri town will be the major beneficiaries of this project. With the improved water supply, they will be provided with a constant supply of better quality water, piped into their homes. In addition to improved environmental conditions, the project will improve the over-all health condition of the town. People would spend less on healthcare and lose fewer working days due to illness, so their economic status should also improve, as well as their overall health.

14. The most noticeable net environmental benefits to the population of the towns will be positive and large as a result of improved water efficiency and security through expansion and rehabilitation of water supply infrastructure.

15. **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.

16. **Monitoring and Reporting.** The PMU and construction supervision 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.

17. **Conclusions and Recommendations.** Therefore the proposed project 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 project as Category “B” is confirmed. No further special study or detailed environmental impact assessment (EIA) needs to be undertaken to comply with ADB SPS (2009) or GoI EIA Notification (2006).

I. INTRODUCTION

A. Background

1. Project background and context. NKUSIP was conceived, following the recommendations of the High Power Committee on Regional Imbalances, in a bid to boost economic growth in a region that has traditionally lagged behind. Twenty five towns were selected for assistance based on the following criteria: (i) district Headquarters of newly created districts, (ii) towns having more than 50,000 population, (iii) towns with tourism importance. NKUSIP eligible subsectors include water supply, sewerage, drainage, slum improvement, non-municipal infrastructure (tourism, lake development), urban road resurfacing and junction improvements and institutional development. The impact of the MFF is improved urban infrastructure and services resulting in overall improvement of quality of life in program ULBs, related increase in economic opportunities and growth in north Karnataka, and reduced imbalances between north Karnataka and the rest of the state. To date, projects have been approved for water supply services in 15 ULBs, sewerage and drainage projects in 19 ULBs, slum improvements in 15 ULBs, fire services in 23 ULBs, and tourism in 4 ULBs. NKUSIP emphasized the importance of conducting comprehensive institutional reforms and pursuing private sector participation in service delivery.

B. Background of IEE

2. Haveri 24x7 water supply project is one of the projects proposed in Tranche 4. Water supply is currently intermittent, unreliable and suffers with huge losses and quality issues. ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguards Policy Statement (2009). 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 project.

C. Environmental Regulatory Compliance

3. Table 1 presents a summary of environmental regulations and mandatory requirements applicable to Haveri 24x7 water supply 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 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. Category A projects require Environmental Clearance from the Ministry of Environment and Forest (MoEF). Category B	Sub project is not a listed activity in Schedule I of this notification and hence environmental clearance is not required.

Law	Description	Requirement
	projects require Environmental Clearance from the State Environmental Impact Assessment Authority (SEIAA).	
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.	None of the sub-components of the project require CFE and CFO under this Act.
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 notified standards notified.	**Appendix 1** provides applicable standards for ambient air quality.
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 2** provides applicable noise standards.
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).	There are no protected properties near project area in Haveri. However, in case of chance finds, the contractors will be required to follow a protocol as defined in the Environmental Management Plan (EMP).

Law	Description	Requirement
	Protected property includes the site, remains, and monuments protected by ASI or the State Department of Archaeology.	
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.	For the project, there will be no land acquisition or temporary resettlement and hence, Resettlement Plan is not required.
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 3** provides applicable labor 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 Haveri 24x7 water supply project
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 Haveri 24x7 water supply project
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 Haveri 24x7 water supply project (no wildlife sanctuary).
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	Not applicable to Haveri 24x7 water supply project (no forest land).

Law	Description	Requirement
	and Forests (MoEF), Govt. of India	
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 Haveri 24x7 water supply project (no forest land).
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.	Not applicable to Haveri 24x7 water supply project (no tree-cutting required).

4. 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.

5. The environmental impacts of Haveri 24x7 water supply project have been identified and assessed as part of the planning and design process. An environmental assessment using ADB's Rapid Environmental Assessment Checklist for Water Supply was conducted, and results of the assessment show that the project is unlikely to cause significant adverse impacts. Thus, this IEE has been prepared in accordance with ADB SPS's requirements for environment category B projects.

D. Scope of IEE

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

E. Report Structure

7. This Report contains eight (8) sections including this introductory section: (i) introduction; (ii) description of Investment 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 PROJECT COMPONENTS

8. Haveri is located at the central part of Karnataka is one among the 25 cities of the state of Karnataka where urban sector investment program has been proposed. The location map of the investment program for Haveri is presented in Map 1.

A. Need for Infrastructure Improvement in Haveri

9. Population in the city is growing as the city develops as an important destination for educational and commercial needs. A study conducted by Department of Forests, Ecology & Environment, Government of Karnataka, 2003 has shown that the cities in the state of Karnataka has poor environmental performance due to lagging in ensuring basic infrastructure facilities to the urban population. In addition to the associated environmental pollution, importantly, due to lack of safe and adequate water supply facilities, the risk of infectious diseases through exposure to unhealthy environment runs high, particularly in the case of urban poor. The State of Environment Report (SOER), 2003, Karnataka, brings out the fact that the lack of safe water supply system leads to the health related consequences among urban poor in the area.

10. The following are the important observations of the report (i) “Loss of access to the safe drinking water is a matter of great concern. It is estimated that 75-80% of water pollution by volume is caused by domestic sewage. The remaining is industrial waste water which could be more toxic. Due to improper drainage and lack of disposal facilities, industries and local bodies use large areas of land for disposal of wastewater; (ii) “Adverse health effects are associated with ingestion of contaminated water, lack of access to sanitation, contact with unsafe water and improper management of water resources and agriculture. Infectious diarrhea makes the single largest contribution to the burden of disease associated with unsafe water, sanitation and hygiene. Besides the water borne diseases like cholera, jaundice, other gastrointestinal tract infections are quite significant amongst the population”; and (iii) “These diseases occur in different parts of the state, mostly during summer when there is scarcity of drinking water and source water gets contaminated. The data maintained by Health and Family Welfare Department (2003) indicates that number of attacks for gastroenteritis, viral hepatitis and typhoid are increasing. The yearly occurrence of water borne diseases like cholera and gastroenteritis makes it very clear that environmental impact of water on health is very profound and significant.”

B. Existing Scenario of Water Supply Facilities in Haveri CMC

11. The first organized water supply system for Haveri town was developed in 1960 with Varada River, an ephemeral river, as source. The system is of 4.54 MLD capacity and associated with a conventional water treatment plant located at 5.185 km at Karadigodda. Treated water is taken to a GLSR of capacity 1 ML located at Soolamatti and further distributed. This system is presently not in operation. In 2003, another water supply scheme was developed with River Tungabhadra, located at around 32 km from Haveri, as source. From the intake point water is pumped to a newly constructed WTP of capacity 9.09 MLD located in the Municipal boundary limit near to Old DC office and further distributed through 6 service reservoirs. In addition to these surface sources, the CMC accommodates reportedly around 300 bore wells and open wells utilized for water supply drawing around 1.3 MLD

12. Even though the quality of water meets the drinking water standards, the quantity is highly inadequate – 2 hour supply once in a week. The supply is more erratic during summer season as both the sources are not from perennial rivers and hence the total water supply reduces considerably. Again, due to the high water losses in the system, the supply at consumer end is considerably low. In normal seasons, supply is once every alternate day, for duration of about one hour, which in summers is curtailed to even once in a week.

13. The water distribution network in Haveri covers more than 60 percent of the total population of the total 10,060 households around 6,038 are connected with individual water service connections and there are about 1,500 public stand posts.

14. The socio-economic survey conducted in the non-slum households indicate high dependence on water service connections (WSC) with 74 percent households being served by WSC, of which 29 percent have alternate access to open/bore wells. Twenty five percent of slum households in Haveri are served by water service connections (WSC). The following table shows the access of water supply. The following table shows the access of water supply to the surveyed households.

Table 2: Access to Basic Services – Water Supply

Sl. No	Description	Access to Non-slum Households (%)	Access to Slum Households (%)
1	WSC	45	-
2	Stand post	15	-
3	Open well/Bore well	11	75
4	WSC + Open well/Bore well	29	25

Source: Socio-economic Survey, 2004.

15. Considering the existing and future water supply issues it may be concluded that the system needs to be strengthened and expanded. The water losses, which are considerable at present (25 percent), need to be tackled. It is also necessary to develop an all-weather reliable water source for the town.

C. Water Supply System Improvements under Implementation in Haveri CMC

16. The proposed water supply system rehabilitation in Haveri aims at providing safe, adequate and reliable water supply to the inhabitants. The objectives of system improvement are:

a. Improving the longevity of the individual components and the system.
b. Improving the operational performance of the components and the system.
c. Reducing the loss of the water and increasing the utilizable output of the system.

17. The Haveri Municipal area is divided in to four zones based on the distribution pattern. Zone 1 comprises areas such as Vidyanagar West, Shivaji Nagar, Viabhava Laxmi Nagar, Bharathi Nagar and Aswini Nagar and is catered by the 1.0 ML ELSR at Aswini Nagar. Total length of network in this zone is 12.119 km. Zone 2 comprises areas such as Indira Nagar, Manjunath Nagar, Netaji Nagar, Basaveswara Nagar, Vidyanagar East and Rajendra Nagar and is catered by the twin tanks near Municipal High School (old ELSR 0.5 ML, New ELSR 1.0 ML). There is small 50000 litres capacity ELSR at Netaji Nagar floating on the distribution system in this zone. Total length of network in this zone is 24.19 km. Zone 3 comprises areas such as Vijay Nagar, Nagendra Matti, Udaya Nagar, Melina Pet Siddadevapura Kondwad Oni, Desai Oni, Shivling Nagar and Market area and is catered by the 1.0 ML old GLSR at Soolamatti.

Total length of network in this zone is 26.88 km. Zone 4 is a small zone comprises areas such as Desai Oni, Googi katti, JP Circle and Daneswar Nagar and is catered by the 0.5 ML ELSR near J.P Circle. Total length of network in this zone is 3.03 km.

18. From the analysis of the existing system it was observed that the immediate requirement in this sector is developing a surface water storage which can store water for the lean periods of 90 days. Further it was found that the distribution mains and sub mains are not of the required sizes which require augmentation and the distribution network requires further extension inside the city limit.

19. In order to ensure the regular water supply during lean months, the alternative options studied were: (i) construction of a barrage across Thungabhadra Near Guttal; and (ii) identifying an impounding reservoir which can store water for summer requirements. Out of the above options, it was observed that construction of a barrage across Thungabhadra is not feasible since the width of the river is too long and the plain topography at the intake will necessitate substantial inundation. Further this proposal will have impact on the existing inter state Krishna River water dispute and further the allocated fund is not sufficient to construct a new reservoir at this location. It was observed that Heggere Kere - a lake of capacity 1400 ML located at 1.5 km away from the heart of the city located near to the new WTP can be converted to an impounding reservoir. It is proposed to pump the surplus water from river Varada for 240 days in a year and utilize the stored water after treatment through new WTP of the adequate capacity during lean months. This proposal was found to be the most feasible option which requires laying of pipeline from river Varada to Heggere Kere and further from lake to new WTP along with necessary pumping arrangements.

20. From the analysis of existing distribution network using Water GEMS V8 XM Edition hydraulic modelling software it was observed that in zone 4 the distributions system is having its capacity to meet the ultimate year demand. Zone 1, Zone 2 and Zone 3 have inadequately sized transmission system and in order to improve the distribution system it was proposed to do rehabilitation in Zone 1, 2 and 3 to meet the requirements of year 2041 for 6.5 km and extending network to un covered areas by laying 12.54 km of distribution network within the city limit. Other proposals include feeding OSHR at Netaji Nagar with dedicated feeder of 10".

21. Further to cater the future demand, in 2026, the town has to plan for an additional 3.5 MLD scheme using its own budgetary funds existing by augmenting the pumping and treatment capacity. The total network length also needs to be increased. This way the ultimate year requirement can be met. On-going works covered in Tranche 1 is presented in the following table.

Table 3: Water Supply Sub-components proposed under Tranche 1 of NKUSIP

No.	Component
(i)	Extension of Distribution network for a length of 12.54 km
(ii)	Rehabilitation of existing distribution system for a length of 6.5 km
(iii)	Laying 300 / 400 DI pumping main for pumping surplus water from River Varada to lake and further transfer of stored water to WTP and installing pump sets of 50 HP / VT (3 nos) at Heggere Lake along with providing flow meters.

22. The above work was awarded to M/s Sai Sudhir Infrastructure Limited, Hyderabad on 19/12/2009 for a amount of Rs. 990.73 Lakhs and the schedule of completion was 18.06.2011. Almost 95% of the work has been completed till date.

