Initial Environmental Examination

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Project Number: 43253-025
December 2016

IND: Karnataka Integrated Urban Sector Development Investment Program – Tranche 1: Byadgi Town Water Supply Subproject

Package Numbers: 01WS02
01WS03

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

Initial Environmental Examination

Updated

December 2016

IND: Karnataka Integrated Urban Water Management Investment Program

Tranche 1: Byadgi Town 24 x 7 Water Supply
(Bulk water supply (transmission main) 01WS02 and Distribution network 01WS03)

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

The initial environmental examination (IEE) prepared based on preliminary designs was reviewed and approved by KUIDFC and ADB in April 2013. It has been disclosed in KUIDFC and ADB's website (http://www.adb.org/projects/documents/kiuwmip-byadgi-uwss-subproject-iee)

The approved draft IEE has now been updated reflecting the detailed design of the Byadgi Town 24x7 Water Supply Scheme

CURRENCY EQUIVALENTS

(as of November 2016)

Currency unit	–	Equivalent to
Rs1.00	=	$ 0.015
$1.00	=	Rs 66.7

ABBREVIATIONS

AC	Asbestos Cement
ADB	Asian Development Bank
APMC	Agricultural Produce Market Committee
ASI	Archaeological Survey of India
BOD	Bio-Chemical Oxygen Demand
CBO	Community Based Organizations
CEMP	Construction Environmental Management Plan
CFE	Consent for Establishment
CFO	Consent for Operation
CGWB	Central Ground Water Board
CMC	City Municipal Council
CPHEEO	Central Public Health and Environmental Engineering Organization
CPCB	Central Pollution Control Board
CRO	Complaint Receiving Officer
DC	Deputy Commissioner
DI	Ductile Iron
DPD	Deputy Project Director
DPR	Detailed Project Report
E	East
EA	Executing Agency
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ES	Environmental Specialist
GoI	Government of India
GoK	Government of Karnataka
GLSR	Ground Level Service Reservoir
GO	Government Order
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
HDPE	High Density Poly Ethylene
HSC	House Service Connection
H&S	Health and Safety
IA	Implementing Agency
IEE	Initial Environmental Examination
INR	Indian National Rupees
INRM	Indian Residential Mission
IWRM	Integrated Water Resource Management

KIUWMIP	Karnataka Integrated Urban Water Management Investment Program
KMRP	Karnataka Municipal Reforms Project
KSPCB	Karnataka State Pollution Control Board
KUIDFC	Karnataka Urban Infrastructure Development & Finance Corporation
KUWS&DB	Karnataka Urban Water Supply and Drainage Board
MFF	Multitranche Financing Facility
MoEFCC	Ministry of Environment, Forest and Climate Change
MS	Mild Steel
MSL	Mean Sea Level
N	North
NGO	Non-Government Organisation
NOx	Nitrogen Oxide
OH & S	Occupation Health and Safety
OHT	Over Head Tank
O&M	Operations & Maintenance
PIU	Program Implementation Unit
PMDCSC	Project Management Design Construction and Supervision Consultants
PMU	Program Management Unit
PPE	Personal Protection Equipment
PUC	Pollution Under Control
PWD	Public Works Department
R&R	Resettlement and Rehabilitation
RCC	Reinforced Cement Concrete
REA	Rapid Environmental Assessment
RoW	Right of Way
RP	Resettlement Plan
RPMU	Regional Program Management Unit
RSPM	Respirable Suspended Particulate Matter
SC	Steering Committee
SEIAA	State Environmental Impact Assessment Authority
SOP	Standard Operating Procedures
SPM	Suspended Particulate Matter
SPS	Safeguard Policy Statement
STP	Sewage Treatment plant
TMC	Town Municipal Council
ToR	Terms of Reference
ULB	Urban Local Body
USD	US Dollars
UWSS	Urban Water Supply & Sanitation
WTP	Water Treatment Plant
WWTP	Waste Water Treatment Plant

WEIGHTS AND MEASURES

^{o}C	degree centigrade
dB	Decibels
dia	diameter
kg	kilo gram
Kl	kilolitre
km	kilometre
kmph	kilometre per hour
ha	hectares
HP	Horse Power
LPCD	liters per capita per day
lps	liters per second
m	meter
m^3	Cubic meter
mg	milli gram
mm	milli meter
m^2/day	meter square per day
M	million
mcm	million cubic meters
ML	Million liters
MLD	million liters per day
sq.km	Square Kilometer

NOTE{S}

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

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EXECUTIVE SUMMARY

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

2. ByadgiTown24 x 7 water supply subproject is one of the subprojects proposed in Tranche 1.At present, the surface source is supplying from Tungabhadra Water Supply Scheme Commissioned in 2002. Under this scheme, water is supplied to Ranebennur, Byadgi and three enroute villages. The scheme was designed for 15.89 MLD of bulk water production. The allocated quantity to Byadgi is 3.3 MLD. But, Byadgiis getting 0.64 MLD only after utilization of en-route villages and current demand is 5.16 MLD.

3. The proposed water supply scheme was intended to cover entire town and have pipe line network of 101.5 km with 7389 House Service Connection. 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 sub components proposed under Tranche 1 which includes the town Water Supply System component.

4. **Categorization.** Byadgi Town Water Supply Scheme is classified as Environmental Category B as per the SPS 2009 as no significant impacts are envisioned. Accordingly this Initial Environmental Examination (IEE) has been prepared and assesses the environmental impacts and provides mitigation and monitoring measures to ensure no significant impacts as a result of the subproject.

5. **Subproject Scope**. The subproject scope in the draft IEE covered: (i) Construction of 1 no. GLSR of 900 KL at BettadaMallapa Hillock, (ii) rehabilitation of 11 km; 200- 400 mm diameter DI pipes from GLSR at BettadaMallappa Hillock to overhead reservoirs for further supply, (iii) new distribution pipeline of 14 km 90-160 mm dia HDPE pipes, (iv) installation of 22 nos. Bulk Water Meters and (v) installation of 7,030 nos. Domestic Meters. During the detailed design, the scope has been revised, and the subproject is split into two packages for convenience in implementation:(i) Bulk water supply package for the replacement of part of transmission main of 8.7 km with DI K9 pipe, and (ii) Distribution system package comprising (a) construction of one new overhead water storage reservoir of 0.1 ML at Nehru Nagar zone (b) replacement of 101.5 km pipeline network by HDPE and DI K7 pipes, and (v) 7,389 house service connections with 100% metering. Operation & Maintenance of implemented project of 24 x 7 water supply schemes for 5 yearsThis updated IEE reflects the final scope of work and design of the subproject .

6. **Implementation Arrangements.** Karnataka Urban Infrastructure Development & Finance Corporation (KUIDFC) is the Executing Agency (EA) responsible for implementing the Investment Program. Investment Program implementation activities is monitored by KUIDFC through a separate Investment Program Management Unit (PMU) for the IWRM Project, which set-up within KUIDFC. At the Executing Agency (i.e. KUIDFC), environmental issues coordinated centrally by an Environmental Specialist (Designated as Assistant Executive Engineer–Environment),reporting to the Task Manager, Assistant Executive Engineer–Environment will ensure that all subprojects comply with environmental safeguards. The IEE/ EIA reports prepared by the Consultant, and will be reviewed by the Assistant Executive

Engineer–Environment as per the ADB's Environmental Guidelines and forwarded to ADB for review and approval. The consultant (Program Management design construction supervision consultant, PMDCSC) includes an environmental specialist to supervise the implementation of environmental safeguards. The consultant team also includes a Construction Supervisor at each ULB/CMC responsible for the supervision of project implementation including environmental safeguards at the ULB/CMC level. Like other town, in Byadgi Program Implementation Unit (PIU) there is one Assistant Executive Engineer (AEE) responsible for safeguard implementation and environment specialist of PMDCSC assist AEE for environmental compliance. The contractor shall appoint one supervisor (environment & safety officer)who will be responsible on a day-to day basis for ensuring implementation of EMP, coordinating with RE and environment specialists(all levels), community liaison, consultation with interested/affected parties and grievance redressal and necessary reporting.

7. **Description of the Environment.** Subproject components are located in Byadgi urban area (23 wards divided in 5 zones, zone 1 – BettadaMallappa , zone 2- Gandhi Nagar, zone 3-Nehru Nagar, zone 4- Kollur Camp and zone 5-Agasanahalli) or in its immediate surroundings. All the components of the subproject sites are located in existing right of ways (RoWs) and government-owned land. No private land is required for this sub project. There are no protected areas, wetlands, mangroves, or estuaries in or near the subproject location. There are no forest areas within or near Byadgi. Traffic management will be necessary during pipe-laying.

8. **Potential Environmental Impacts.** Potential impacts were identified in relation to location, design, construction and operation of the improved infrastructure. Locations and siting of the proposed infrastructures were considered to reduce impacts.[1] During the construction phase, impacts mainly arise from (i) increased dusts due to excavation works; (ii) increased noise levels and air pollution in the immediate vicinity of the work; (iii) need to dispose of moderate quantities of waste soil; (iv) disturbance of residents and businesses, and (v) traffic. These are common temporary impacts of construction in urban areas, and there are well developed methods for their mitigation.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.

9. **Environmental Management Plan.** The EMP of this updated IEE includes (i) mitigation measures to reduce all negative impacts to acceptable levels; (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.