D. Proposed 24 X 7 Water Supply System

23. The following table presents the proposed works in Haveri to ensure 24x7 water supply.

Table 4: Proposed 24x7 Water Supply Project Components in Haveri

	Component	Description and Location
A.	**Bulk water supply Improvement to Tungabhadra River Source**	
1.	Electrical works at headworks	Existing facility on government land. Works will be limited within the compound. No land acquisition required. Space is available and sufficient for civil works.
2.	1.5 ML Overhead Tank (OHT)	Construction of OHT adjacent to existing 1 ML reservoir at government land in Soolamatti. Works will be limited within the compound. Excavation will be confined to __m x __m. No land acquisition required. Space is available and sufficient for civil works.
3.	Repair to existing MS Transmission Main	Works will be limited along existing pipeline. Trenching will require maximum of ___ m width. No land acquisition required. Right of way (ROW) is available and sufficient for civil works.
4.	Installation of bulk flow meters	Works will be limited along existing pipeline. No land acquisition required. ROW is available and sufficient for civil works.
5.	Electromechanical works at water treatment plant	Works will be limited within the compound. No land acquisition required. Space is available and sufficient for civil works.
6.	Rehabilitation of Karaji pumping station	Works will be limited within the compound. Excavation will be confined to __m x __m. No land acquisition required. Space is available and sufficient for civil works.
7.	Provision of air valves along pumping main	Works will be limited along existing pipeline. No land acquisition required. ROW is available and sufficient for civil works.
B.	**Rehabilitation of Distribution Networks**	
1.	Replacement of existing distribution network	Total length of 24.55 kilometers with HDPE pipes with the following diameter: 63 millimeters (mm), 90mm, 110mm, 160 mm, and 200mm. Trenching will require maximum of 0.9m width. Works will be limited along existing pipeline. No land acquisition required. ROW is available and sufficient for civil works and has no encroachment.
2.	Provision of isolation valves and pressure relief valve	Works will be limited along pipeline to be laid. No land acquisition required. ROW is available and sufficient for civil works and has no encroachment.
3.	Provision of electromagnetic valves	Works will be limited along pipeline to be laid. No land acquisition required. ROW is available and sufficient for civil works and has no encroachment.
4.	Software cost	No civil works involved.
5.	Road restoration	All roads disturbed and/or damaged by civil works will be restored to original condition.

	Component	Description and Location
		Works will be limited along pipeline to be laid. No land acquisition required. ROW is available and sufficient for civil works and has no encroachment.
6.	Fixing of baseline parameters	No civil works involved.
C.	Provision of house service connections (total of 5,325)	No land acquisition required. ROW is available and sufficient for civil works and has no encroachment.

24. Excavation for the pipe replacement and pipe laying works will be undertaken through open trenching, which will be maximum width of 0.9 m only on either side of the road ROW with maximum length of 100 m. Excavation, laying of pipes and backfilling will be completed within the day. Subsequent to completion of works, road reinstatement will be undertaken by the contractor as part of the civil works. The same shall be mentioned in the bid document to make it binding on the contractor.

Table 5: Target Outputs and Outcomes for Tranche 4 Subproject (Gadag-Betageri)

Indicator	
Current coverage of water services (%)	64%
Target coverage of water services upon completion of NKUSIP T1-T3 (%)	90%
Current 24 x 7 Coverage (%)	0%
Target 24 x 7 Coverage (%)	90%
Current Population (2011)	172,612
Population in 2026	241,125
24 x 7 benefiting population upon T4 completion	172,000
Current average supply (hours per week)	2
Target average supply upon completion of NKUSIP T1-T3 (hours per week)	56
Target average supply upon completion of NKUSIP T4 (hours per week)	168
Current household (HH) connections	28,619
Additional HH connections after completion of the NKUSIP T4	11,618
Current number of HH meters	0
Additional HH meters under NKUSIP T4	41,618
Current number of bulk meters (provided under NKUSIP T1-T3)	6
Additional bulk water meters under NKUSIP T4	16
Current storage capacity (ML)	9
Rehabilitated storage capacity (ML)	
Additional storage capacity (ML)	1.12
Current length of piped network (km)	179
Additional water supply distribution length(km)	0
Length of rehabilitated pipes (km)	87

E. Investment Program Implementation Schedule

25. Haveri 24x7 water supply project town will be implemented over a period of 18 months.

III. DESCRIPTION OF THE ENVIRONMENT

26. **Physiography**. Haveri is situated in the central part of Karnataka. Geographically, the town is located at 75035'E longitude and 14035'N latitude. The town is developing as an important trade centre in the district. It has good educational facilities. The town extends to an

area of 26.19 sq. km and houses more than 67,0881 population as per Census 2011.

27. The town is situated on a flat terrain, with predominant slope from north to southeast. The ground levels vary from the maximum of 570 m in the north to 555 m in the south. The predominant soils in this town are red and black cotton soil. The major crops grown on these soils are Jowar, Red Chilly and Maize.

28. **Seismology**. As per the seismic zoning map of India, the Haveri town falls under the Zone II, which is the lowest earth quake risk zone in India. This zone is termed as "low damage risk zone".

29. **Climatic Conditions**. The town is characterized with hot summer months and low rainfalls during monsoon. The temperature varies between 420C during summer and 170C during winter. Generally, April and May are the hottest months while December to February is the coldest. The following table shows the mean maximum and minimum temperature recorded in the region. As there was no meteorological observatory present at Haveri, the data presented here is of the observatory located at Gadag, around 50 km north of Haveri. This data is considered as representative data as both the towns are located in the same physiographical zone and also they are closely located.

Table 6: Mean Maximum and Mean Minimum Temperature (in O C)

Month	Long term normal (30 Years) – Mean				2004 (Actual) –Mean	
	Daily Max	Daily Min	Highest in a month	Lowest in a month	Max daily	Min Daily
Jan	30.2	16.6	32.5	13.9	31.0	16.1
Feb	33	18.7	35.6	15.2	33.0	18.3
Mar	36.1	21.1	38.1	17.9	37.2	21.4
April	37.3	22.5	39.4	19.9	37.8	22.3
May	36.1	22.3	39.6	19.7	34.0	22.4
June	31.0	21.6	35.8	20.0	30.0	21.3
July	28.4	21.1	31.6	20.0	29.6	20.8
Aug	28.6	20.8	31.8	19.7	28.5	20.4
Sep	29.8	20.5	33.3	18.8	29.4	20.5
Oct	30.6	20.5	33.4	18.3	30.6	19.9
Nov	29.8	18.4	32.0	15.0	30.4	18.3
Dec	29.1	16.4	31.4	13.6	29.8	14.6

Source: Meteorological Centre, Bangalore

30. The town experiences southwest monsoon from June to September and the period between the months of October and November can be termed as post monsoon months. The town experiences scanty rainfall and the long term annual average rainfall is 696 mm. The rainfall is confined and about 60 percent of the annual rainfall is received during the months of June to September. The maximum rainfall is registered during the month of August. The morning relative humidity (RH) varies from 51 to 87 percent while evening RH varies from16 to 67 percent; and the RH is generally higher during the southwest monsoon.

31. The region is continuously experiencing below normal rainfall from the last few years. The actual rainfall recorded in the year 2002 was 490 mm as against the normal rainfall of 696 mm marking a departure of -30 percent while in 2004 the actual rainfall was 511 mm marking a

[1] Provisional figures downloaded from http://www.havericity.gov.in/ on 17th May, 2013.

departure from normal of -26 percent. The region experiences moderate winds. The wind blows predominantly from west during May to September while during November and December predominant wind direction is from east. Most of the winds occur in the range of 12 – 19 kmph, however during the period of June to August winds of more than 19 kmph also occur. The following table shows the climatological details of Haveri City.

Table 7: Climatological Characteristics of Haveri

Month	Long Term Avg. (30 Years) – Mean				2004 – Actual			
	RH Max	RH Min	Wind Speed	Total Rainfall	Mean RH 0830 Hrs	Mean RH 1730 Hrs	Wind speed	Total Rainfall
	%	%	Kmph	Mm	%	%	kmph	mm
Jan	68	41	7.1	2.6	71	36	8.7	0.0
Feb	61	35	7.1	1.1	51	25	9.3	0.0
Mar	62	32	7.7	5.3	55	16	10.1	Trace
April	70	37	9.6	43.4	65	25	10.2	17.6
May	78	45	13.4	85.8	75	51	14.2	105.4
June	84	66	18.1	83.9	83	63	16.5	59.8
July	88	75	18.8	72.4	87	67	14.0	72.8
Aug	88	73	17.2	81.5	87	67	15.4	52.4
Sep	87	69	12.8	134.3	86	65	9.2	166.2
Oct	82	60	7.6	130.1	80	51	10.3	37.1
Nov	73	51	6.9	34.5	67	38	11.9	Trace
Dec	72	48	7.3	7.7	62	29	9.6	0.0
Total/ annual mean	76	53	11.1	695.6	72	44	11.6	511.3

Source: Meteorological Centre, Bangalore

32. **Surface Water.** Heggere Kere (lake) located in the southern side of the town is an important surface water body. It is said that the lake was once the main source of water for the town. Dodda Halla (a stream) is the major natural stream flowing along the southern and southeastern boundary of the town. This stream carries overflows of Haggere kere and also carries runoff from surrounding areas.

33. The Dodda Halla runs dry for almost complete year except during for a short duration of monsoon. The stream at present carries wastewater from the Haveri town; this water is mainly used for irrigation purpose. Almost entire area in the town drains into the stream. This stream joins River Varada in the northeastern side of the town at about 12 km from the town. Given the low flow, extraction for the irrigation and also the dry weather condition of the town, the wastewater never meets the river.

34. **Groundwater.** Sizable population in Haveri depends on groundwater for the daily water needs. However, the main source of water supply for the town is from the Rivers, Varada and Tungabhadra, flowing considerably far from the town. In other areas of the town, the population is dependent on groundwater sources. The groundwater table is the area is deep fluctuating between 30 m and 50 m below from ground level.

Table 8: Groundwater Levels in Haveri (2002 – 2004)

Month	Depth of Water Table (in m)		
	2002	2003	2004
January	36.91	-	36.45
February	29.25	-	37.25
March	44.25	-	39.25
April	-	-	41.75
May	-	-	39.5
June	-	-	34.25
July	-	-	33.85
August	-	-	30.05
September	-	-	29.35
October	41.25	34.65	27.8
November	51.25	34	14.95
December	52.25	35.05	15.05

Source: Department of Mines & Geology

35. The following table shows the groundwater characteristics in the area. Some of the monitored parameters such as TDS, chlorine exceed desirable limits specified under Indian Standard (IS) 10500, but are under permissible limits. As presented in **Table 10**, the quality of water has improved from monsoon to post monsoon season. This is primarily because of high extractions during summer when the water table is lowered considerably resulting into decline of water quality (refer **Error! Reference source not found.** above). Again, due to recharge of groundwater aquifers during monsoon, the water table and ground water quality has improved considerably. It may be noted that during this period the water table fluctuation was recorded as high as 19 m. It may be mentioned, therefore, that unsustainable levels of groundwater extractions are leading to decline in the water quality.

Table 9: Groundwater Quality – Haveri (2003)

Parameter	July 2003 (monsoon)	November 2003 (Post monsoon)
pH	8.39	8.39
Total Hardness	480	332
TDS	965	731
CO3	10	19
HCO3	78	191
Cl	389	232
SO4	114.6	111
NO3	72	11
Ca	96	64
Mg	60	43
Na	140	133
K	25	11
F	0	0.75
Fe	0.09	0.04

Source: Department of Geology and Mines; * all units are mg/l except pH.

36. **Air Quality.** As there are no major air pollution sources, the air quality of the town, in general, is within acceptable limits. Currently, no air quality monitoring stations are in operation within CMC limit.

37. **Flora and Fauna.** There are no forest areas within Haveri CMC and there are no sensitive environmental features such as national parks, wetlands, and biosphere reserves.

38. Ranebennur Taluka of Haveri district is notable for occurrence of good herds of Blackbucks. Wolves are also found but rare. Ranebennur Blackbuck sanctuary covers an area of about 119 sq. km. The natural vegetation in the sanctuary has been largely replaced by Eucalyptus plantations. Blackbuck (Antilope cervicapra), wolf (Canis lupus), jackal (C. aureus), porcupine and Indian hare (Lepus nigricollis) are the wild fauna species found here. Haveri district houses peacock sanctuary at Bankapura situated at 22 km away from Haveri Town spreading to 139 acres is the one among the two peacock sanctuaries in India. Both sanctuaries are located far away from Haveri town and there is no interference of the proposed Investment Program components. No endangered/protected species of either flora or fauna are found in the town and their surroundings.

39. **Demography.** Haveri has witnessed a gradual increase in the urban population. The population had increased from 45,295 in 1991 to 55,900 in 2001 indicating a decadal growth rate of 23.41 percent. Extending to a total area of 26.19 sq. km inhabiting 55,900 population, the gross density of the town is 2,134 persons per sq. km. The central part of the town is thickly populated where 3 wards are having population density more than 6000.

40. **Sex Ratio.** The sex ratio (2001) in Haveri was 956, which is higher than the district and the state urban average of 945 and 940 respectively. The town has higher and literacy rate in comparison with the district and as well the state of Karnataka. The respective figure in 2001, for Haveri was 80% and that of district and State urban was 75% and 71.4 %.

41. **Economic Base.** Due to its connectivity and vast agricultural hinterland, the town of Haveri is becoming an important trading centre for agricultural based products in the district. Haveri has Agriculture Producers Market Committee (APMC) yard that caters to the surrounding towns and villages, and mainly deals with cottonseeds, groundnut, cardamom and other products. Haveri is administrative centre of the region. Haveri is also an important religious centre and houses number of mutts.