10. The purpose of the 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 Byadgi Town 24x7 Water Supply Subproject; (iii) detailing specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (iv) ensuring that safety recommendations are complied with.

11. This updated IEE 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

[1] These include (i) locating all 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 avoid acquisition of land and impacts on livelihoods specifically in densely populated areas of the city.

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. The contractor shall allocate a budget (as per EMP) for compliance with these EMP measures, requirements and actions. The contractor will be required to (i) submit a site-specific construction EMP (CEMP) based on the EMP of this updated IEE; (ii) establish an operational system for managing environmental impacts (ii) carry out all of the monitoring and mitigation measures set forth in the CEMP; and (iii) implement any corrective or preventative actions set out in safeguards monitoring reports that the PMU will prepare from time to time to monitor implementation of this IEE and CEMP. A copy of this updated IEE and EMP must be kept on work sites at all times.

12. The environmental monitoring program will ensure that all measures are implemented, and will determine whether the environment is protected as intended. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries. Any requirements for corrective action will be reported to the ADB.

13. **Benefits of the Subproject.** The most noticeable net environmental benefits to the population of the town will be positive and large, as a result of improved water supply scheme. The citizens of the Byadgi Town will be the major beneficiaries. In addition to improved environmental conditions, the subproject will improve the people's over-all health condition.With the improved water supply, they will be provided with a constant supply of better quality water, piped into their homes. Diseases of poor sanitation, such as diarrhoea and dysentery, should be reduced, so people should spend less on healthcare and lose fewer working days due to illness, so their economic status should also improve, as well as their overall health.

14. **Consultation and Disclosure.** The stakeholders were involved in developing and updating of the IEE through discussions on-site and public consultation, after which views expressed were incorporated into the IEE and in the planning and development of the subproject. The updated IEE will be 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 subproject implementation to ensure that stakeholders are fully engaged and have the opportunity to participate in its development and implementation.

15. **Grievance Redress Mechanism.** A grievance redress mechanism is described within the IEE to ensure any public grievances are addressed quickly.

16. **Monitoring and Reporting.** The PMU, PIU, and PMDCSC will be responsible for monitoring. The PMDCSC 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.** The proposed subproject is unlikely to cause significant adverse impacts. The potential impacts that are associated with design, construction& operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures &procedures. Based on the findings of the IEE, there are no significant impacts and the classification of the subproject as Category "B" is confirmed. No further special study or detailed environmental impact assessment (EIA) needs to be undertaken to comply with ADB SPS (2009) or GoI EIA Notification (2006).

I. INTRODUCTION

A. Introduction to KIUWMIP

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

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

3. The expected outcome will be improved water resource planning, monitoring and service delivery in 4 towns of the Upper Tungabhadra sub basin. Tranche 1 will have 3 outputs; (i) Expanded efficient UWSS infrastructure in 4 towns of the Upper Tungabhadra sub basin; (ii) Improved water resource planning, monitoring and service delivery in Karnataka; and (iii) KUIDFC strengthened capacity.The IEE is based on an assessment of these components within the project area.

B. Background of IEE

4. The Byadgi Town Water Supply Scheme is proposed in Tranche -1 of the KIUWMIP. At present, the surface source is supplying from Tungabhadra Water Supply Scheme Commissioned in 2002. Under this scheme, water is supplied to Ranebennur, Byadgi and three enroute villages. The scheme was designed for 15.89 MLD of bulk water production. The allocated quantity to Byadgi is 3.3 MLD. But Byadgi is getting 0.64 MLD only after Utilization of en-route villages. The current demand @ 135 LPCD is 5.16 MLD. Hence this project component is proposed.

5. Since acute scarcity of drinking water is felt by the citizens, KUWS & DB designed another combined water supply scheme to meet the demand of the Byadgi Town and en-route three villages from river Tungabhadra near the existing headwork of Ranebennur, which is near Muddenur village.

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

7. After completion of the detailed design in 2015, the subproject has been updated, and the subproject is split into two packages for convenience in implementation one is Bulk water supply comprising (i) replacement of part of transmission main of 8.7 km with DI pipe; second package comprising (i) construction of one new overhead water storage reservoir of 0.1 ML at Nehru Nagar zone (ii) replacement of 101.5 km pipeline network by HDPE and DI K7 pipes, and

(iii) 7,389 house service connections with 100% metering. Operation & Maintenance of implemented project of 24 x 7 water supply schemes for 5 years This IEE, for the Byadgi Town24 x 7 Water Supply Scheme Subproject, discusses the environmental impacts and mitigation measures relating to the location, design, construction and operation of all physical works proposed under this subproject. IEE relies mainly on secondary sources of information and site reconnaissance surveys including on-site informal discussions with the local people. The IEE follows the process and documentation as per the ADB's Safeguard Policy Statement (SPS, 2009). A Rapid Environmental Assessment Checklist is given in **Appendix 1**

C. Environmental Regulatory Compliance

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

Table 1: Applicable Environmental Regulations

Law	Description	Requirement
EIA Notification	The EIA Notification of 2006 and 2009 (replacing the EIA Notification of 1994), set out the requirement for environmental assessment in India. This states that Environmental Clearance 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 requires Environmental Clearance from the Ministry of Environment Forest and Climate Change (MoEFCC). Category B projects require Environmental Clearance from the State Environmental Impact Assessment Authority (SEIAA).	Sub project is not a listed activity in Schedule I of this notification and hence environmental clearance is not required.
Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments	Control of water pollution is achieved through administering conditions imposed in consent issued under provision of the Water (Prevention and Control of Pollution) Act of 1974. These conditions regulate the quality and quantity of effluent, the location of discharge and the frequency of monitoring of effluents. Any component of the Project having the potential to generate sewage or trade effluent will come under the purview of this Act, its rules and amendments. Such projects have to obtain Consent For Establish (CFE) under Section 25 of the Act from Karnataka State Pollution Control Board (KSPCB) before starting implementation and Consent For Operate (CFO) before commissioning. The Water Act also requires the occupier of such projects to take measures for abating the possible pollution of receiving water bodies.	None of the components in this sub project requires CFE or CFO under this act.
Air (Prevention and	The projects having potential to emit air	For the project, the following

Law	Description	Requirement
Control of Pollution) Act of 1981, Rules of 1982 and amendments.	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.	will require CFE and CFO from KSPCB: if, (i) diesel generators; (ii) hot mix plants; and (iii) stone crushers, 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 2** 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 3**provides applicable noise standards.
Ancient Monuments and Archaeological Sites and Remains Act, 1958 and Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010	The Amendment Act designates areas within 100 meters (m) from the "protected property" as "prohibited area" and beyond that up to 200 m as "regulated area" respectively. No "construction" is permitted in the "prohibited area" and any "construction" in the "regulated area" requires prior permission of the Archaeological Survey of India (ASI). "Protected property" includes the site, remains, and monuments protected by ASI or the State Department of Archaeology and "construction" means the construction of any structure or building.	There are no protected properties near project area in Byadgi. However, in case of chance finds, the contractors will be required to follow a protocol as defined in the Environmental Management Plan (EMP).
Land Acquisition Act of 1894	Privateland 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 Byadgi Water Supply Scheme, no private land is required to be acquired.
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	**Appendix 4** provides applicable labor laws including amendments issued from time to time applicable to establishments engaged in construction of civil works.

Law	Description	Requirement
	retirement, and discipline. The contractor shall provide equal wages and benefits to men and women for work of equal value or type.	
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 Byadgi Town Water Supply Scheme as no mentioned activities are involved in the 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 Byadgi Town Water Supply Scheme as no wetlands presents in the project area.
Wildlife Protection Act, 1972	This overarching Act provides protection to wild animals, birds, plants and matters connected with habitat protection, processes to declare protected areas, regulation of wildlife trade, constitution of state and national board for wildlife, zoo authority, tiger conservation authority, penalty clauses and other important regulations.	Not applicable to Byadgi Town Water Supply Scheme as none of the project component will have any impact on wildlife or protected areas.
Forest (Conservation) Act, 1980	The Forest (Conservation) Act prevents the use of forest land for non-forest uses without the clearance from Ministry of Environment and Forests (MoEF), Govt. of India	Not applicable to Byadgi Town Water Supply Scheme as there is no forest area within or adjacent to the project area.
KarnatakaForest Act, 1963 and KarnatakaForestRules, 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 Byadgi Town Water Supply Scheme as there is no forest area within or adjacent to the project area.
Karnataka Preservation of Trees Act, 1976 and Karnataka Preservation of Trees Rules, 1977	This Act has put restriction on felling of trees in the State unless until permitted by the Tree Officer. Any person desiring to fell a tree shall apply in writing to the tree officer for permission in that behalf. It further defines clauses for planting adequate number of trees, planting in place of fallen/destroyed trees, preservation of trees and adoption of trees.	No Tree cutting envisaged as per the present design. Compensatory plantation as stipulated in the tree cutting permission shall be adhered to if any tree cutting required.

9. 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.

10. The environmental impacts of Byadgi Town Water Supply Scheme sub project have been identified and assessed as part of the planning and design process. Environmental assessment using ADB's Rapid Environmental Assessment Checklist for Water Supply Scheme componentswereconducted and results of the assessments show that the project is unlikely to cause significant adverse impacts. Thus, this IEE has been prepared in accordance with ADB SPS's requirements for environment category B projects.