42. **Poverty.** Slum households constitute 11 percent of the total households in the town. Slums occupy 39.8 Ha of area, which is around 1.5 percent of the total CMC area.

43. **Cultural and Historic Places.** The town of Haveri is a historic place in the region. Siddeswara temple, situated in the town is an ancient and famous monument and an important place of worship. Here, one can witness the art of Dravida and Chalukya styles on the walls and columns of the temple. This temple is a protected monument by Archeological Survey of India (ASI), but doesnot fall in zone, where 24 x 7 water supply scheme is proposed.

44. In addition, many important places like Kagindi, Kanakapheeta, Adikeshava Temples are situated in the town. In the recent times the Haveri has become an important religious place in the region. The town is famous for Mutts; few famous mutts of Karnataka State, namely, Hukkeri Mutt, Hosakeri Mutt, Muragham Mutt, Sindhagi Mutt, and Raghavendra Swami Mutt are situated here.

45. **Environmental Settings of Subproject Sites.** There are no significant environmental sensitive features along the proposed area. The minimum road width in the entire project area is 3 meters and total closure of road is not anticipated during construction works.

IV. SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Introduction

46. Potential environmental impacts of the proposed infrastructure components are presented in this section. Mitigation measures to minimize/mitigate negative impacts, if any, are recommended along with the agency responsible for implementation. Monitoring actions to be conducted during the implementation phase is also recommended to reduce the impact.

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

a. **Location impacts** include impacts associated with site selection and include loss of on-site biophysical array and encroachment either directly or indirectly on adjacent environments. It also includes impacts on people who will lose their livelihood or any other structures by the development of that site.
b. **Design impacts** include impacts arising from Investment Program design, including technology used, scale of operation/throughput, waste production, discharge specifications, pollution sources and ancillary services.
c. **Construction impacts** include impacts caused by site clearing, earthworks, machinery, vehicles and workers. Construction site impacts include erosion, dust, noise, traffic congestion and waste production.
d. **O&M impacts** include impacts arising from the operation and maintenance activities of the infrastructure facility. These include routine management of operational waste streams, and occupational health and safety issues.

48. 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).

49. In the proposed water supply scheme replacing of existing PVC distribution system by HDPE pipe for a length of 24.55 Km and restoration of road. The proposed pipeline is not passing through any environmentally sensitive areas.

50. This section of the IEE reviews possible project-related impacts, in order to identify issues requiring further attention and screen out issues of no relevance. ADB SPS (2009) require that impacts and risks will be analyzed during pre-construction, construction, and operational stages in the context of the project's area of influence.

51. The ADB Rapid Environmental Assessment Checklist (General) in http://www.adb.org/documents/guidelines/environmental_assessment/eaguidelines002.asp was used to screen the project for environmental impacts and to determine the scope of the IEE investigation.

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

The project will be in properties held by the local government and access to the project location is thru public rights-of-way and existing roads hence, land acquisition and encroachment on private property will not occur.

B. Pre-Construction Impacts

53. **Design of the Proposed Components**. The Central Public Health and Environmental Engineering Organization (CPHEEO) manual suggests a design period of 15/30 years[2] in general while designing the system for water supply components. Since, the packages are proposed to be implemented sequentially; theoretically, each of the system components should have a different design year.

54. However, in order to maintain unanimity in the design period and design population, it is proposed to consider 2041 as the design year for all the system components. Accordingly, 2011 shall be the base year and 2026 the intermediate year to cross check the designs pertaining to intermediate demand. The rate of supply has been taken as 135 lpcd for 100% population.

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

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

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

57. **Site selection of construction work camps, stockpile areas, storage areas, and disposal areas**. Priority is to locate these near the project location. However, if it is deemed necessary to locate elsewhere, sites to be considered will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems. Residential areas will not be considered for setting up 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 water bodies, swamps, or in areas which will inconvenience the community.

58. **Site selection of sources of materials**. Extraction of materials can disrupt natural land

[2] As per CPHEEO, pumps, motors, storage reservoirs are to be designed for a life of 15 years.

contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution. To mitigate the potential environmental impacts, locations of quarry site/s and borrow pit/s (for loose material other than stones) would be assessed by CSS. Priority would be sites already permitted by Mining Department. If other sites are necessary, these would be located away from population centers, drinking water intakes and streams, cultivable lands, and natural drainage systems; and in structurally stable areas even if some distance from construction activities. It will be the construction contractor's responsibility to verify the suitability of all material sources and to obtain the approval of CMC. If additional quarries will be required after construction is started, then the construction contractor shall use the mentioned criteria to select new quarry sites, with written approval of CMC.

C. Construction Impacts

59. The civil works for water supply projects include earth work excavation for pipeline trenches, pipelaying, installing valves, flow meters and data loggers, shifting of public utilities and providing house service connections. Earth work excavation will be undertaken by machine and include danger lighting and using sight rails and boning rods at every 100 mts., while pipe laying works will include laying pipes at required gradient, fixing collars, elbows, tees, bends and other fittings including conveying the material to work spot and testing for water tightness.

60. The excavation is done in such a way that there will be a minimum depth of 1 m. above the pipe line. Sufficient care will be taken while laying, so that existing utilities and cables are not damaged and pipes are not thrown into the trenches or dragged, but carefully laid in the trenches. Once they are laid, pipes will be joined as per specification and then tested for any cracks of leakages. The minimum working hours will be 8 hours daily, the total duration of each stage depends on the soil condition and other local features. The excavation of trenches is estimated to generate ___ cubic meters of soil, while the residual soil after pipelaying and refilling is expected to be only ___ cubic meters. This soil shall be used for filling if required or stored/ dumped in approved debris disposal site.

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

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

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

(i) The material sources permitted by government;
(ii) Verify suitability of all material sources and obtain approval of Program Management Unit (PMU); and
(iii) Submit to CSS on a monthly basis documentation of sources of materials.

64. **Air Quality**. Emissions from construction vehicles, equipment, and machinery used for

excavation and construction will induce impacts on the air quality in the construction sites. Anticipated impacts include dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons) but temporary and during construction activities only. To mitigate the impacts, construction contractors will be required to:

(i) Consult with PMU/CSS on the designated areas for stockpiling of, 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) Use tarpaulins to cover sand and other loose material when transported by trucks; and
(iv) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly.

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

(i) Prepare and implement a spoils management plan (**Appendix 4**);
(ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
(iii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with PMU/CSS on designated disposal areas;
(iv) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
(v) Place storage areas for fuels and lubricants away from any drainage leading to water bodies;
(vi) Dispose any wastes generated by construction activities in designated sites; and
(vii) Conduct surface quality inspection according to the Environmental Management Plan (EMP).

66. **Noise Levels**. There are no health facilities, scheduled or unscheduled historical, archaeological, paleontological, or architectural sites near the construction sites. However, construction works will be on settlements, along and near schools, and areas with small-scale businesses. The sensitive receptors are the general population in these areas. Increase in noise level may be caused by excavation equipment, and the transportation of equipment, materials, and people. Impact is negative, short-term, and reversible by mitigation measures. The construction contractor will be required to:

(i) Plan activities in consultation with PMU/CSS so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance;
(ii) Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach;
(iii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and

(iv) Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s.

67. **Landscape and Aesthetics**. The construction works does not envisage any cutting of trees, but it will produce excess excavated earth, excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, and other similar items. These impacts are negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

(i) Prepare and implement spoils management plan;
(ii) Avoid stockpiling of excess excavated soils;
(iii) Coordinate with ULB/CMC for beneficial uses of excess excavated soils or immediately dispose to designated areas;
(iv) Recover used oil and lubricants and reuse or remove from the sites;
(v) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
(vi) Remove all wreckage, rubbish, or temporary structures which are no longer required; and
(vii) Request PMU/CSS to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.

68. **Surface and Groundwater Quality**. Another physical impact that is often associated with excavation is the effect on drainage and the local water table if groundwater and surface water collect in the voids. To ensure that water will not pond in pits and voids near project location, the construction contractor will be required to conduct excavation works on non-monsoon season to the maximum extent possible.

69. **Accessibility**. Hauling of construction materials and operation of equipment on-site can cause traffic problems. Potential impact is negative but short term and reversible by mitigation measures. The construction contractor will be required to:

(i) Prepare and implement a Traffic Management Plan (Appendix 5)
(ii) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
(iii) Schedule transport and hauling activities during non-peak hours;
(iv) Locate entry and exit points in areas where there is low potential for traffic congestion;
(v) Keep the site free from all unnecessary obstructions;
(vi) Drive vehicles in a considerate manner;
(vii) Coordinate with Traffic Police for temporary road diversions and with for provision of traffic aids if transportation activities cannot be avoided during peak hours; and
(viii) Notify affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.

70. Where ever road width is minimal, there will be temporary loss of access during the laying of pipes. Under those circumstances, contractor can adopt following measures:

(i) Inform the affected local population two days in advance about the work schedule

(ii) Plan and execute the work in such a way that the period of disturbance/ loss of access is minimum.
(iii) Provide pedestrian access in all the locations until normalcy is restored.

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

(i) Prepare and implement spoils management plan (**Appendix 4**);
(ii) Leave spaces for access between mounds of soil;
(iii) Provide walkways and metal sheets where required to maintain access across for people and vehicles;
(iv) Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools;
(v) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and
(vi) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.
(vii) Notify community/ water users in advance about likely interruptions in water supply.
(viii) Provide alternate sources of clean water until water supply is restored.

72. **Socio-Economic – Employment**. Manpower will be required during the 18-months construction stage. 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 within the 2-km immediate area if manpower is available; and
(ii) Secure construction materials from local market.

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

(i) Comply with all national, state and local core labor laws (See Appendix 3 of this IEE);
(ii) Develop and implement site-specific occupational health and safety (OH&S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use personal protective equipment; (c) OH&S Training[3] for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;

[3] Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job.

(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 protective protection, and preventing injuring to fellow workers;
(ix) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted;
(x) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
(xi) Ensure moving equipment is outfitted with audible back-up alarms;
(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.

74. **Asbestos Materials.** Sections of distribution network are of asbestos cement (AC), and because of the health risks these will be left in situ and replaced by new pipes. Details will be obtained from the ULB/CMC of the nature and location of all water supply infrastructure, and planning pipeline alignments carefully to avoid any conflict or damage. Given the dangerous nature of this material for both workers and citizens, one additional measure should be taken to protect the health of all parties in the event (however unlikely) that AC pipes are encountered. This is that, prior to start of construction works water supply system, the design consultant in coordination with the ULB/CMC will develop a protocol to be applied in any instance that AC pipes are encountered, to ensure that appropriate action is taken. This should be based on the approach recommended by the United States Environmental Protection Agency (USEPA),[4] and amongst other things, should involve:

(i) Training of all personnel (including manual labourers) to enable them to understand the dangers of AC pipes and to be able to recognise them in situ;
(ii) Reporting procedures to inform management immediately if AC pipes are encountered;
(iii) Development and application of a detailed H&S procedure to protect both workers and citizens. This should comply with national and international standards for dealing with asbestos, and should include: (a) removal of all persons to a safe distance; (b) usage of appropriate breathing apparatus and

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.

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

protective equipment by persons delegated to deal with the AC material; and (c) Procedures for the safe removal and long-term disposal of all asbestos-containing material encountered.

75. **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 at isolated area, hence health and safety risk to community is minimum. Potential impact is negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

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

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

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

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

(i) Strictly follow the protocol for chance finds in any excavation work;
(ii) Request PMU/CSS or any authorized person with archaeological/historical field training to observe excavation;
(iii) Stop work immediately to allow further investigation if any finds are suspected; and

(iv) Inform PMU/CSS if a find is suspected, and take any action they require ensuring its removal or protection in situ.
(v) Adjacent to historic sites, undertake excavation and construction work in such a way that no structural damage is caused to the building.

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

(i) The said site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, top-soil stripping, stacking and preservation should be undertaken prior to initiation of any activities.
(ii) Debris disposal site shall be at least 200 m away from surface water bodies[5].
(iii) No residential areas shall be located within 100 m downwind side of the site.
(iv) The site is minimum 250 m. away from sensitive locations like settlements, ponds/lakes or other water bodies.
(vi) The local governing body and community shall be consulted while selecting the site.

D. Operation and Maintenance Impacts

79. Operation and Maintenance of the water supply system will be carried out by the ULB/CMC. The system have a design life of ___ years, during which shall not require major repairs or refurbishments and should operate with little maintenance beyond routine actions required to keep the equipment in working order. The stability and integrity of the system will be monitored periodically to detect any problems and allow remedial action if required. Any repairs will be small-scale involving manual, temporary, and short-term works involving regular checking and recording of performance for signs of deterioration, servicing and replacement of parts.

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

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

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

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

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

83. The citizens of the Haveri CMC will be the major beneficiaries of the improved water supply, as they will be provided with a constant supply of better quality water, piped into their homes. In addition to improved environmental conditions, the project will improve the over-all health condition of the town as diseases of poor sanitation (such as diarrhoea and dysentery) will be reduced.

V. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Overview

84. A two tier consultation process was adopted for NKUSIP for information disclosure and making all the concerned people involved in the project. Institutional consultations were conducted with the Governmental Departments such as Planning Department, Urban Development Board, Public Works Department, Pollution Control Board, Karnataka Urban Water Supply and Drainage Board, Haveri CMC, etc. After consultations with Haveri CMC, the Commissioner has certified that the proposals for Haveri suit the requirements of the ULB/CMC.

85. Public consultation involved focus group discussions. The people residing along the project activity areas were consulted during topographical surveys and site visits in 25 July 2013 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 water supply network for its best functioning to have the maximum health and aesthetic benefits. Public will respond only if they will informed about the project and why it is required and they may react negatively if they are uninformed. Views expressed were incorporated into the IEE and in the planning and development of the subproject.

Public Consultation at Haveri

Public Consultation at Varada Barrage

B. Future Consultation and Disclosure

86. The public consultation and disclosure program will remain a continuous process throughout the project implementation and shall include the following:

a. Consultation during detailed design

87. Focus-group discussions with affected persons and other stakeholders to hear their views and concerns, so that these can be addressed in project design wherever necessary. Regular updates on the environmental component of the project will kept available at the PMU and DSC offices.

88. Implementing agency will conduct information dissemination sessions at major intersections and solicit the help of the local community leaders/prominent citizens to encourage the participation of the people to discuss various environmental issues.

89. The PMU, with assistance of DSC will conduct information dissemination sessions in the project area. During EMP implementation PMU and DSC will organize public meetings and will appraise the communities about the progress on the implementation of EMP in the project works.

b. Consultation during construction

90. Public meetings with affected communities (if any) to discuss and plan work programs and allow issues to be raised and addressed once construction has started.

91. Smaller-scale meetings to discuss and plan construction work with local communities to reduce disturbance and other impacts, and provide a mechanism through which stakeholders can participate in project monitoring and evaluation.

C. Project Disclosure

92. A communications strategy is of vital importance in terms of accommodating traffic during road closure. Local communities will be continuously consulted regarding location of construction camps, access and hauling routes and other likely disturbances during construction. The road closure together with the proposed detours will be communicated via advertising, pamphlets, radio broadcasts, road signages, etc.

93. Public information campaigns via newspaper/radio/TV, to explain the project details to a wider population. Public disclosure meetings at key project stages to inform the public of progress and future plans.

94. For the benefit of the community the IEE will be translated in the local language and made available at the offices of KUIDFC, PMU and DSC. Hard copies of the IEE will be accessible to citizens as a means to disclose the document and at the same time creating wider public awareness. Electronic version of the IEE will be placed in the official website of the CMC/PMU/ State Government and the official website of ADB after approval of the IEE by Government and ADB. The PMU will issue Notification on the start date of implementation in local newspapers

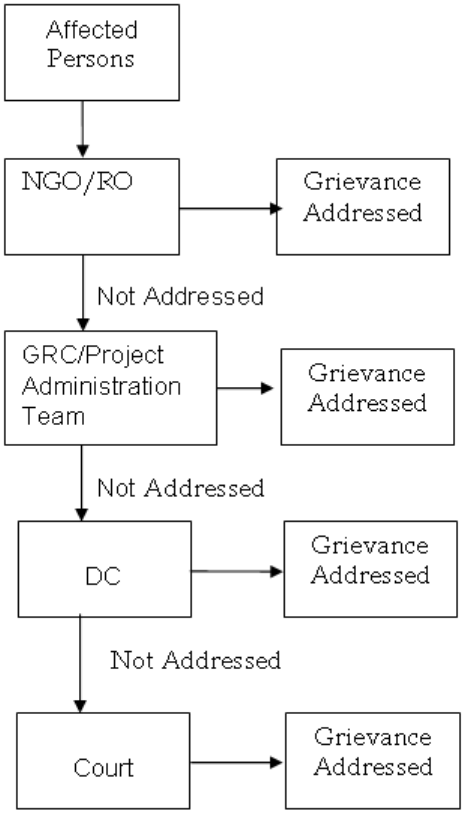
D. Redress of Grievances

95. Grievances will first be brought to the attention of the implementing NGO. Grievances not redressed by the NGO will be brought to the Grievance Redress Committee (GRC) established in each Investment Program district. The GRC process is designed to be transparent, gender responsive, culturally appropriate and commensurate to the risks and

adverse impacts of the project, as well as readily accessible to all segments of the affected people. Affected people are to be appropriately informed about the mechanism through media and public outlets. And to ensure that all views incorporated in implementation process.

96. Only major grievances shall be placed before the GRC. The GRC will determine the merit of each grievance and attempt to resolve the same within a month from the date of lodging of complaints, failing which the grievance shall be addressed to the Deputy Commissioner. The GRC shall forward grievances of serious nature immediately on receipt of complaint to the Deputy Commissioner. The DC will hear appeals against the decisions of GRC. The decision of DC is final and cannot be contested in any other forum except in the Courts of Law.

Figure 1: Grievance Redressal Process



E. Community Participation

97. The sub project requires an integrated approach for operation and maintenance in all aspects. The active participation of local community, conservation organizations, NGOs, and citizens groups with active support from the media at all levels of the project planning, executing and monitoring is required for implementation of measures. Several organizations, both Government, Non- Government and at Community levels, can be participants in the project implementation.

98. To implement the EMP of this project in a proper way, it is essential to provide scope of involving communities and affected persons in the process. Stakeholders' participation throughout the stages of project implementation and operation will be integrated in the project.

99. The post development monitoring will also become meaningful only through public participation. Monitoring with the help of public can identify changes in the project sites.

100. It has been fully realized that, to redress the environmental issues likely to surface during construction and operational phases, a constant communication need to be established with the affected communities. This has been ensured by regular monitoring. Meetings will be organized with the project affected and the various stakeholders at regular intervals at the potential hotspot/sensitive locations before and during the construction period.

F. Information Disclosure and Communication

101. A summary of the IEE Report in English and Kannada will be published in the website of Municipality and NKUSIP. A board showing the details of the project will be displayed at the construction site for the information of general public.

VI. ENVIRONMENTAL MANAGEMENT PLAN

A. Environmental Management Plan

102. The following tables show the potential environmental impacts, proposed mitigation measures and responsible parties.

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

104. 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.

105. 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.

Table 10: Environmental Management Plan of Anticipated Impacts during Pre Construction

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Utilities	Telephone lines, electric poles and wires, water lines within proposed project area	(i) Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and (ii) Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. (iii) Require contractors to prepare spoils management plan (Appendix 4) and traffic management plan (Appendix 5)	CSS	(i) List of affected utilities and operators; (ii) Bid document to include requirement for a contingency plan for service interruptions (example provision of water if disruption is more than 24 hours), spoil management plan (Appendix 4), and traffic management plan (Appendix 5)	No cost required. Mitigation measures are part of TOR of PMU, design engineers, and supervising consultants.
Social and Cultural Resources	Ground disturbance can uncover and damage archaeological and historical remains	(i) Consult Archaeological Survey of India (ASI) or concerned dept. of Karnataka Govt. to obtain an expert assessment of the archaeological potential of the site; (ii) Consider alternatives if the site is found to be of	PMU & CSS	Chance Finds Protocol	No cost required. Mitigation measures are part of TOR of PMU, design engineers, and supervising consultants.

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		medium or high risk; (iii) Develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognised and measures are taken to ensure they are protected and conserved.			
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Disruption to traffic flow and sensitive receptors	(i) Prioritize areas within or nearest possible vacant space in the project location; (ii) If it is deemed necessary to locate elsewhere, consider sites that will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems; (iii) Do not consider residential areas; (iv) Take extreme care in selecting sites to avoid direct disposal to water body which will inconvenience the community. (v) For excess spoil disposal, ensure (a) site shall be selected	PMU and CSS to determine locations prior to award of construction contracts.	(i) List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas. (ii) Written consent of landowner/s (not lessee/s) for reuse of excess spoils to agricultural land	No cost required. Mitigation measures are part of TOR of PMU, design engineers, and supervising consultants.

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		preferably from barren, infertile lands. In case agricultural land needs to be selected, written consent from landowners (not lessees) will be obtained; (b) debris disposal site shall be at least 200 m away from surface water bodies; (c) no residential areas shall be located within 50 m downwind side of the site; and (d) site is minimum 250 m away from sensitive locations like settlements, ponds/lakes or other water bodies.			
Sources of Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution.	(i) Prioritize sites already permitted by the Mining Department; (ii) If other sites are necessary, inform construction contractor that it is their responsibility to verify the suitability of all material sources and to obtain the approval of PMU and (iii) If additional quarries will be	PMU and CSS to prepare list of approved quarry sites and sources of materials	(i) List of approved quarry sites and sources of materials; (ii) Bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.	No cost required. Mitigation measures are part of TOR of PMU, design engineers, and supervising consultants.

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		required after construction is started, inform construction contractor to obtain a written approval from PMU.			
Structural and seismic stability of storage reservoirs (OHTs or GLSRs) is to be ensured for the safety of people working in and living around these structures.	The failure of the storage structures can be catastrophic.	The design shall incorporate seismicity of the place and all other safety factors. All care shall be taken to ensure a safe and structurally sound construction.	PMU and CSS	Incorporated in final design and communicated to contractors.	No cost required. Mitigation measures are part of TOR of PMU, design engineers, and supervising consultants.
Consents, permits, clearances, NOCs, etc.	Failure to obtain necessary consents, permits, NOCs, etc can result to design revisions and/or stoppage of works	(i) Obtain all necessary consents, permits, clearance, NOCs, etc. prior to start of civil works. (ii) Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc. (iii) Include in detailed design drawings and documents all conditions and provisions if necessary	PMU and CSS	Incorporated in final design and communicated to contractors.	No cost required. Cost of obtaining all consents, permits, clearance, NOCs, etc. prior to start of civil works responsibility of PMU. Mitigation measures are part of TOR of PMU, design engineers, and supervising consultants.
Asbestos Cement Pipes	Health risk due to exposure to asbestos materials	(i) Obtain details from ULB/CMC of the nature and location of all water supply infrastructure (ii) Develop an AC	ULB/CMC and design engineers	(i) Detailed design drawings showing alignment of AC pipes (ii) AC pipe protocol (iii) Trainings as per	No cost required. Mitigation measures are part of TOR of PMU, design engineers, and

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		pipe protocol (iii) Require all personnel (including manual laborers) to undergo training as per AC pipe protocol		AC pipe protocol	supervising consultants.

Table 11: Environmental Management Plan of Anticipated Impacts during Construction

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
EMP Implementation Training	Irreversible impact to the environment, workers, and community	(i) Project manager and all key workers will be required to undergo EMP implementation including spoils management, Standard operating procedures (SOP) for construction works; occupational health and safety (OH&S), core labor laws, applicable environmental laws, etc	Construction Contractor	(i) Certificate of Completion (Safeguards Compliance Orientation) (ii) Posting of Certification of Completion at worksites (iii) Posting of EMP at worksites	Cost of EMP Implementation Orientation Training to contractor is responsibility of PMU. Other costs responsibility of contractor.
Air Quality	Emissions from construction vehicles, equipment, and machinery used for installation of pipelines resulting to dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons.	(i) Consult with PMU/CSS on the designated areas for stockpiling of clay, soils, gravel, and other construction materials; (iii) Damp down exposed soil and any stockpiled on site by spraying with water when necessary during dry weather; (iv) Use tarpaulins to cover sand and other loose material when transported by trucks; and (v) Fit all heavy equipment	Construction Contractor	(i) Location of stockpiles; (ii) Complaints from sensitive receptors; (iii) Heavy equipment and machinery with air pollution control devices; (iv) Certification that vehicles are compliant with Air Act	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		and machinery with air pollution control devices which are operating correctly.			
Surface water quality	Mobilization of settled silt materials, and chemical contamination from fuels and lubricants during installation of pipelines can contaminate nearby surface water quality.	(i) Prepare and implement a spoils management plan (**Appendix 4**) (ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets; (ii) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; (iii) Place storage areas for fuels and lubricants away from any drainage leading to water bodies; (iv) Dispose any wastes generated by installation of pipeline in designated sites; and (v) Conduct surface quality inspection according to the Environmental Management Plan (EMP).	Construction Contractor	(i) Areas for stockpiles, storage of fuels and lubricants and waste materials; (ii) Number of silt traps installed along trenches leading to water bodies; (iii) Records of surface water quality inspection; (iv) Effectiveness of water management measures; (v) No visible degradation to nearby drainages, nallahs or waterbodies due to civil works	Cost for implementation of mitigation measures responsibility of contractor.
Noise Levels	Increase in noise level due to earth-moving and excavation equipment, and the transportation of equipment,	(i) Plan activities in consultation with PMU/CSS so that activities with the greatest potential to generate noise are conducted during periods of the day	Construction Contractor	(i) Complaints from sensitive receptors; (ii) Use of silencers in noise-producing equipment and sound barriers; (iii) Equivalent day and	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
	materials, and people	which will result in least disturbance; (ii) Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; (iii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and (iv) Maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at a distance of 10 m or more from the vehicle/s.		night time noise levels (See Appendix 2 of this IEE)	
Landscape and aesthetics	Impacts due to excess excavated earth, excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, and other similar items.	(i) Prepare and implement spoils management plan (Appendix 4); (ii) Avoid stockpiling of excess excavated soils; (iii) Coordinate with ULB/CMC for beneficial uses of excess excavated soils or immediately dispose to designated areas; (iv) Recover used oil and lubricants and reuse or remove from the sites; (v) Manage solid waste according to the following	Construction Contractor	(i) Complaints from sensitive receptors; (ii) Worksite clear of hazardous wastes such as oil/fuel (iiv) Worksite clear of any excess excavated earth, excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		preference hierarchy: reuse, recycling and disposal to designated areas; (vi) Remove all wreckage, rubbish, or temporary structures which are no longer required; and (vii) Request PMU/CSS to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.			
Existing Infrastructure and Facilities	Disruption of service and damage to existing infrastructure at specified project location	(i) Obtain from PMU/CSS the list of affected utilities and operators if any; (ii) Prepare a contingency plan to include actions to be done in case of unintentional interruption of service	Construction Contractor	Existing Utilities Contingency Plan	Cost for implementation of mitigation measures responsibility of contractor.
Ecological Resources – Terrestrial	Loss of vegetation and tree cover	(i) Minimize removal of vegetation and disallow cutting of trees; (ii) If tree-removal will be required, obtain tree-cutting permit from the Forest Department; and (iii) Plant two native trees for every one that is removed.	Construction Contractor	PMU/CSS to report in writing the no of trees cut and planted.	Cost for implementation of mitigation measures responsibility of contractor.
Land use	Environmental Issues due to land use change	The impact due to change in land use will be negligible due to this project.	Not applicable	Not applicable	Not applicable
Accessibility	Traffic problems and	(i) Plan transportation	Construction	(i) Traffic route during	Cost for