D. Scope of IEE

11. 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

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

II. DESCRIPTION OF THE PROJECT COMPONENTS

13. Geographically, Byadgi Town is located at a latitude of 14°41'18" N and longitude of 75°29′19"E, at an average altitude of 630 m above the mean sea level (MSL).

A. Need for Infrastructure Improvement inByadgi

14. At present Byadgi Town meets its water supply requirement through both surface and sub-surface sources. River Tungabhadra is the main surface source of water supply to Byadgi. The sub-surface sources mainly comprise of bore wells. The sub-surface sources cater to small pockets of population within their respective service areas.

15. In the Old water supply surface source, water was supplying from Tungabhadra Water Supply Scheme Commissioned in 2002. Under this scheme, water was supplied to Ranebennur, Byadgi and three enroute villages. The scheme was designed for 15.89 MLD of bulk water production. The allocated quantity to Byadgiwas3.3 MLD, however due to various

reasons (such as leakages, power shortages, etc.,) the actual quantity reached Byadgi was much less (0.64 MLD)after utilizationof en-route villages. To meet the demand supply gap, the PMC also provided water supply from 56 bore wells, out of which 55 are fitted with power pumps and one with hand pump.

16. Considering the water supply situation in Byadgi, a scheme to improve the water supply to Byadgi town was initiated in 2012 by Karnataka Urban Water Supply and Drainage Board (KUWSDB)to provide bulk water of 9.08 MLD from River Tungabhadra to Byadgi town and three en-route villages namely (i) Asudi (ii) Hulihalli and (iii) Kadaramandagi. This project is now completed, works are recently commissioned (in the later part of 2016), and presently the water is being supplied to Byadgi from this new water supply system. The water allocated to Byadgi in this scheme is 7.3 MLD. Following are the components of the scheme:

(i) **Head Works**: The new intake is constructed in River Tungabhadra at Mudenur about 35 km fromByadgi town. Intake is designed for Ultimate demand of 9.08 MLD with 4 m dia RCC intake with 600mm dia RCC connecting pipe line from intake to Jack Well. Jack well is designed for ultimate demand with 8 m dia RCC Jack well cum pump house, which is provided with three 75 HP pumps (2 working + 1 standby).

(ii) **Transmission Main.** The total distance between the Jack Well and the new WTP at Byadgi is 35.74 km. Of which, under the schemes, KUWS&DB has laid a new pipeline for a length of 27 km(400 mm diameter mild steel (MS) pipe). In the rest 8.7 km stretch (from chainage 20020 m to 28655),it has utilized an existing old MS pipe of323.9 mm diameter. It is learnt that though this existing pipe is not in very good condition, and apparently has a history of leaks and busts, the KUWS&DB has utilized this mainly due to lack of adequate funds to put an entire new transmission main.

(iii) **Water Treatment Plant (WTP).** A WTP of capacity 6.81 MLD is constructed at Byadgi. Treatment process is based on conventional water treatment, and consists of following components:1) Cascade aerator, 2) Parshall flume, 3) Flash Mixer, 4) Clarifloculator, 5) Rapid Sand filter (4 twin beds), 6) Wash water tank,7) Chemical House, 8) Laboratory and office, 9) Pure water sump and Pump house, 10) Chlorinator room and tonner room, 11) The back wash water and clarifloculator waste water is discharged into the drain.

(iv) **Clear water sump, pump house and clear water main**. A 5 lakh liter capacity clear water sump is constructed at the WTP, and a pump house with 50 HP pumps to pump clear water to the fiveexisting service reservoirs in Byadgi–GhandhinagarOHT (1.0 ML), Kolur Camp OHT (0.455 ML), Agasanahalli OHT (0.1 ML), Nehru Nagar OHT (0.455 ML) and Bettada Hillock zone GLSR (0.5 ML).Feeder mains of 150-300 mm dia DI are laid from the clear water pump house at WTP to all the existing service reservoirs.

B. Description of the Subproject

17. The water requirement for the Byadgi town is for the year 2016 is estimated as 5.16 MLD, 2031 is 6.89 MLD and 2046 is 9.71 MLD. The above KUWS&DB scheme is adequate to provide water supply to meet the demand of 2031, and augmentation will be required after year 2031. Therefore in the KIUWMIP, it is proposed improve the distribution system, provide an additional service reservoir, and the house service connections with meters in the entire town. Besides it is also proposed under the project to replace the 8.7 km section of raw transmission main (fromchainage 20020 m to 28655), that is old and leaking, with a new pipe.

18. Following table (**Table 2**) shows the various components of this subproject. The descriptions shown in are based on the detailed design, and are final. Figure 1 and 2 shows location map of Byadgi town. Proposed schematic scheme and comprehensive diagram for the proposed water supply network is given in **Figure 3 and 4.** One OHT will be constructed within Govt land beside existing OHT at Nehru Nagar. Location of OHT at Byadgi is shown in **Figure 5.** Presently land is vacant**.** Proposed replacement of part of raw water transmission line from 20020 m to 28655 m chainage with 400 mm diameter DI K-9 Class pipeis shown in google map in **Figure 6.** Allignment of transmission main is mostly vacant land and within road ROW.Layout plan of reservoir is shown in **Figure 7.** Distribution pipe line will be layed different part of the town and along the existing road. There is no as such congested area along the road. **Appendix 5** shows photo illlustration of different project locations.

Table 2: Proposed Components in this sub project

Component	Description of Works	Location
Bulk Water Supply* 01WS02		
1. Raw water main	Providing new pipe for the section from 20020 m to 28655 m • 8.7 km 400 mm Diameter DI K-9 class pipe	About 2 km of the section is along national highway 4 (NH4). Pipeline will be laid underground in the NH service road. The rest of the section will be laid along a main road connecting Byadgi with NH4. Road is wide and the pipeline willbe laid in the earthen shoulder of the road with in the right of way.
Distribution network 01WS03		
1. Distribution Supply Network	101.5 km length 100.15 km HDPE pipes • 63 mm - 7,608 m • 75 mm - 39,865 m • 90 mm - 21,819 m • 110 mm - 11,244 m • 140 mm- 2,477 m • 160 mm - 6,535 m • 200 mm - 6,579 m • 250 mm - 4,025 m 1.364 km DI pipes • 300 mm- 1,364 m	Pipes will be laid along the roads, and will almost cover entire city. No land acquisition required. ROW is available and sufficient for civil works and has no encroachment.
2. Service reservoir	New overhead tank (OHT)at Nehru Nagar in Zone 3 Capacity: 1 million litre	OHT will be constructed in a vacant Government land beside the existing OHT at Nehru Nagar.
3. House Service Connections (HSC)	7389 Nos. at Zone 1,2,3,4 and 5. All the properties will be connected with HSC with meters	At each house in the service area

* Raw water main component- separate package with Harihar WS package

C. Implementation Schedule.

19. Preparation of detailed project report and bids for this subproject commenced on June2016. Construction activities for this subproject are likely to start in February 2017, and should be completed in 30 months. A tentative schedule is given below.

- Bulk Water 01WS02

Completion of DPR	-	June 2015
Tender issue	-	June 2016
Contract Award	-	Jan 2017
Commencement of work	-	Feb 2017
Completion of work	-	July 2018

Present Status: The bid for the bulk water supply improvements package was tendered on 09 June 2016 and technical bid was opened on 02 Aug 2016 and technical bid evaluation under progress

- Distribution network 01WS03

Completion of DPR	-	June2015
Tender issue	-	Jan 2017
Contract Award	-	June 2017
Commencement of work	-	July 2017
Completion of work	-	June 2019
Operation and Maintanance	-	May 2026(7 years)