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
	conflicts near project locations and haul road	routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites; (ii) Schedule transport and hauling activities during non-peak hours; (iii) Locate entry and exit points in areas where there is low potential for traffic congestion; (iv) Keep the site free from all unnecessary obstructions; (v) Drive vehicles in a considerate manner; (vi) Coordinate with Traffic Police for temporary road diversions and with for provision of traffic aids if transportation activities cannot be avoided during peak hours; (vii) Notify affected sensitive receptors 2 days in advance by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints. (viii) Plan and execute the work in such a way that the period of disturbance/ loss of access is minimum. (iii) Provide	Contractor	construction works including number of permanent signages, barricades and flagmen on worksite (Appendix 5); (ii) Complaints from sensitive receptors; (iii) Number of signages placed at project location.	implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		pedestrian access in all the locations until normalcy is restored.			
Socio-Economic – Income.	Impede the access of residents and customers to nearby shops	(i) Prepare and implement spoils management plan (Appendix 4) (ii) Leave spaces for access between mounds of soil; (ii) Provide walkways and metal sheets where required for people; (iii) Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools; (iv) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and (v) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.	Construction Contractor	(i) Complaints from sensitive receptors; (ii) Spoils management plan (iii) Number of walkways, signages, and metal sheets placed at project location.	Cost for implementation of mitigation measures responsibility of contractor.
Socio-Economic - Employment	Generation of contractual employment and increase in local revenue	(i) Employ at least 50% of the labour force, or to the maximum extent, local persons within the 2-km immediate area if manpower is available; (ii) Secure construction materials from local market.	Construction Contractor	(i) Employment records; (ii) Records of sources of materials (iii) Compliance to core labor laws (See appendix 3 of this IEE)	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		(iii) Comply with core labor laws			
Occupational Health and Safety	Occupational hazards which can arise during work	(i) Comply with all national, state and local core labor laws (See Appendix 3 of this IEE) (ii) Develop and implement site-specific occupational health and safety (OH&S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use personal protective equipment like helmet, gumboot, safety belt, gloves, nose musk and ear plugs; (c) OH&S Training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents; (ii) Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site; (iii) Provide medical insurance coverage for workers; (iv) Secure all installations from unauthorized	Construction Contractor	(i) Site-specific OH&S Plan; (ii) Equipped first-aid stations; (iii) Medical insurance coverage for workers; (iv) Number of accidents; (v) Supplies of potable drinking water; (vi) Clean eating areas where workers are not exposed to hazardous or noxious substances; (vii) record of H&S orientation trainings (viii) personal protective equipment; (ix) % of moving equipment outfitted with audible back-up alarms; (xi) permanent sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. (xii) Compliance to core labor laws (See appendix 3 of this IEE)	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		intrusion and accident risks; (v) Provide supplies of potable drinking water; (vi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances; (vii) Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; (viii) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; (ix) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; (x) Ensure moving equipment is outfitted with audible back-up alarms; (xi) Mark and provide sign boards for hazardous			

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and (xii) Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.			
Asbestos Cement (AC) Materials	Health risks associated with AC pipes	(i) Left AC pipes in-situ. (ii) Training of all personnel (including manual labourers) to enable them to understand the dangers of AC pipes and to be able to recognize them in situ; (iii) Reporting procedures to inform management immediately if AC pipes are encountered; (iv) Development and application of a detailed OH&S procedure to protect both workers and	Construction Contractor	(i) Site-specific OH&S Plan including AC pipe protocol (iii) record of OH&S orientation on AC Cement Materials Protocol (iv) personal protective equipment for AC materials (v) sign boards for pipe alignment identified as AC pipes.	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		citizens. This should comply with national and international standards for dealing with asbestos, and should include: (a) removal of all persons to a safe distance; (b) usage of appropriate breathing apparatus and protective equipment by persons delegated to deal with the AC material; and (c) Procedures for the safe removal and long-term disposal of all asbestos-containing material encountered.			
Community Health and Safety.	Traffic accidents and vehicle collision with pedestrians during material and waste transportation	(i) Plan routes to avoid times of peak-pedestrian activities. (ii) Liaise with PMU/CSS in identifying high-risk areas on route cards/maps. (iii) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure. (iv) Provide road signs and flag persons to warn of on-going trenching activities.	Construction Contractor	(i) Traffic Management Plan; (ii) Complaints from sensitive receptors	Cost for implementation of mitigation measures responsibility of contractor.
Work Camps and worksites	Temporary air and noise pollution from	(i) Consult with PMU/CSS before locating project	Construction Contractor	(i) Complaints from sensitive receptors;	Cost for implementation of

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
	machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants Unsanitary and poor living conditions for workers	offices, sheds, and construction plants; (ii) Minimize removal of vegetation and disallow cutting of trees; (iii) Provide drinking water, water for other uses, and sanitation facilities for employees; (iv) Ensure conditions of liveability at work camps are maintained at the highest standards possible at all times; Prohibit employees from poaching wildlife and cutting of trees for firewood; (v) Train employees in the storage and handling of materials which can potentially cause soil contamination; (vi) Recover used oil and lubricants and reuse or remove from the site; (vii) Manage solid waste according to the preference hierarchy: reuse, recycling and disposal to designated areas; (viii) Ensure unauthorized persons specially children are not allowed in any worksite at any given time.		(ii) Drinking water and sanitation facilities for employees	mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Social and Cultural Resources	Risk of archaeological chance finds	(i) Strictly follow the protocol for chance finds in any excavation work; (ii) Request PMU/CSS or any authorized person with archaeological field training to observe excavation; (iii) Stop work immediately to allow further investigation if any finds are suspected; (iv) Inform PMU/CSS if a find is suspected, and take any action they require ensuring its removal or protection in situ.	Construction Contractor	Records of chance finds	Cost for implementation of mitigation measures responsibility of contractor.
Submission of EMP implementation report	Unsatisfactory compliance to EMP	(i) Appointment of supervisor to ensure EMP implementation (ii) Timely submission of monitoring reports including pictures	Construction contractor	Availability and competency of appointed supervisor Monthly report	Cost for implementation of mitigation measures responsibility of contractor.
Post-construction clean-up	Damage due to debris, spoils, excess construction materials	(i) Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and (ii) All excavated roads shall be reinstated to original condition. (iii) All disrupted utilities restored (iv) All affected structures rehabilitated/compensated	Construction Contractor	PMU/CSS report in writing that (i) worksite is restored to original conditions; (ii) camp has been vacated and restored to pre-project conditions; (iii) all construction related structures not relevant to O&M are removed; and (iv) worksite clean-up is satisfactory.	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		(v) The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up. (vi) All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be topsoiled and regrassed using the guidelines set out in the revegetation specification that forms part of this document. (vii) The contractor must arrange the cancellation of all temporary services. (viii) Request PMU/CSS to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.			

Table 12: Environmental Management Plan of Anticipated Impacts during Operation

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Check for blockage and leakage problems reducing the	It may affect the water supply system	Effectiveness of leak detection and water auditing to reduce the water losses	CMC Haveri	CMC Haveri	CMC cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
water losses					
Asset management	Reduction in NRW Increased efficiency of the system	Preparation of O & M Manual	CMC Haveri	CMC Haveri	CMC cost

B. Institutional Requirements

106. **Government.** Karnataka Urban Infrastructure Development & Finance Corporation (KUIDFC) is the Executing Agency (EA) responsible for overall technical supervision and execution of all projects funded under the investment program. Implementation activities will be overseen by a separate Program Management Unit (PMU). The investment program is divided into four packages, for ease of operation and monitoring. The PMU is headed by an executive program director based in Dharwad and have four deputy program directors, one for each package. A team of senior technical, administrative and financial officials, including a state-level environmental specialist and a regional-level environmental specialist, will assist the PMU in managing and monitoring program implementation activities. The ultimate implementation responsibility lies with ULBs/CMCs in coordination with various other departments of Government of Karnataka. Assistant Executive Engineer (AEE) of ULBs/CMCs supervises the project implementation including the environmental safeguards.

107. A state-level environmental specialist at PMU will look after the environmental safeguards related aspects of the project to be assisted by a regional-level environment specialist. Each divisional program office will have an environmental specialist to assist the regional environmental specialist in environmental safeguards related aspects.

108. **Consultants.** Each Divisional Program Director is being assisted by a consultant team 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 environmental specialist to supervise the implementation of environmental safeguards at the divisional level. The consultant team also includes a construction supervision specialist (CSS) at each ULB/CMC responsible for the supervision of project implementation including environmental safeguards at the ULB/CMC level.

109. **Contractor.** The contractor shall appoint one supervisor who will be responsible on a day-to-day basis for (i) ensuring implementation of EMP, (ii) coordinating with the CSS and environment specialists (all levels); (iii) community liaison, consultations with interested/affected parties, and grievance redressal; and (iv) reporting.

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

Figure 2: Environmental Safeguards Implementation Arrangement

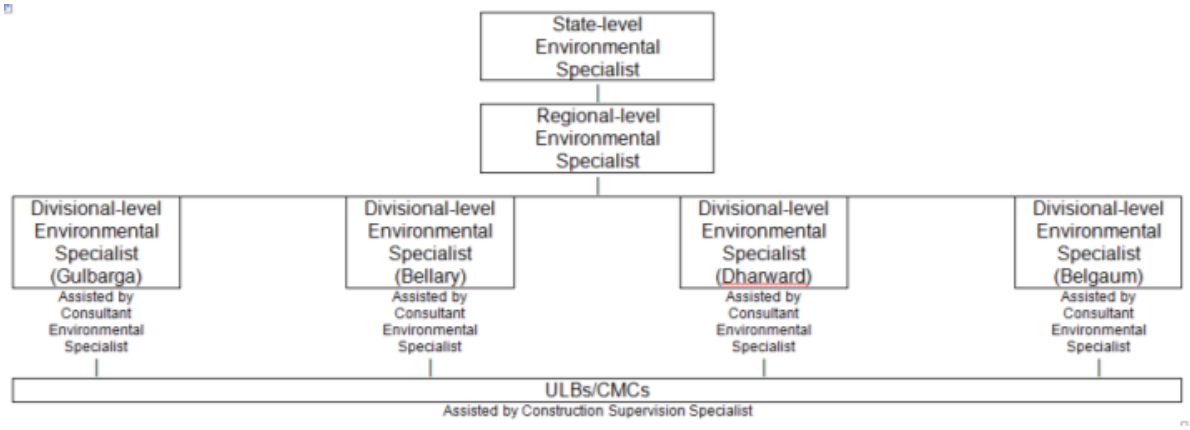


Table 13: Institutional Roles and Responsibilities

Responsible Agency	Responsibility		
	Pre-Construction Stage	**Construction Stage**	**Post-Construction**
State Environmental Specialist	(i) Review REA checklists and assign categorization based on ADB SPS (ii) Review and approve EIA/IEE (iii) Submit EIA/IEE to ADB for approval and disclosure in ADB website (iv) Ensure approved IEEs are disclosed in KUIDFC website and summary posted in public areas accessible and understandable by local people. (v) Ensure environmental management plans (EMPs) are included in the bid documents and contracts (vi) Organize an orientation workshop for PMU, ULBs/CMCs, and all staff involved in the project implementation on (a) ADB SPS, (b) Government of India national, state, and local environmental laws and regulations, (c) core labor standards, (d) OH&S, (e) EMP implementation especially spoil management, working in congested areas, public relations and ongoing consultations, grievance redress, etc. (vii) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs (viii) Organize an induction course for the training of contractors preparing them on EMP implementation, environmental monitoring requirements related to	(i) State environment specialist responsible for over-all environmental safeguards compliance of the project (ii) Prepare and submit to ADB semi-annual monitoring reports (iii) Review and submit Corrective Action Plans to ADB (iv) Organize capacity building programs on environmental safeguards (iv) Coordinate with national and state level government agencies (vi) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs	Compliance monitoring to review the environmental performance of project component, if required and as specified in EMP
Regional Environmental Specialist		(i) Review quarterly monitoring report (ii) Assist in the preparation of semi-annual monitoring reports (iii) Monitor and ensure compliance of EMPs as well as any other environmental provisions and conditions. (iv) If necessary prepare Corrective Action Plan and ensure implementation of corrective actions to ensure no environmental impacts; (v) Organize capacity building programs on environmental safeguards at regional level (vi) Coordinate with regional level government agencies (vii) Assist in addressing any grievances brought about through the Grievance Redress	Compliance monitoring to review the environmental performance of project component, if required and as specified in EMP