Figure 1: View of Byadgi Town

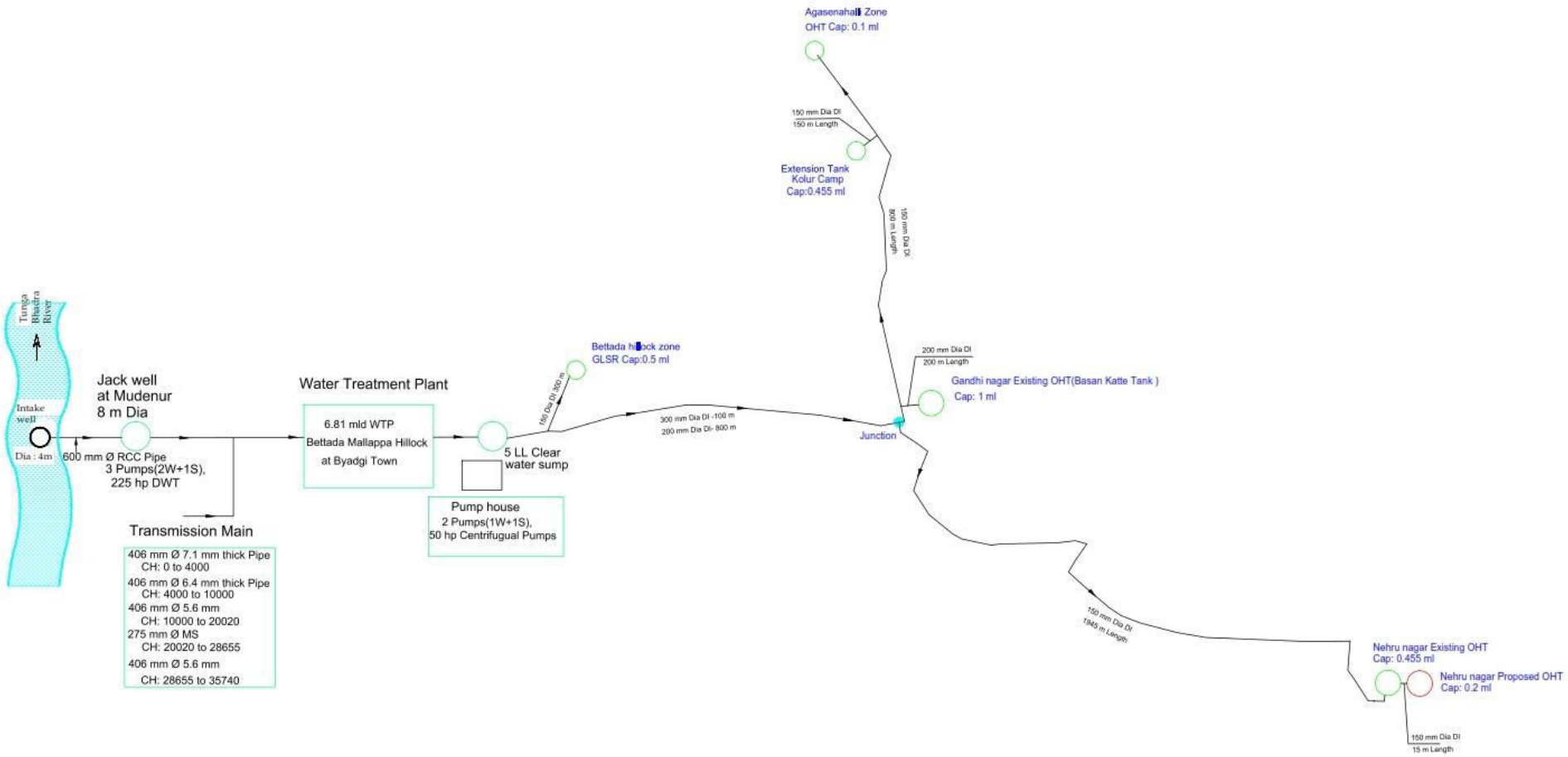

Figure 2: Schematic Diagram of KUWS&DBByadgi Water Supply Scheme

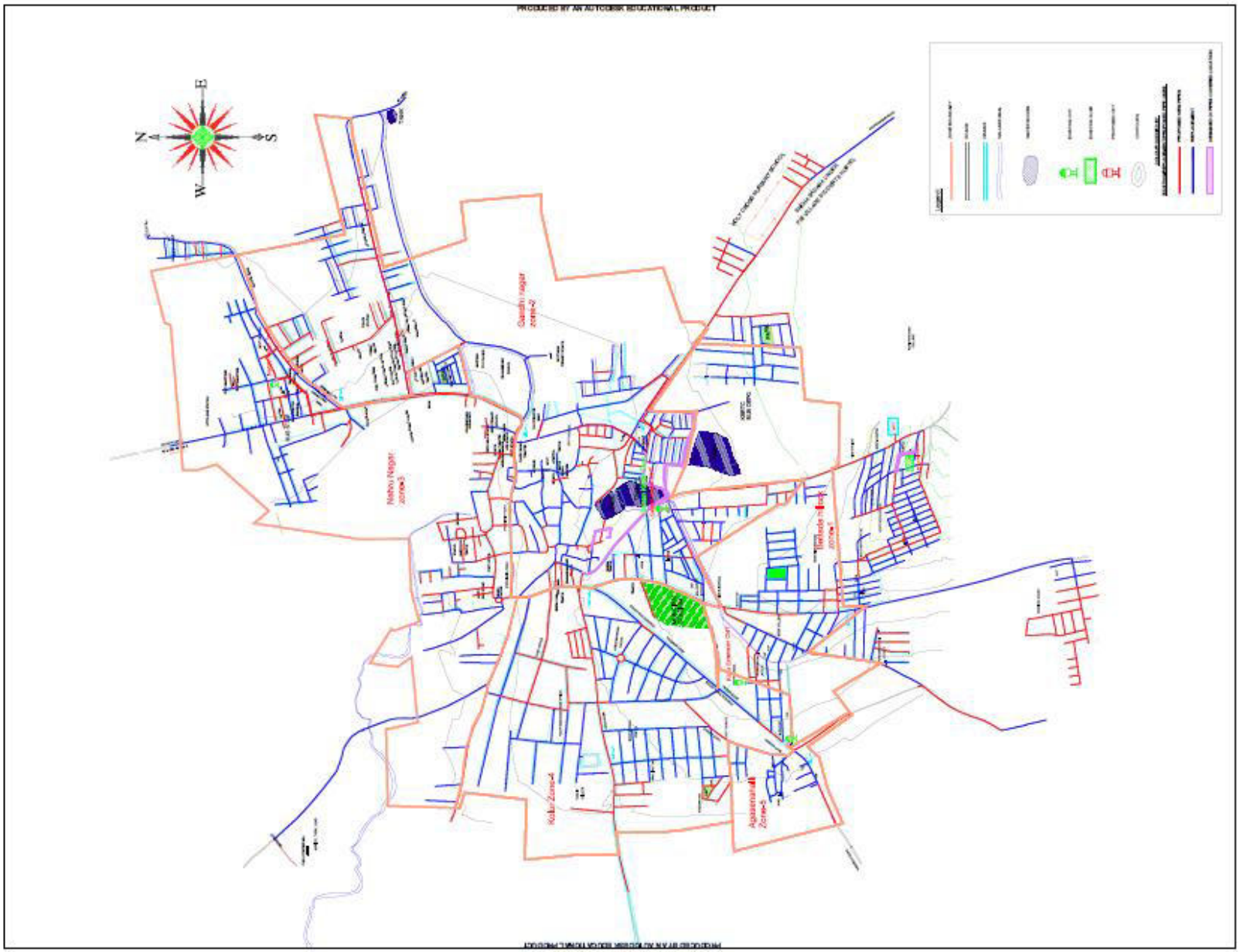

Figure 3:The Comprehensive Plan of Water Supply System in Byadgi City

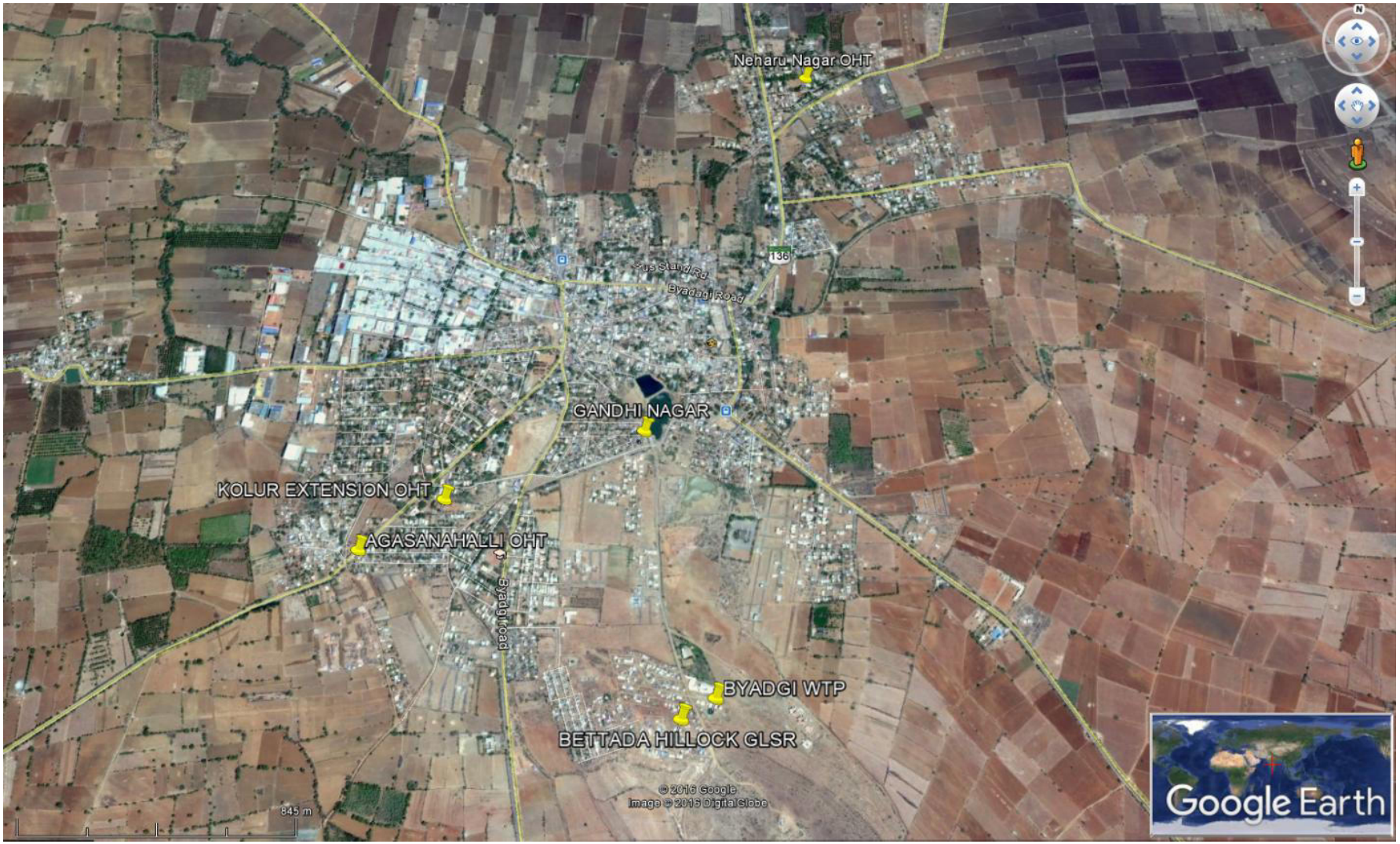

Figure 4: Location of OHT inByadgi

Figure 5: Proposed 8.7 km Raw Water Transmission Alignment

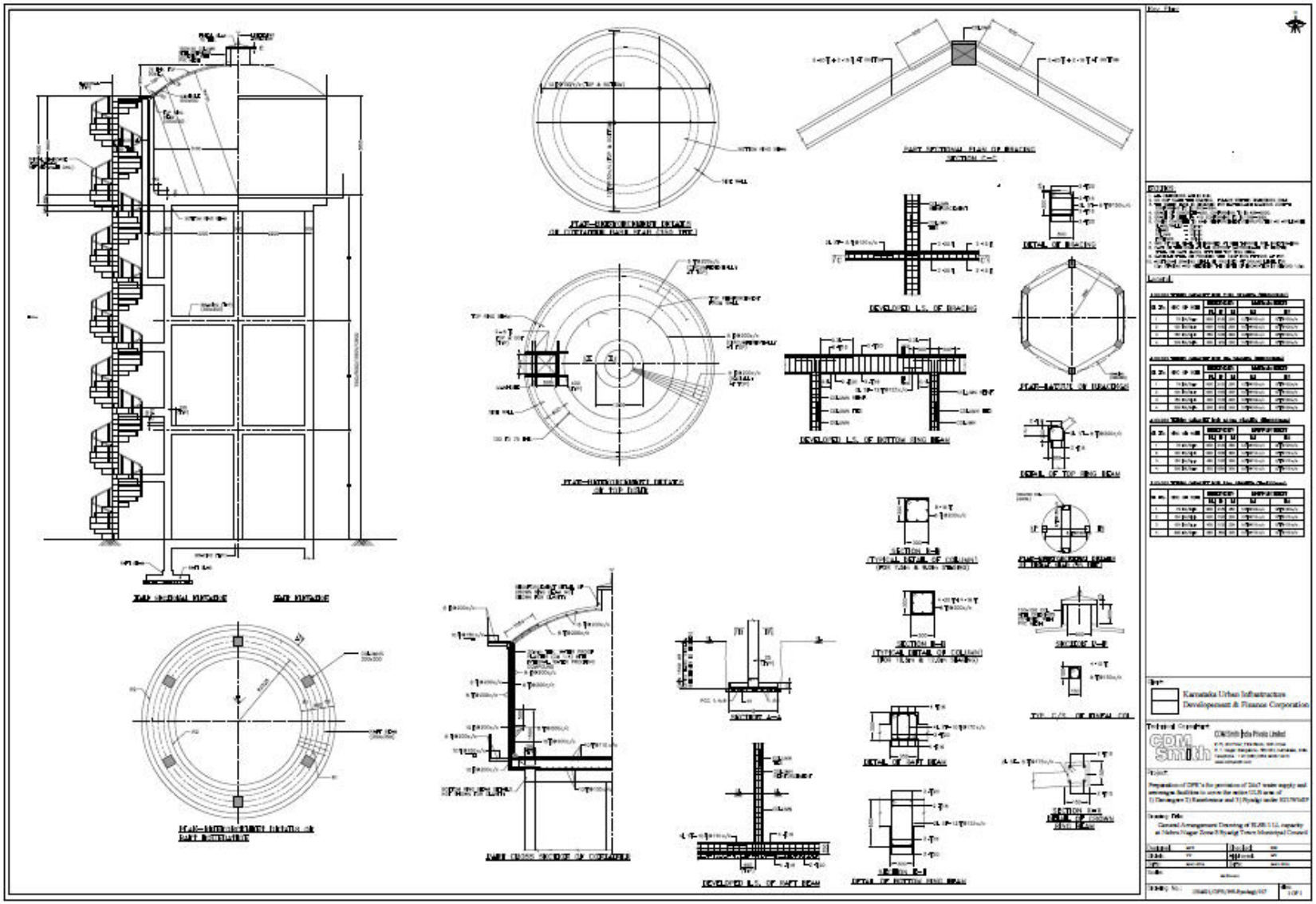

Figure 6: Layout of reservoir

III. DESCRIPTION OF THE ENVIRONMENT

A. Environmental Profile of Byadgi

Location

20. Byadgi is located in Haveri District. Geographically, Byadgi Town is located at a latitude of 14°41′18" N and longitude of 75°29′19"E. The town is located 10 km away from National Highway (Pune-Bangalore).

21. Byadgi has the status of Town Municipal Council (TMC). The town is divided into 23 wards and spreading to an area of 4.20 sq. Km.

Topography, Soil & Geology

22. The town is located on plain terrain. The town has two types of soil – hard red sandy soil in southern part and medium black and deep black cotton soil in northern part. The red loamy soil and laterite soil are seen in very small parts on southern border of the district. This type of soil favours cotton and groundnut cultivation.

23. Geology of Byadgi, consists of Ranebennur group of Dharwad rock formationand consists more of gravel and chlorite phylites. The bases of these rocks are less distributed and have only small cracks.

24. The average Ground Level is 630 m above MSL. There is isolated pocket in the south which is 696 m above MSL.

25. As per the seismic zoning map of India, Byadgi Town falls under the zone II, which is the lowest earth quake risk zone in India. The zone is terms as "Low Damage Risk Zone"

Climate

26. Byadgi has a tropical climate characterized by general dryness except during monsoon and blessed with a good and healthy climate throughout the year. The average annual rainfall of Byadgi is 753 mm. The rainfall occurs in monsoon seasons from June to September.

27. Byadgi experiences slight variation in temperature across the year. April and May experiences high temperature and the lowest are recorded in the months of December and January. The average maximum and minimum temperatures are 38^{o}C and 22^{o}C respectively. The relative humidity is high during monsoon, 80.7 % and less in February 55 %.

28. During January and February the wind blow predominantly from south east to south, March and April being transitional the south-easterly winds are gradually replace with northwest or westerly winds. From April to September the winds are predominantly from northwest or west direction, in October the reversal of direction is completed and during November – December wind blow predominantly from east to south east. The wind speed ranges from 7.0 to 19.6 kmph and average speed is 7.1kmph.