Responsible Agency	Responsibility		
	Pre-Construction Stage	**Construction Stage**	**Post-Construction**
	mitigation measures; and taking immediate actions to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation. (ix) Ensure compliance with all government rules and regulations regarding site and environmental clearances as well as any other environmental requirements (x) Assist PMU, PIUs, and project NGOs to document and develop good practice construction guidelines to assist the contractors in implementing the provisions of IEE. (xi) Assist in the review of the contractors' implementation plans to ensure compliance with the IEE.	Mechanism in a timely manner as per the IEEs (viii) Assist in overseeing implementation of the EMP during construction including environmental, health and safety monitoring of contractors; (ix) Coordinate with the state- and divisional level environmental specialists, ULBs/CMCs, NGOs, consultants and contractors on mitigation measures involving the community and affected persons and ensure that environmental concerns and suggestions are incorporated and implemented	
Divisional Environmental Specialist		(i) Review monthly monitoring report. Prepare quarterly monitoring report (ii) Prepare Corrective Action Plans if necessary (iv) Organize capacity building programs on environmental safeguards at divisional level (iv) Coordinate with regional level government agencies (vi) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs	Compliance monitoring to review the environmental performance of project component, if required and as specified in EMP
ULB/CMC	(i) Conduct initial environmental assessment for proposed project using REA checklists and submit to PMU (ii) Prepare EIA/IEE based on categorization and submit to PMU for approval (iii) Ensure IEE is included in bid documents and contract agreements. Ensure cost of EMP	(i) Ensure EMP implementation is included in measuring works carried out by the contractors and certifying payments. (ii) Ensure Corrective Action Plan is implemented. (ii) Conduct public awareness campaigns and participation programs (iii) Prepare monthly	(i) Conducting environmental monitoring, as specified in the EMP. (ii) Issuance of clearance for contractor's post-construction activities as specified in the EMP.

Responsible Agency	Responsibility		
	Pre-Construction Stage	**Construction Stage**	**Post-Construction**
	implementation is provided. (iv) Disclose approved EIAs/IEEs. (v) Obtain all necessary clearances, permits, consents, NOCs, etc. Ensure compliance to the provisions and conditions. (vi) EMP implementation regarding sites for disposal of wastes, camps, storage areas, quarry sites, etc. (vii) Ensure contractors undergo EMP implementation orientation prior to start of civil works	reports. (vi) Address any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs	
Consultant Environment Specialist at divisional level Construction Consultant Specialist at ULB/CMC level	(i) Assist ULBs/CMCs in preparation of REA checklists and EIAs/IEEs (ii) Assist ULBs/CMCs in obtaining all necessary clearances, permits, consents, NOCs, etc. Ensure provisions and conditions are incorporated in the IEE and detailed design documents. (iii) Assist in ensuring IEE is included in bid documents and contract agreements. Assist in determining adequacy of cost for EMP implementation. (iv) Assist in addressing any concern related to IEE and EMP. (v) Assist in summarizing IEE and translating to language understood by local people.	(i) Monitor EMP implementation (ii) Recommend corrective action measures for non-compliance by contractors (iii) Assist in the review of monitoring reports submitted by contractors (iv) Assist in the preparation of monthly reports (vi) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs	(i) Assist in the inspection and verification of contractor's post-construction activities.
Contractors	(i) Ensure EMP implementation cost is included in the methodology. (ii) Undergo EMP implementation orientation prior to award of contract (iii) Provide EMP	(i) Implement EMP. (ii) Implement corrective actions if necessary. (iii) Prepare and submit monitoring reports including pictures to ULB/CMC (iv) Comply with all applicable legislation, is	(i) Ensure EMP post-construction requirements are satisfactorily complied (ii) Request certification from ULBs/CMCs

Responsible Agency	Responsibility		
	Pre-Construction Stage	**Construction Stage**	**Post-Construction**
	implementation orientation to all workers prior to deployment to worksites (iv) Seek approval for camp sites and sources of materials. (v) Ensure copy of IEE is available at worksites. Summary of IEE is translated to language understood by workers and posted at visible places at all times.	conversant with the requirements of the EMP; (v) Brief his staff, employees, and laborer about the requirements of the EMP and provide environmental awareness training to staff, employees, and laborers; (vi) Ensure any sub-contractors/ suppliers who are utilized within the context of the contract comply with all requirements of the EMP. The Contractor will be held responsible for non-compliance on their behalf; (vii) Bear the costs of any damages/compensation resulting from non-adherence to the EMP or written site instructions; (viii) Ensure that ULBs/CMCs and CSS are timely informed of any foreseeable activities related to EMP implementation. (vi) Address any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs	

C. Training Needs

The following table presents the outline of capacity building program to ensure EMP implementation. The estimated cost is $12,000 (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 14: Outline Capacity Building Program on EMP Implementation

Description	Target Participants	Estimate (US$)	Cost and Source of Funds
1. Sensitization (1 day) - ADB Safeguards Policy Statement	All staff and consultants involved in the project	Lumpsum - $1,500	PMU cost

Description	Target Participants	Estimate (US$)	Cost and Source of Funds
- 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			
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	Lumpsum - $4,500	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.	Lumpsum - $4,500 Lumpsum - % of EMP Implementation Cost or % of contingency	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	Lumpsum - $1,500	PMU Cost
5. Contractors Orientation to Workers on EMP implementation (OH&S, core labor laws, spoils	All workers (including manual laborers) of the contractor prior to dispatch to worksite	Lumpsum - % of EMP Implementation Cost or % of contingency	Contractors cost as compliance to contract provisions on EMP implementation (refer

Description	Target Participants	Estimate (US$)	Cost and Source of Funds
management, etc)			to EMP tables)

D. Monitoring and Reporting

111. 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.

112. 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 DSC 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.

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

114. ADB will review project performance against the NKUSIP'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

E. EMP Implementation Cost

115. 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.

Table 15: Cost Estimates to Implement the EMP

	Particulars	Stages	Unit	Total Number	Rate (USD)	Cost (USD)	Costs Covered By
A.	**Mitigation Measures**						
1	Compensatory plantation measures		Per tree	20	50	1,000	Civil works contract
	Subtotal (A)					**1,000**	
B.	**Monitoring Measures**						
	Air quality	Constructi	Per	20	100	2,000	Civil works

	Particulars	Stages	Unit	Total Number	Rate (USD)	Cost (USD)	Costs Covered By
	monitoring	on	location				contract
	Noise levels monitoring	Construction	Per location	20	50	1,000	Civil works contract
	Subtotal (B)					**3,000**	
C.	**Capacity Building**						
1.	Introduction and sensitization to environment issues	Pre-construction	lump sum			1,500	PMU
2.	EMP implementation	Construction	lump sum			4,500	PMU
3.	Training Plans and Protocols	Construction	lump sum			4,500	PMU
4.	Experiences and best practices sharing	Construction/Post-Construction	lump sum			1,500	PMU
5.	Contractors Orientation to Workers on EMP implementation (OH&S, core labor laws, spoils management, etc)	Prior to dispatch to worksite	Lumpsum % of EMP Cost or % of contingency			2,000	Civil works contract
	Subtotal (C)					**13,500**	
	Total (A+B+C)				**USD**	**18,000**	

VII. FINDINGS AND RECOMMENDATIONS

116. The process described in this document has assessed the environmental impacts of all elements of the Haveri 24x7 water supply project. All potential impacts were identified in relation to pre-construction, construction, and operation phases.

117. Planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible; thus, environmental impacts as being due to the project design or location were not significant. However, the social impacts (access disruptions) due to construction activities are unavoidable, as the residential and commercial establishments exist along the project corridor. A resettlement plan has been developed in accordance with ADB SPS 2009 and Government of India laws and regulations.

118. Anticipated impacts during operation and maintenance will be related to detection and repair of leaks and pipe bursts. These are, however, likely to be minimal, as proper design and selection of good quality pipe material shall mean that leaks are minimal. Leak repair work will be similar to the pipe-laying work.

119. The public participation processes undertaken during project design ensured

stakeholders are engaged during the preparation of the IEE. The planned information disclosure measures and process for carrying out consultation with affected people will facilitate their participation during project implementation.

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

121. The EMP will assist the PMU, MASC, and contractors in mitigating the environmental impacts, and guide them in the environmentally sound execution of the proposed project. The EMP will also ensure efficient lines of communication between the implementing agency, project management unit, and contractors.

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

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

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

APPENDIX 1: NATIONAL AMBIENT AIR QUALITY STANDARDS BY CPCB

Sl No:	Pollutants	Time weighted average	Concentration in ambient air		Method of measurement
			Industrial, Residential, Rural & Other Areas	Ecologically Sensitive Areas	
1	Sulphur Dioxide (SO2) µg/m3	Annual 24 hours	50 80	20 80	Improved West and Geake-Ultraviolet fluorescence
2	Nitrogen Dioxide (NO2) µg/m3	Annual 24 hours	40 80	30 80	Modified Jacob & Hochheiser (Na-Arsenite) Chemiluminescence
3	Particulate Matter (Size less than 10 µm) or PM10 µg/m3	Annual 24 hours	60 100	60 100	Gravimetric -TOEM -Beta attenuation
4	Particulate Matter (Size less than 2.5 µm) or PM2.5 µg/m3	Annual 24 hours	40 60	40 60	Gravimetric -TOEM -Beta attenuation
5	Carbon Monoxide (CO) mg/m3	8 hours 1 hours	02 04	02 04	Non Dispersive Infra Red (NDIR) Spectroscopy

APPENDIX 2: NATIONAL AMBIENT AIR QUALITY STANDARDS IN RESPECT OF NOISE

Area code	Category of area/zone	Limit in dB (A)	
		Day time	Night time
a	Industrial area	75	70
b	Commercial area	65	55
c	Residential area	55	45
d	Silence zone	50	40

APPENDIX 3: 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 4: SAMPLE OUTLINE SPOIL MANAGEMENT PLAN

I. Spoils information

   A. Materials type
   B. Potential contamination
   C. Expected volume and sources
   D. Spoil classification

II. Spoils management

   A. Transportation of spoil
   B. Storage of spoil
   C. Contaminated spoil
   D. Approved reuse and/or disposal sites

III. Records of reuse and/or disposal

APPENDIX 5: SAMPLE OUTLINE TRAFFIC MANAGEMENT PLAN

A. Principles for TMP around the Water Pipes Construction Sites

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

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

B. Operating Policies for TMP

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

(i) Make traffic safety and temporary traffic control an integral and high-priority element of 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 A2 to Figure A12** illustrates the operating policy for TMP for the construction of water pipes and the sewers along various types of roads.