Table 3:Climatic Profile of Byadgi

Month	Climate Data					
	Rainfall (mm)	Temperature (^{o}C)			Relative Humidity (%)	Wind Speed (KMPH)
		Max	Min	Mean		
Jan	0.6	30.7	15.9	23.3	61.1	5.9
Feb	1.0	32.6	17.7	25.2	57.9	6.1
Mar	4.2	35.1	20.4	27.8	55.1	5.6
Apr	44.7	36.2	22.8	29.5	56.8	5.7
May	86.6	35.3	23.3	29.3	62.3	7.2
Jun	94.3	30.9	22.3	26.6	70.6	10.0
Jul	156.8	28.9	21.9	25.4	79.6	10.5
Aug	97.3	28.5	21.6	25.0	80.7	9.3
Sep	99.6	29.7	21.2	25.5	77.6	6.7
Oct	114.3	30.4	20.8	25.6	74.3	6.0
Nov	41.0	30.3	18.7	24.5	67.9	5.4
Dec	6.8	30.0	16.4	23.2	63.4	7.1

Source: Indian Meteorological Department

Air Quality

29. The major sources of sound pollution in the city are from the vehicles. Karnataka State Pollution Control Board (KSPCB) monitors air and noise pollution in the State in line with Air (Prevention and Control of Pollution) Act, 1981. KSPCB have monitoring stations located at various places across the state; however it covers major cities and industrial locations only. There are no regular monitoring stations in Byadgi.

30. Byadgi is a small town with limited urbanization and traffic density. There are no major industries around Byadgi. Hence the air pollution is comparatively low compared to other towns in the district. Vehicular emission and dust pollution are high on the main roads and commercial places.

Surface Water

31. There are no notable rivers and streams in and around the Byadgi town. Hombaraddikere (Lake) is the major water body near to Byadgi town in addition to few small tanks in the town limit. The water from the town drains into Shanbogar*Nalla*, which flows from east to west and carries runoff to HombaradiKere.

Ground Water

32. The ground water development varies between 64 % and 92 % for ByadgiTaluk as on year 2012. In the study conducted by Central Ground Water Board (CGWB), chloride problem was observed in ByadgiTaluk. **Table 4** gives the Ground Water Table status for Byadgi

Table 4: Groundwater Development in Byadgi Taluk

Particulars		Details (in mcm)
Recharge from Rainfall during monsoon season		19.57
Recharge from other sources during monsoon season		28.24
Recharge from Rainfall during non-monsoon season		13.19
Recharge from other sources during non-monsoon season		10.94
Net annual ground water availability		65.25
Gross ground water draft for all users		62.55
Stage of Development		96 %
Categorization (as on March 2009)	Safe Area	20 %
	Over Exploited Area	80 %

Industry & Agriculture

33. With the exception of agriculture there is no major industries in the town, however urbanization and urban population growth indicates a trend of change in the occupation pattern of the community from the agriculture related tasks to light industrial and other non-agriculture occupations. BESM Arts and Science College and Ballari Rudrapa College are the major higher educational institutions in Byadgi.