C. Analyze the impact due to street closure

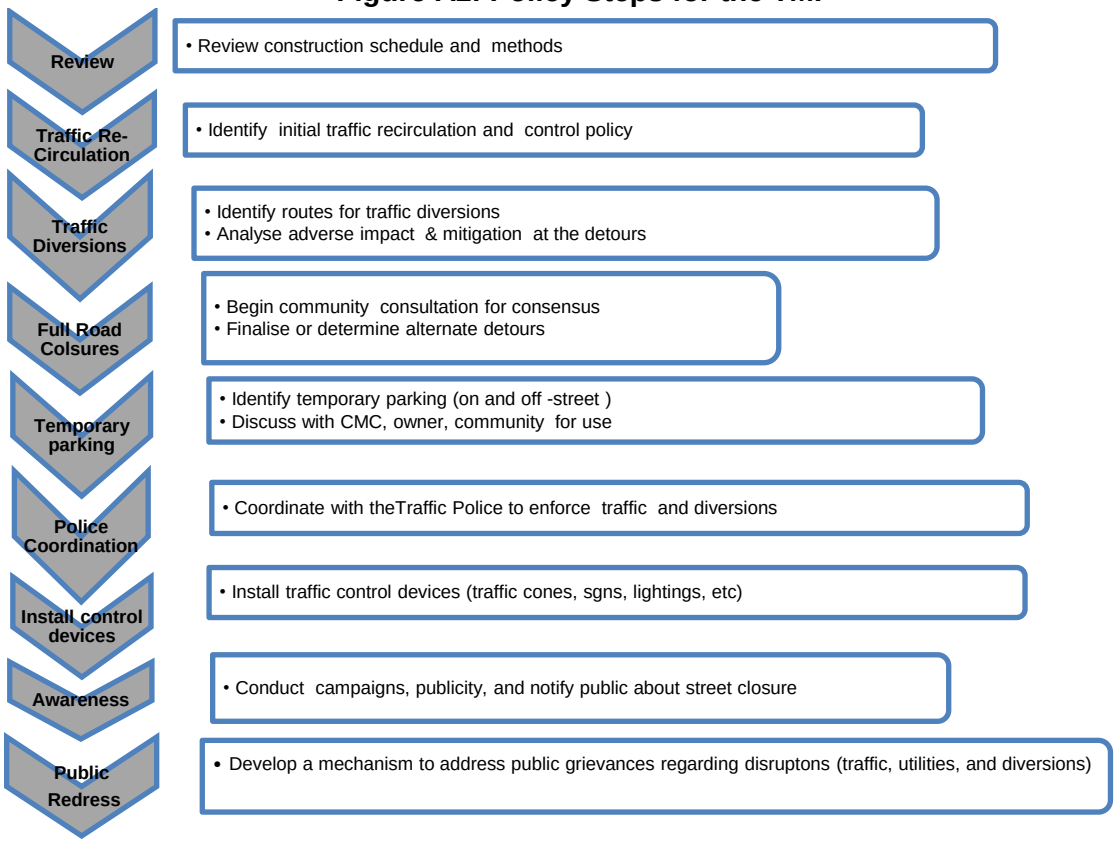
4. Apart from the capacity analysis, a final decision to close a particular street and divert the traffic should involve the following steps:

(i) approval from the ULB/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.

Figure A1: 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 in the new city areas are wide but in old city roads very narrow and carry considerable traffic. However, regardless of where the construction takes place, all the work zones should be cordoned off, and traffic shifted away at least with traffic cones, barricades, and temporary signs (temporary “STOP” and “GO”).

12**.** **Figure A2 to Figure A12** illustrates a typical set-up for installing traffic control devices at the work zone of the area, depending on the location of work on the road way, and road geometrics:

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

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

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

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

Figure A2 & A3: Work on shoulder or parking lane & Shoulder or parking lane closed on divided road)

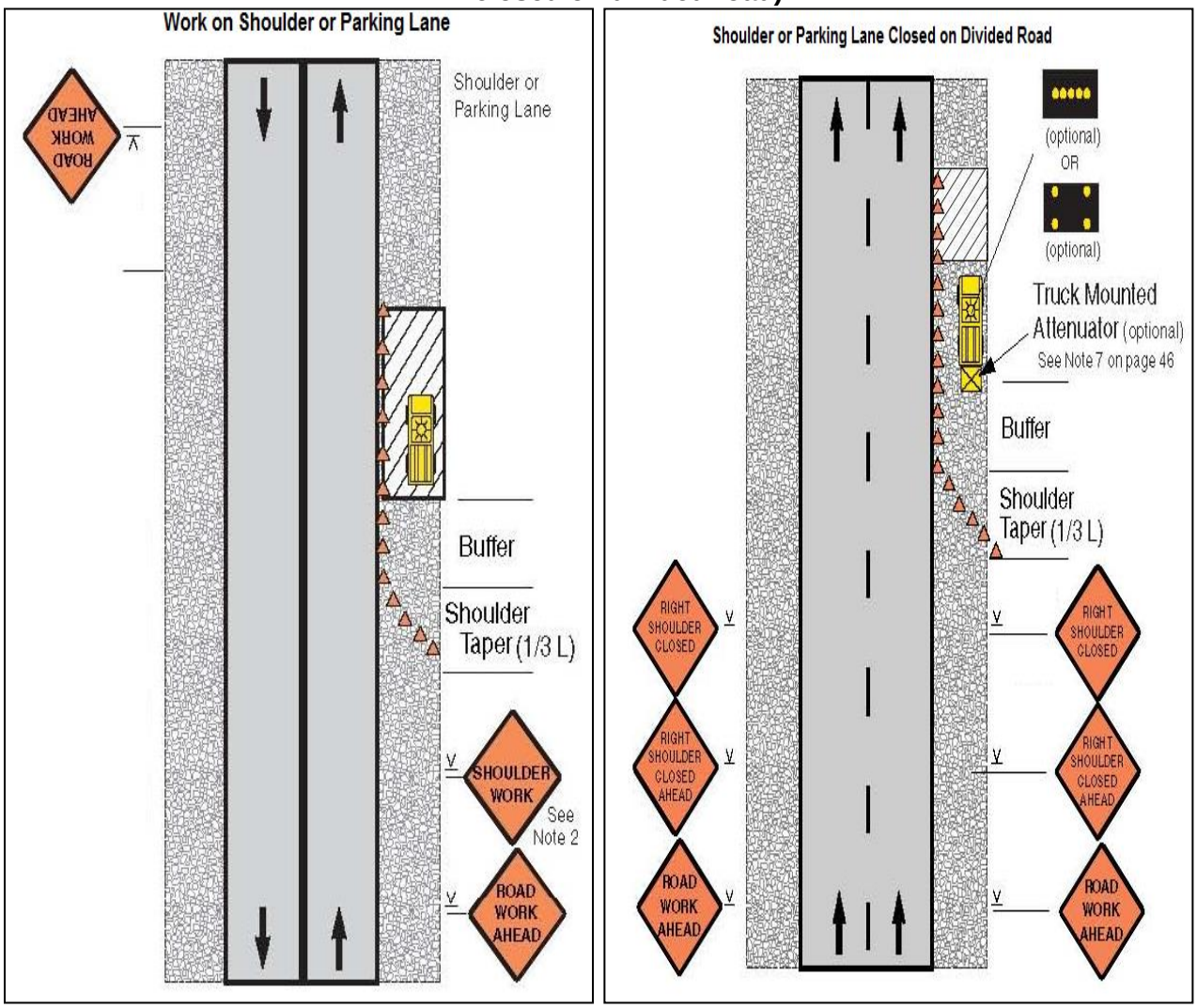


Figure A4 & A5: Work in Travel lane & Lane closure on road with low volume

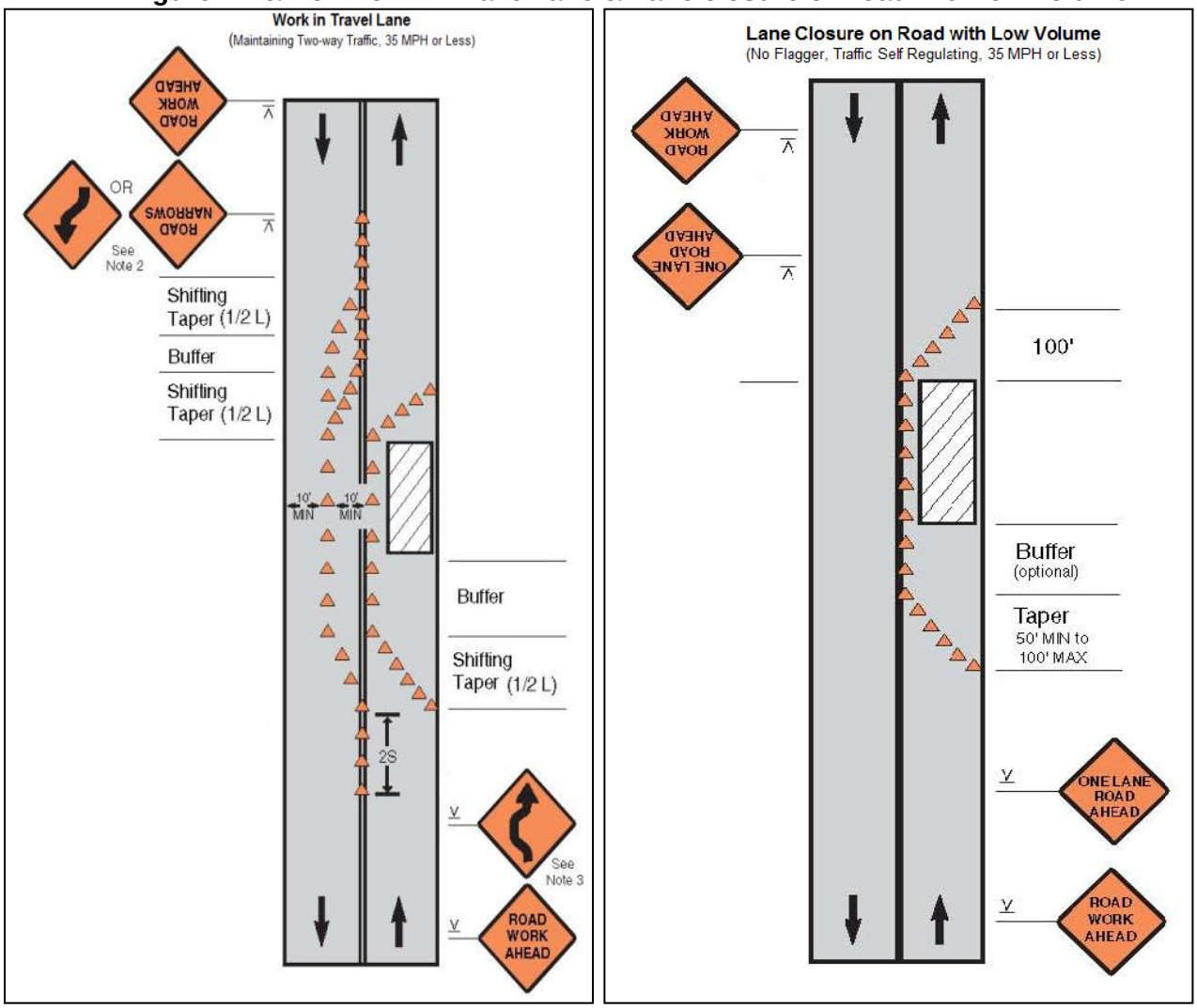
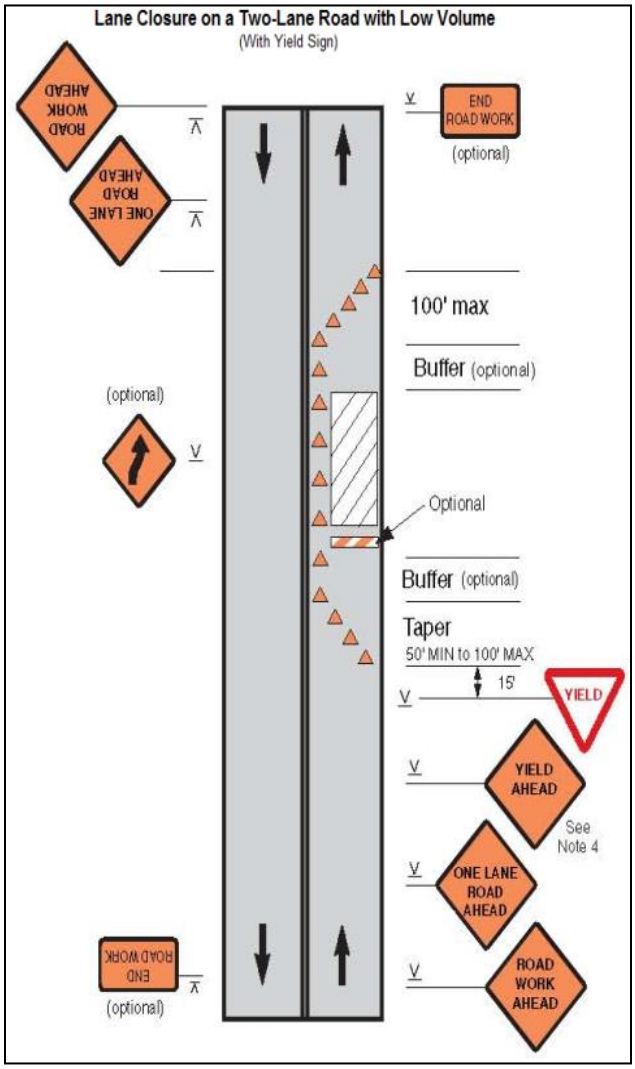


Figure A6 & A7: Lane closure on a two-line road with low volume (with yield sign) & Lane closure on a two-line road with low volume (one flagger operation)