34. Byadgi has a large Agriculture Produce Marketing Committee (APMC) yard that caters to the surrounding towns and villages which. Due to good connectivity by roads and railway line with other parts of the region, it has become a focal point for trade and commerce

Storm Water Drainage

35. There is no major watercourse in the town. Key issues associated with storm waterdrainage in the town comprise: (i) only 18 percent of the road length is covered withdrains; (ii) Adverse health impacts on population living in low-lying areas due tounplanned disposal of storm water; and (iii) Disposal of sullage/solid waste into roadside/natural drain result in blockage of drains and polluting Tanks.

36. The City Development Plan proposes to develop Byadagi's storm water drainage based on: (i) Rehabilitation of Existing Drains; and (ii) Laying of new roadside drains.

Transportation

37. Key transportation issues in Byadagi TMC – (i) Hogaragali road and Main road exhibit poor surface condition with cracks, potholes, ravelling and soil on the surface; It was observed that street roads are poor in surface condition with the presence of potholes and soil present on the surface; Absence of road side drains; (ii) Soil strata of the town is characterised as sand and BC soil, and the town also has extreme climatic conditions affecting the road construction and maintenance; (iii) There are two junctions and Main road, Hausabhavi road with considerable pedestrian movement, but there is no footpath. Effective road width is reduced due to pedestrian movement on carriageway causing accidental risk; (iv) Encroachment of sidewalks by street-side vendors; (v) There is no parking regulation;

Socio Cultural Resources

38. **Demography:**Byadgi population has grown from 25,663 in 2001 to 30,600 in 2011 with a growth rate of 19.24 %. The decadal growth was never steady during the past ten decades. The lowest growth rate of 6.65 was observed during 1961-71 and the highest was recorded in the decade 1921-1931with a figure of 40.17 percent. Details of decadal population growth are indicated in the

39. Table 5 below.

Table 5: Population Growth of Byadgi Town

Year	Population	Decadal Growth Rate
	Nos.	%
1921	5,502	-
1931	7,712	40.17
1941	8,783	13.89
1951	11,625	32.36
1961	13,450	15.70
1971	14,345	6.65
1981	17,935	25.03
1991	20,574	14.71
2001	25,663	24.74
2011	30,600	19.24

40. The population density of Byadgi Town was 4,270 persons per square kilometre in the year 1981 and it increased to 7,286 persons per square kilometre in 2011.

41. **Sex Ratio**.The current sex ratio (female population per 1,000 male population) in Byadgi is 983, which is higher than the district and state urban average figures of 945 and 940 respectively. The sex ratio is showing an increasing trend from the year 1971 to 2011, which indicates that the female population is growing at a faster rate than the male population.

42. **Literacy**.The literacy rate of the city is 67.0 percent (2011 census).

History, Culture & Tourism

43. Byadgi is a Taluka in Haveri District. The town is a moderate urban centre in the District. The history of Byadgi is very old. The surrounding areas of Byadgi produce Chilli (red in colour and long) which is dried in sun light and sent to different markets. This spicy chilli is one of the common ingredients used in Udupi cuisine.

44. Famous holy place KagineleKanakadas Temple is located in the Byadgitaluk and 15 km northeast in direction from Byadgi town. Another holy place Kadaramandalagi KanteshTemple is 6 km away from Byadgi.

45. Largest proportion of population comprises Hindus followed by Muslims and then Christians. Almost all speak in Kannada followed by Hindi.

B. Environmental Settings of Investment Program Component Sites

46. As per proposed plan transmission main for 8.7 Km will be laid along the road, which is vacant and located within ROW. From Chainage 20020 to 22020 for about 2 Km the pipe line needs to be laid along the service road of National highway within the right of way and balance pipe line needs to be laid along the PWD road ROW. And the surrounding land use pattern is agricultural land. Water storage reservoir at Nehru Nagar is located within the existing OHT campus and in Govt. land. Distribution pipeline will be laid within ROW of the road with no river/ canal/ highways crossing. There is no significant environmental sensitive feature in the proposed area. The proposed components are not expected to cause any long term or major environmental impacts. **Appendix 5** shows the site photographs.

IV. SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Introduction

47. 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 further.

48. As a general practice, an IEE should evaluate impacts due to the pre- construction (location, design), construction and operation phases of the project. Construction and operation are the two activities in which the project interacts physically with the environment, so they are the two activities during which the environmental impacts occur. In assessing the effects of these processes therefore, all potential impacts of the project should be identified, and mitigation is devised for any negative impacts. Following sections evaluate impacts of the proposed24 x 7 Water Supply Scheme for Byadgi town.

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

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

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

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

49. 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.

50. 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. The complete checklist is given in **Appendix 1.**

51. In this sub project component, new water supply lines, OHT and House Service Connections are proposed. The proposed components are not falling in any environmentally sensitive area.

B. Pre-Construction Impact

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

53. In case of water supply lines, no significant impacts are anticipated since the laying of waterline will be along the already built up area.The one new OHT has been proposedisin government land. Therefore, no private land will be required for any of the components in this sub project.

54. Proposed subproject sites are carefully selected to avoid encroachment into sensitive areas and minimise the impacts on people livelihoods and homestead.

55. 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.

56. The ULB/TMC should obtain necessary clearances before the starting of the work. The contractor has to ensure the clearance before starting the work. The applicable clearances are given as **Appendix 8.**

57. **Utilities.**During the installation stage of water lines,traffic and public utilities like telephone lines, electric poles and wires, water lines within the proposed sub project locations may require to be shifted in few cases. To mitigate the adverse impacts due to relocation of the utilities, IA will:

(a) Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase;
(b) Conduct detailed site surveys with the construction drawings and discuss with the respective agencies during the construction phase before ground clearance; and
(c) Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. In case of disruption of water supply, alternative supply, through tankers, shall be provided.

58. **Site selection of construction work camps, stockpile areas, storage areas, and disposal areas**. If the work camp is planning to set up, priority is to locate these near the subproject locations. However, if it is deemed necessary to locate elsewhere, sites to be considered will not result in destruction of property, vegetation, irrigation, and drinking water supply systems. Residential areas will not be considered for setting up camps to protect the

human environment (i.e., to curb accident risks, health risks due to air and water pollution and dust, and noise, and to prevent social conflicts, shortages of amenities, and crime). Extreme care will be taken to avoid disposals near the forest, water bodies, swamps, or in areas which will inconvenience the community. All locations would be included in the design specifications and on plan drawings. Construction work camps shall be located at least 200 m from residential areas. Material stockpiles shall be protected by bunds during the monsoon to arrest the silt laden runoff into drains.

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

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

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

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

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

63. However, in order to maintain unanimity in the design period and design population, it is proposed to consider 2046 as the design year for all the system components. Accordingly, 2016 shall be the base year and 2031 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.

64. This subproject is mainly proposed to rehabilitate the entire distribution system in Byadgi along with a provision of additional OHT to improve the service levels. It is also proposed to provide a new pipe section in the raw water transmission, which is currently leaking.The subproject do not include any new source development or source augmentation measures, as adequate water supply is already made available to Byadgi through a new project by

KUWS&DB. This subproject will complete the existing scheme and improve the service, and therefore no notable design related impacts.

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

(a) Consult TMC to obtain an expert assessment of the archaeological potential of the site;
(b) Consider alternatives if the site is found to be of high risk;
(c) 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
(d) 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.

C. Construction Impact

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

67. The excavation is done in such a way that there will be a minimum depth of 1 meter.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.

68. Following table (**Table 6**) shows the details of construction activities involved in the subproject.

Table 6:Construction Activities for the Subproject

Component	Construction method	Likely waste generated
Water Supply line	Trench excavation along the identified main roads of about 1 meter plus pipe dia, but in some case it may go deeper. A bed of sand of 100 mm thick will be prepared at the bottom and pipes will be placed and joined. Excavated soil will be replaced and compacted. Where the pipes are laid in the roadway, handheld pneumatic drill will be used to break the road surface. Construction activity will be conducted along the roads in the town and will cover most part of the town. The work will be conducted by a team of 5 workers at each site	~ 10,97,46 m^3 of soil will be excavated; 70-75% will be utilized for refill; remaining soil (~26,000 m^3) need to be disposed off This excess soil shall be used for filling if required or stored/ dumped in approved debris disposal site.
Raw water	A trench of size 1 m wide and 1.7 m deep will be	~ 14,790 m^3 of soil will be

Component	Construction method	Likely waste generated
transmission line	excavated along the roads. As the pipeline is located along the wide main roads (NH4 & PWD road), excavation will be done using mechanical excavator. A bed of sand of 100 mm thick will be prepared at the bottom and pipes will be placed and joined. Excavated soil will be replaced and compacted. The work will be conducted by a team of 5 workers at each site.	excavated; 85% will be utilized for refill; remaining soil (~2500 m^3) need to be disposed off This excess soil shall be used for filling if required or stored/ dumped in approved debris disposal site.
OHT	The cavity for the foundations for the overhead tank (OHT) will be excavated manually. Aggregate and concrete will be tipped into each void to create the foundations and floor, after which metal reinforcing rods will be added to create the outline of the walls of the reservoir and the vertical supporting pillars. Sections of reinforcing will then be encased in wooden shuttering and concrete will be poured in, and this process will be repeated to gradually create each structure from RCC, including the tank of the reservoirs. Surfaces will be smoothed and finished where necessary by hand. The work will be conducted by a team of 10-15 workers at each site	Quantity of excavated earth generated from the work is minimal and will be utilized at the site for levelling and in other construction works.