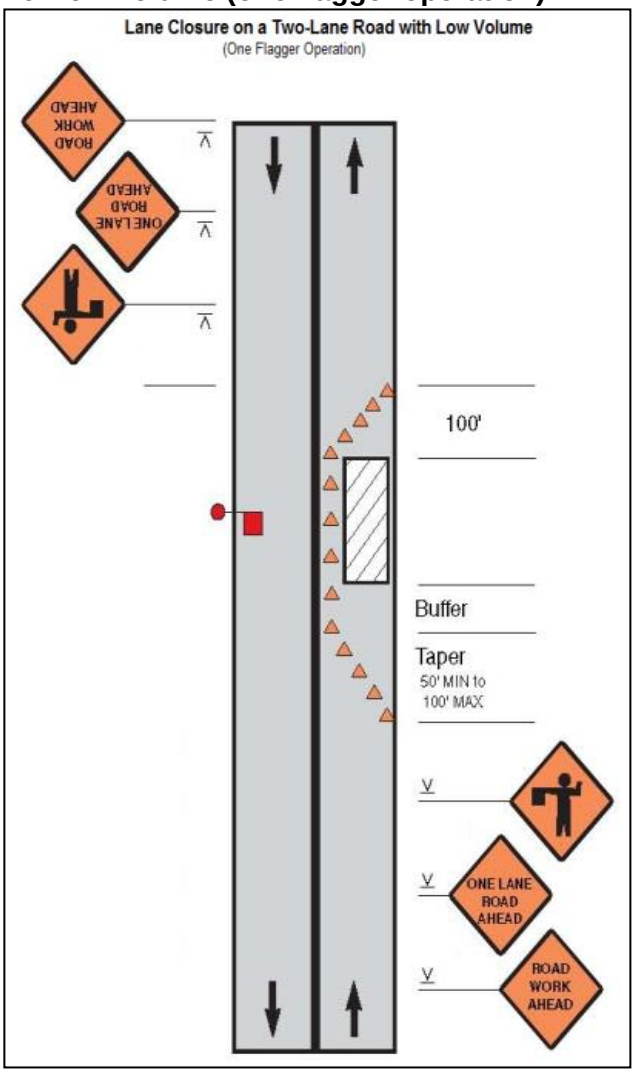


Figure A8 & A9: Lane Closure on a Two-Lane Road (Two Flagger Operation) & Lane Closure on a Four-Lane Undivided Road

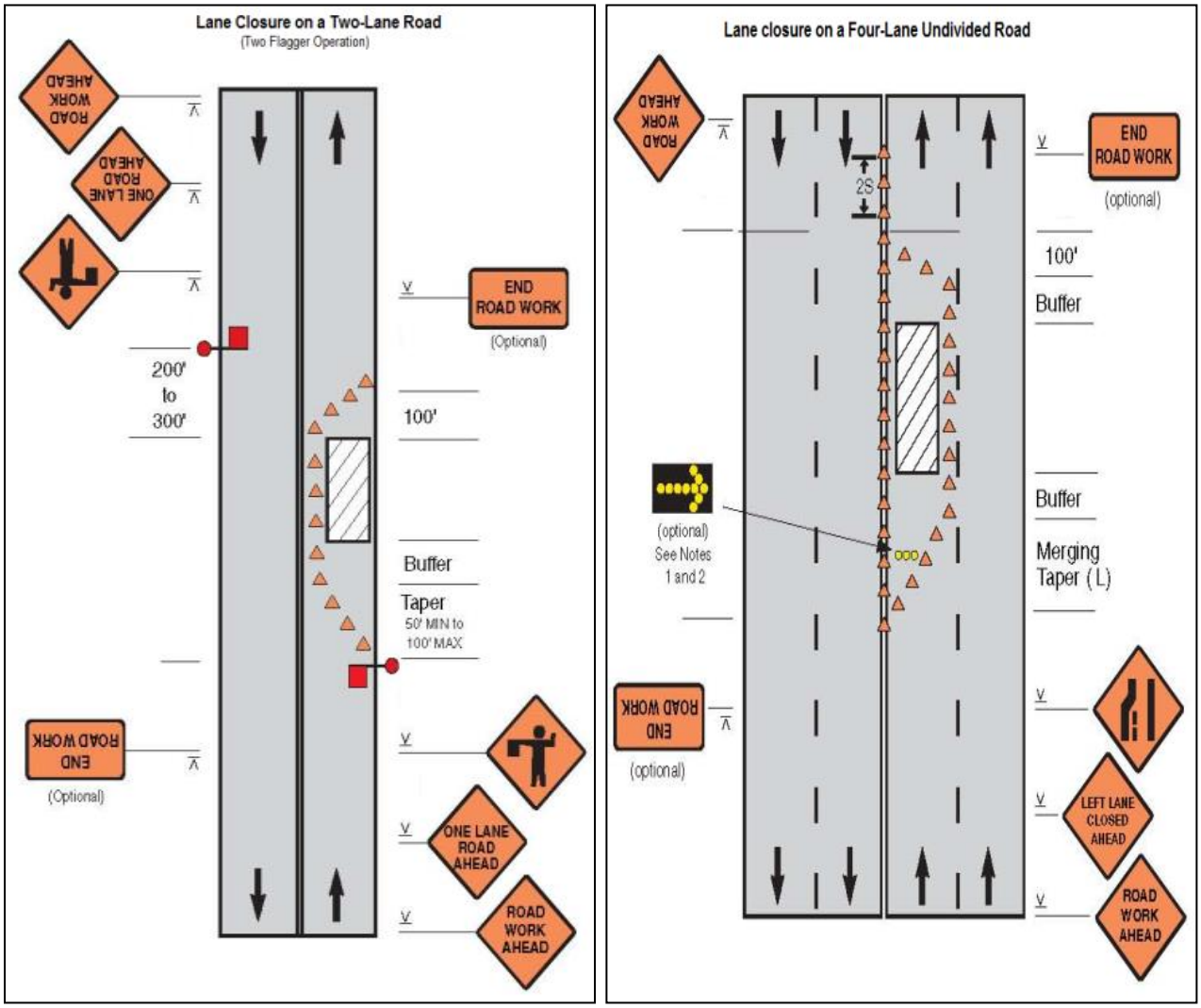


Figure A10 & A11: Lane Closure nn Divided Roadway & Half Road Closure On Multi-Lane Roadway

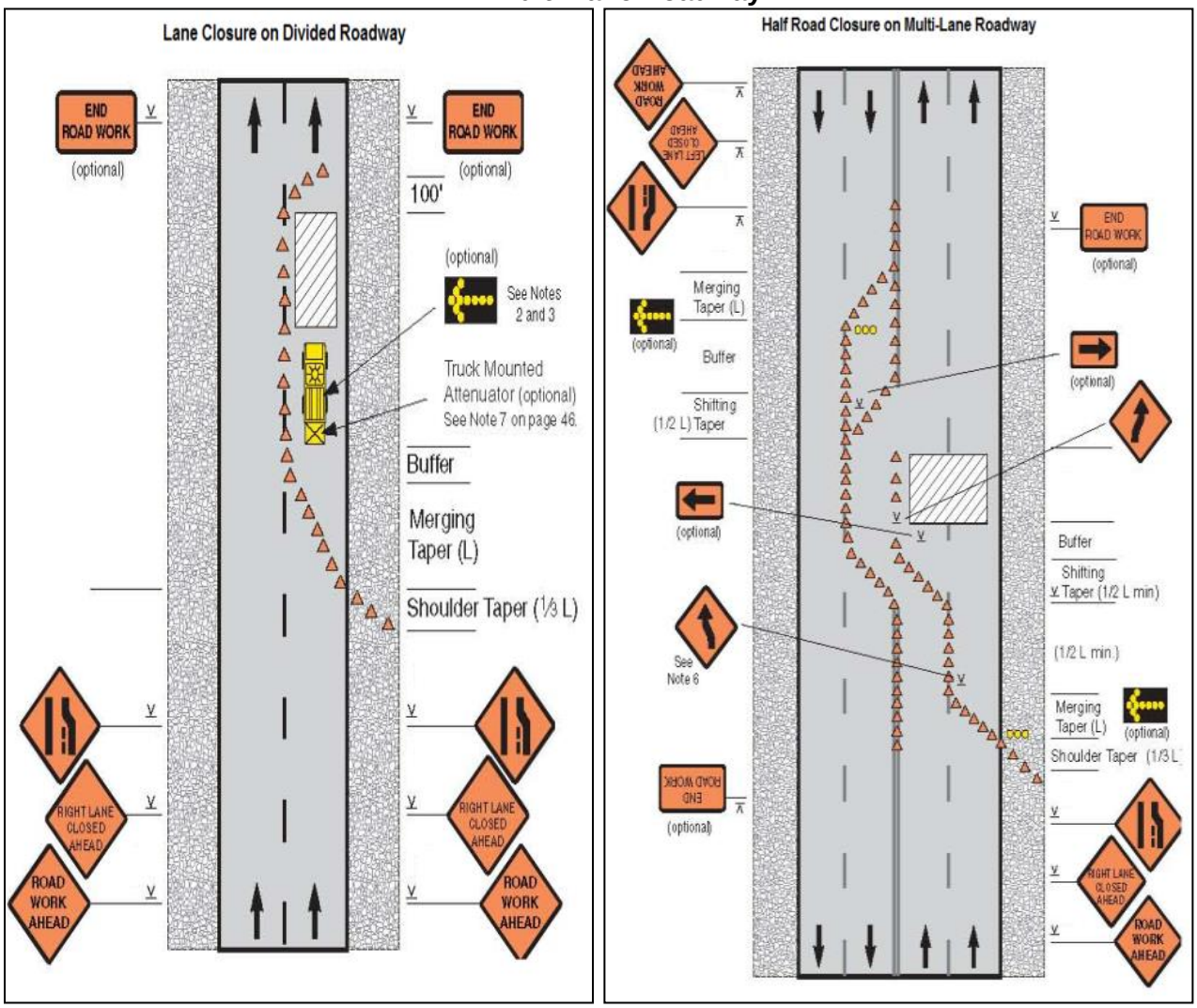
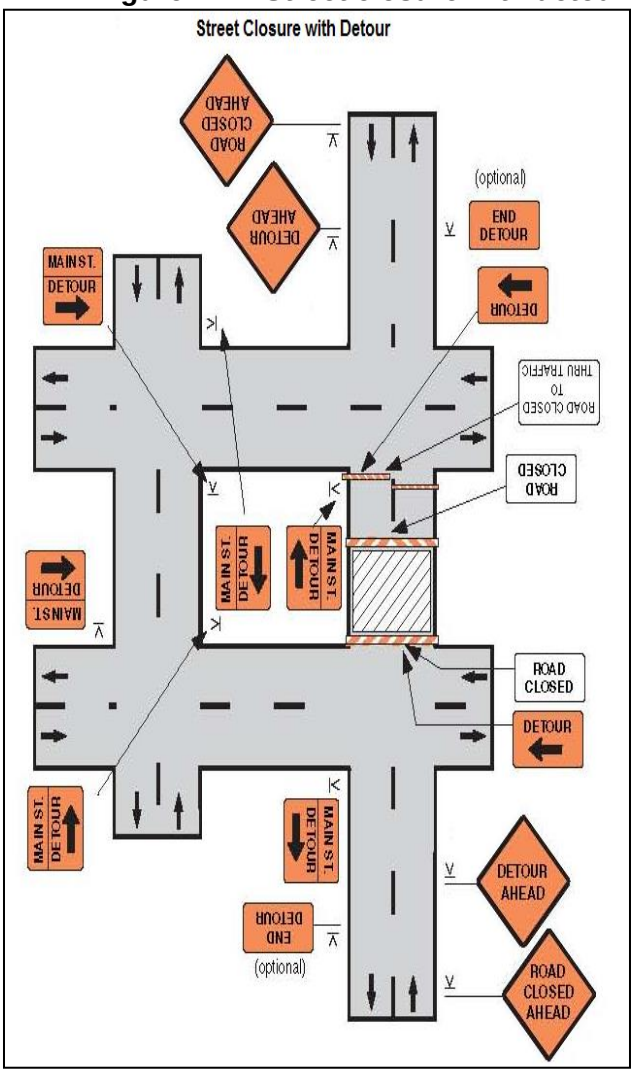


Figure A12: Street closure with detour



APPENDIX 6: 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 the specific project as necessary.

I. 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 Sub-Project				List of Works	Progress of Works
		Design	Pre-Construction	Construction	Operational Phase		
		☐	☐	☐	☐		
		☐	☐	☐	☐		
		☐	☐	☐	☐		

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

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

III. Compliance status with environmental loan covenants

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

IV. Compliance status with the environmental management 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 routine site inspection needs to note and record the following:
    - What are the dust suppression techniques followed for site and if any dust was noted to escape the site boundaries;
    - If muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads;
    - adequacy of type of erosion and sediment control measures installed on site, condition of erosion and sediment control measures including if these were intact following heavy rain;
    - Are their designated areas for concrete works, and refuelling;

- Are their spill kits on site and if there are site procedure for handling emergencies;
- Is there any chemical stored on site and what is the storage condition?
- Is there any dewatering activities if yes, where is the water being discharged;
- How are the stockpiles being managed;
- How is solid and liquid waste being handled on site;
- Review of the complaint management system;
- Checking if there are any activities being under taken out of working hours and how that is being managed.

V. 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						

VI. 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

VII. Approach and methodology for environmental monitoring of the project

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

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

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

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

Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Government Standards)		
			PM10 µg/m3	SO2 µg/m3	NO2 µg/m3

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM10 µg/m3	SO2 µg/m3	NO2 µg/m3

Water Quality Results

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

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

Noise Quality Results

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

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

IX. Summary of key issues and remedial actions

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

X. 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

Resolution

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 **Name**
Position **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/caution 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						

Sl. No.	Safety Issues	Yes	No	Non-Compliance	Corrective Action	Penalty	Remarks
	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 checkup 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: _____