69. Although construction of the pipelines involve quite simple techniques of civil work, the invasive nature of excavation and the subproject locations in the built-up areas of ByadgiTown, 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.

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

71. While trenching at densely populated areas like market place or layouts, roads with heavy traffics additional care has to be taken. Hard barricade should be mandatorily provided along with caution board and traffic diversion boards. Some of the densely populated areaidentified at Byadgi are Nehru Nagar, Chowdeshwari Nagar, Byadgi Market etc. and major road with heavy traffic are State Highway, Bus stand road and Bye-pass road. Except these three road, all other roads are narrow and/or located in busy commercial area. Therefore, full closure will be required in those stretches.

72. Prior to starting of work, the contractor should prepare Construction Management Plan. The Construction Management Plan should be site specific and has to submit every month before starting the work. The Construction Management Plan will include the method statement for construction works, Utility Management and Contingency Plan, Traffic Management Plan, Work camp and Labour Camp details, Safety measures taken for the workers and the public. etc.

73. The method statement for pipeline works should be simple and explain the contractor's work process that is actually conducted on site, with safety and safeguard concerns. Method Statement is very important, particularly for pipe line works along the roads. Method Statement

can be prepared for each stretch (say 1 km) /specific site based on the project area. Method Statement should be in a Table format with appended site layout map and cover the following:

- Work description
- No. Of workers (skilled & unskilled)
- Details of Plant, equipment & machinery, vehicles
- Work duration (total, and activity-wise, for example for pipe laying, from excavation to road resurfacing/testing)
- PPE (helmet, gloves, boots, etc) details for each type of work
- Details of materials at each site (type & quantity)
- Risks/hazards associated with the work (for example, Trench excavation will have risks such as trench collapse, persons/vehicles falling into trench, structural risk to nearby buildings, damage to buildings, infrastructure etc)
- Construction waste/debris generated (details & quantity)
- Detail the sequence of work process (step-by-step) including specific details of each work
- Contractor's supervision & management arrangements for the work
- Emergency: Designate (i) responsible person on site, and (ii) first aider
- Typical site layout plan including pipe trenching, placement of material, excavated earth, barricading etc
- The pipelines are to be laid along the roads. The excavated soil, placed along the trench may get disturbed due to wind, rain water and the movement of workers, vehicles and pedestrians, and spill onto road way – disturbing road users, creating dust, road safety issues, etc, and also into nearby open drains.

74. The following should be included in the site layout plan:

- Provide barricading/security personnel at the site to prevent entry/trespassing of pedestrian/vehicles into the work zone
- Location of temporary stockpiles and provision of bunds
- Separation of stockpiles areas with workers/vehicle movement paths to avoid disturbing the stockpiled soil
- Wetting of soil to arrest dust generation by sprinkling water
- Waste/surplus soil and concrete debris utilization and disposal plan – indicate expected duration of temporary stockpiling along the trench at each site and identify final surplus soil utilization/disposal site in consultation with PIU

i. Impact on Physical Resources

75. **Topography, Soils & Geology**. Subproject activities are not large enough to affect these features; so there will be no impacts.

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

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

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

(a) Consult with PIU on the designated areas for stockpiling of clay, soils, gravel, and other construction materials;
(b) Damp down exposed soil and any stockpiled on site by spraying with water when necessary during dry weather;
(c) Bring materials (aggregates, sand, etc gravel) as and when required;
(d) Use tarpaulins to cover sand and other loose material when transported by vehicles;
(e) Clean wheels and undercarriage of vehicles prior to leaving construction site
(f) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly; ensure valid Pollution Under Control (PUC) Certificates for all vehicles and equipment used in the construction activity.

78. **Noise Levels.** The soils are deep in the subproject area and therefore activities like rock cutting/blasting that generate high noise are not anticipated. In isolated areas where a hard stratum is encountered (especially for deep pipe lines in some locations requiring using of pneumatic drills, there will be high noise during the activity. Also, where the pipelines are required to be laid in the roadway, pneumatic drills will be used to break open the road surface. Pneumatic drills typically generate an equitant noise of 82-98 dBA, at 1 m distance from the activity. Increase in noise level may be caused by excavation equipment, and the transportation of equipment, materials, and people. The sensitive receptors are the general population and socio-cultural institutions in the area. Noise will be for a short term (about 2-3 days at each location) thus impact is minimal and short-term. The construction contractor will be required to:

(a) Plan activities in consultation with the PIU so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance;
(b) Construction work shall be limited to day light hours (6 AM to 6 PM)
(c) Provide prior information to the local public about the work schedule;
(d) Ensure that there are no old and sensitive buildings that may come under risk due to the use of pneumatic drills; if there is risk, cut the rocks manually by chiselling;
(e) Minimize noise from construction equipment/pneumatic drills by using silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and
(f) Maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at a distance of 10 m or more from the vehicle/s.
(g) Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach;

79. **Surface Water Quality.** Byadgi topography is primarily plain; the town receives moderate rainfall. The South – West Monsoon winds brings rainfall from June to September while the North – East monsoon winds delivers further rainfall from October to December. Due to these reasons and also that excavation will not certainly be conducted during rains, there is

no impact on drainage and surface water quality is envisaged. In unavoidable case of excavation during monsoons, there may be temporary impacts like flooding of construction sites, mixing of construction waste and material within the runoff, etc. This may lead to silting and blockage of drains and water bodies. 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.

80. These potential impacts are temporary and short-term duration only and to ensure these are mitigated, construction contractor will be required to:

(a) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets
(b) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with Implementing Agency on designated disposal areas
(c) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies
(d) Provide temporary bunds for stockpiles and materials
(e) Place storage areas for fuels and lubricants away from any drainage leading to water bodies
(f) Dispose any wastes generated by construction activities in designated sites.
(g) Conduct surface quality inspection and monitoring.

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

82. 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.

83. **Landscape and Aesthetics**. The construction work is likely to generate considerable quantities of waste soil. The pipe laying work will generate surplus soil; as small diameter pipes are proposed it will generate only 5-10% as surplus as most of the soil will be used for refilling after the pipe is laid in trench. Indiscriminate disposal of the soil and waste, excess construction material, concrete, packing materials, containers, lubricants and oils may affect the local environment at the disposal location. These impacts are negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

(a) Prepare and implement Waste / Spoil Management Plan – it should present how the surplus waste generated will temporarily stocked at the site, transported and disposed properly.
(b) Avoid stockpiling of excess excavated soils as far as possible
(c) Avoid disposal of any debris and waste soils in the forest areas and in or near water bodies/rivers;
(d) Coordinate with ULB/TMC for beneficial uses of excess excavated soils or immediately dispose to designated areas;
(e) Recover used oil and lubricants and reuse or remove from the sites;
(f) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
(g) Remove all wreckage, rubbish, or temporary structures which are no longer required; and

(h) Request PMU/CSS to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.

ii. Impact on Ecological Resources

84. Subproject sites are located within the town area. There is no natural habitat left in these sites, and therefore no impacts on ecological resources envisaged.

iii. Impact on Economic Development

85. **Land Use**. Subproject activities will not affect the land use. All subproject activities are being conducted in the vacant space along the road ways.

86. **Accessibility**. Transport infrastructure will be affected by the pipe laying work, as in the narrower streets there is not enough space for excavated soil to be piled off the road. The road itself may also be excavated in places where there is no available land to locate pipes alongside. Traffic will therefore be disrupted, and in some very narrow streets the whole road may need to be closed for short periods. Potential impact is negative but short term and reversible by mitigation measures. The construction contractor will be required to:

(a) Plan pipeline work in consultation with the traffic police
(b) Plan work such that trench excavation, pipe laying, and refilling including compacting, at a stretch is completed in a minimum possible time;
(c) Provide for immediate consolidation of backfilling material to desired compaction – this will allow immediate road restoration and therefore will minimise disturbance to the traffic movement;
(d) Schedule transport and hauling activities during non-peak hours;
(e) Do not close the road completely, allow traffic to move on one line;
(f) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
(g) In unavoidable circumstances of road closure, provide alternative routes, and ensure that public is informed about such traffic diversions;
(h) At all work sites public information/caution boards shall be provided – information shall inter-alia include: project name, cost and schedule; executing agency and contractor details; nature and schedule of work at that road/locality; traffic diversion details, if any; entry restriction information; competent official's name and contact for public complaints.
(i) Keep the site free from all unnecessary obstructions;
(j) Drive vehicles in a considerate manner;
(k) Prepare a Traffic Management Plan – a template is provided for reference at **Appendix 7.**

87. 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:

(a) Inform the affected local population two days in advance about the work schedule
(b) Plan and execute the work in such a way that the period of disturbance/ loss of access is minimum.
(c) Provide pedestrian access in all the locations until normalcy is restored.

iv. Impact on Socio Cultural Resources

88. **Impacts on social sensitive areas.** Since the work is being conducted in an urban area, sensitive areas like schools, hospitals and religious centre, the excavation of trenches and pipe laying activity will create nuisance and health hazard to children and people with ailments. The measures suggested under various heads in this section will minimize the impact in general in all areas; however, special attention is necessary at these locations. Following measures shall be implemented in 250 m around the sensitive locations (schools, hospitals, and religious centres):

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

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

(a) Leave space for access between mounds of excavated soil
(b) Provide wooden planks/footbridges for pedestrians and metal sheets for vehicles to allow access across trenches to premises where required
(c) Consult affected businesspeople to inform them in advance when work will occur
(d) Address livelihood issues, if any; implement the Resettlement Plan (RP) to address these issues
(e) Provide sign/caution/warning boards at work site indicating work schedule and traffic information; prevent public entry into work sites through barricading and security; and
(f) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.
(g) Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools;
(h) Prepare and implement spoils management plan
(i) Provide alternate sources of clean water until water supply is restored.

90. **Socio-Economic – Employment**. Manpower will be required during the 30-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:

(a) Employ at least 50% of the labour force, or to the maximum extent, local persons if manpower is available; and

(b) Procure construction materials from local market.

91. **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:

(a) Comply with all national, state and local core labor laws (See **Appendix 4** of this IEE);
(b) Develop and implement site-specific Health and Safety (H & S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use Personal Protective Equipment; (c) H and S Training[2] for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;
(c) All trenches deeper than 1 m shall be protected with hard barricade to avoid safety risks to workers, public and nearby buildings/structures
(d) Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;
(e) Provide medical insurance coverage for workers;
(f) Secure all installations from unauthorized intrusion and accident risks;
(g) Provide supplies of potable drinking water;
(h) Provide clean eating areas where workers are not exposed to hazardous or noxious substances
(i) 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;
(j) 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;
(k) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
(l) Ensure moving equipment is outfitted with audible back-up alarms;
(m) 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
(n) 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.

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

(o) Overall, the contractor should comply with IFC EHS Guidelines on Occupational Health and Safety (this can be downloaded fromhttp://www1.ifc.org/wps/wcm/connect/9aef2880488559a983acd36a6515bb18/2%2Boccupational%2Bhealth%2Band%2Bsafety.pdf?MOD=AJPERES)

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

(a) Provide hard barricading for all deep excavations that may require especially for pipe lines (>1m); identify buildings at risk prior to start of excavation work and take necessary precautions for safe conduct of work
(b) Plan material and waste routes to avoid times of peak-pedestrian activities
(c) Liaise with IA/Byadgi TMC in identifying risk areas on route cards/maps
(d) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure
(e) Provide road signs and flag persons to warn of dangerous conditions, for all work sites along the roads
(f) Overall, the contractor should comply with IFC EHS Guidelines Community Health and Safety (this can be downloaded fromhttp://www1.ifc.org/wps/wcm/connect/dd673400488559ae83c4d36a6515bb18/3%2Bcommunity%2Bhealth%2Band%2Bsafety.pdf?MOD=AJPERES)

93. **Work Camps**. Operation of work camps can cause temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants. Potential impacts are negative but short-term and reversible by mitigation measures. Provision of proper living facilities and basic amenities (water, sanitation, fire safety, health and safety, etc) shall be ensured.

94. The construction contractor will be required to comply with the following. Overall, the contract should follow the IFC EHS guidelines specific to workers accommodation (this can be downloaded from http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ ifc_external_corporate_site/ifc+sustainability/publications/publications_gpn_workersaccommodation).

(a) Consult with PIU before locating workers camps/sheds, and construction plants; as far as possible located within reasonable distance of work site
(b) Minimize removal of vegetation and disallow cutting of trees
(c) Living facilities shall be built with adequate materials, and should be in good condition and free from rubbish and other refuge
(d) The camp site should be adequately drained to avoid the accumulation of stagnant water
(e) Provide water and sanitation facilities; water, meeting Indian drinking water standards shall be provided, in adequate quantities (supply of 60- 80 LPCD); all water storage structures must be cleaned regularly and covered properly to avoid any contamination

(f) Provide separate facilities for men and women; sanitary facilities shall be properly build and well maintained; toilet and bath facilities should be provided on basis of 1 per 15 or less persons
(g) Train employees in the storage and handling of materials which can potentially cause soil contamination;
(h) Recover used oil and lubricants and reuse or remove from the site;
(i) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
(j) Remove all wreckage, rubbish, or temporary structures which are no longer required; and
(k) Report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.

95. The work camp details should be included in the Construction Management Plan.

96. **Social and Cultural Resources – Chance Finds**. Subproject area is not a potential archaeological area and therefore no impacts envisaged.Nevertheless, the construction contractor will be required to:

(a) Strictly follow the protocol for chance finds in any excavation work;
(b) Request PMU/PIUor any authorized person with archaeological/historical field training to observe excavation;
(c) Stop work immediately to allow further investigation if any finds are suspected; and
(d) Inform PMU/CSS if a find is suspected, and take any action they require ensuring its removal or protection in situ.
(e) Adjacent to historic sites, undertake excavation and construction work in such a way that no structural damage is caused to the building.

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

(a) 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.
(b) Debris disposal site shall be at least 200 m away from surface water bodies3.
(c) No residential areas shall be located within 100 m downwind side of the site.
(d) The site is minimum 250 m away from sensitive locations like settlements, ponds/lakes or other water bodies.
(e) The local governing body and community shall be consulted while selecting the site.

D. Operational & Maintenance Impacts

98. Operation and Maintenance of the water supply system will be carried out by the DBO contractor for a period of six years, after which it will be taken over by the TMC for further operation and maintenance. The system hasa design life of 30 years, during which shall not require major repairs or refurbishments and should operate with little maintenance beyond routine actions required to keep the equipment in working order. The stability and integrity of the

[3] 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.

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.

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

100. 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 land filled.

101. 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. Operator 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.

102. The citizens of the Byadgi Town 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 & INFORMATION DISCLOSURE

A. Project Stakeholders

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

(a) Residents, shopkeepers and businesspeople near the work sites;
(b) Public representatives and prominent citizens of the town
(c) ByadgiTown Municipal Council
(d) KUIDFC, GoK

104. Secondary stakeholders are:

(a) Other concerned government institutions (utilities, regulators, etc)
(b) NGOs and CBOs working in the affected communities;
(c) Other community representatives (prominent citizens, religious leaders, elders, women's groups);
(d) The beneficiary community in general; and
(e) ADB as the funding agency

B. Consultation & Disclosure till Date

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

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

107. Further, Focus Group Discussion was conducted along the project road (at Mallur Road, Rattihall Road, ShivapuraBadavane), during thedetaileddesign stage. The details of consultation and feedback received are given in**Appendices9b to 9d**.

C. Future Consultation & Disclosure

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

(i) Consultation during construction:

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

(ii) Project disclosure:

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

109. The IEE prepared for this subproject during the feasibility stage was disclosed on ADB and KUIDFC websites. Further based on ADB requirements, the following will be posted on ADB website: (i) this updated IEE, upon finalization and approval of ADB; (ii) corrective action plan, if any, prepared during Project implementation to address unanticipated environmental impacts and to rectify non-compliance to EMP provisions; and (iii) environmental monitoring reports. Documents will also be available on the websites of KUIDFC and ByadgiTMC.

D. Grievance Redress Mechanism

110. A project specific grievance redress mechanism (GRM) will beestablished to receive, evaluate and facilitate concerns of, complaints and grievances of the DPs in relation to project's social and environmental performances. The main objective of the GRM will be to provide time bound action and transparent mechanism to resolve social and environment concerns.

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

112. Awareness on grievance redress procedures will be created through Public Awareness Campaign with the help of print and electronic media and radio.

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

E. Grievance Redress Process

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

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

116. RPMU consists of SDO and PMDCSC Consultant in the GRC will review the grievances if any and the grievances of critical nature and those cannot be resolved at RPMU level should be referred to Grievance Redress Committee (GRC) set up at sub division headed by Special land acquisition officer/the Assistant Commissioner with a team of members. DPD of the concerned subdivision, the commissioner/chief officer of the ULBs, the most affected beneficiary, one vulnerable beneficiary and environmental engineer as members. All documents

related to grievances, follow up action taken to resolve along with explanatory note on nature, seriousness and time taken for grievance redress shall be prepared by RPMU Officer in charge of environmental safeguards and circulated to GRC members at least a week prior to scheduled meeting. The decision taken at the GRC level will be communicated to the complainant by environmental specialist/Consultant through ULB/PIU. The GRC should be notified and in place before the starting of construction works by the contractor.

117. For any issues that remain unresolved by the GRC or the decision taken at such meetings is not acceptable, the complainants can approach the DLIC and then Court of Law as per Govt. of Karnataka legal procedure.

F. GRC / SC composition and selection of members

118. The GRC for the project will be headed by Special land acquisition officer/the Assistant Commissioner as chairman with members as followed: (1) DPD of the concerned subdivision (member secretary). (2) commissioner/chief officer of the ULBs. (3) The most affected beneficiary. (4) one vulnerable beneficiary.(5) Environmental officer. Appeals against the decision of the GRC are to be addressed to the Deputy Commissioner of the concerned district.

119. In the event when the established GRM is not in a position to resolve the issue, affected person can use the ADB Accountability Mechanism through directly contact (in writing) to the Complaint Receiving Officer (CRO) at ADB headquarters or to ADB Indian Resident Mission (INRM). The complaint can be submitted in any of the official languages of ADB's DMCs. The ADB Accountability Mechanism information will include in the Project Information Document (PID) to be distributed to the affected communities, as part of the project GRM. The PID will be prepared by the contactor in coordination with the PIU and consultant and get it approved by the EE/AEE in charge of the project.Grievance Redress Mechanism is shown in the **Figure 8.**

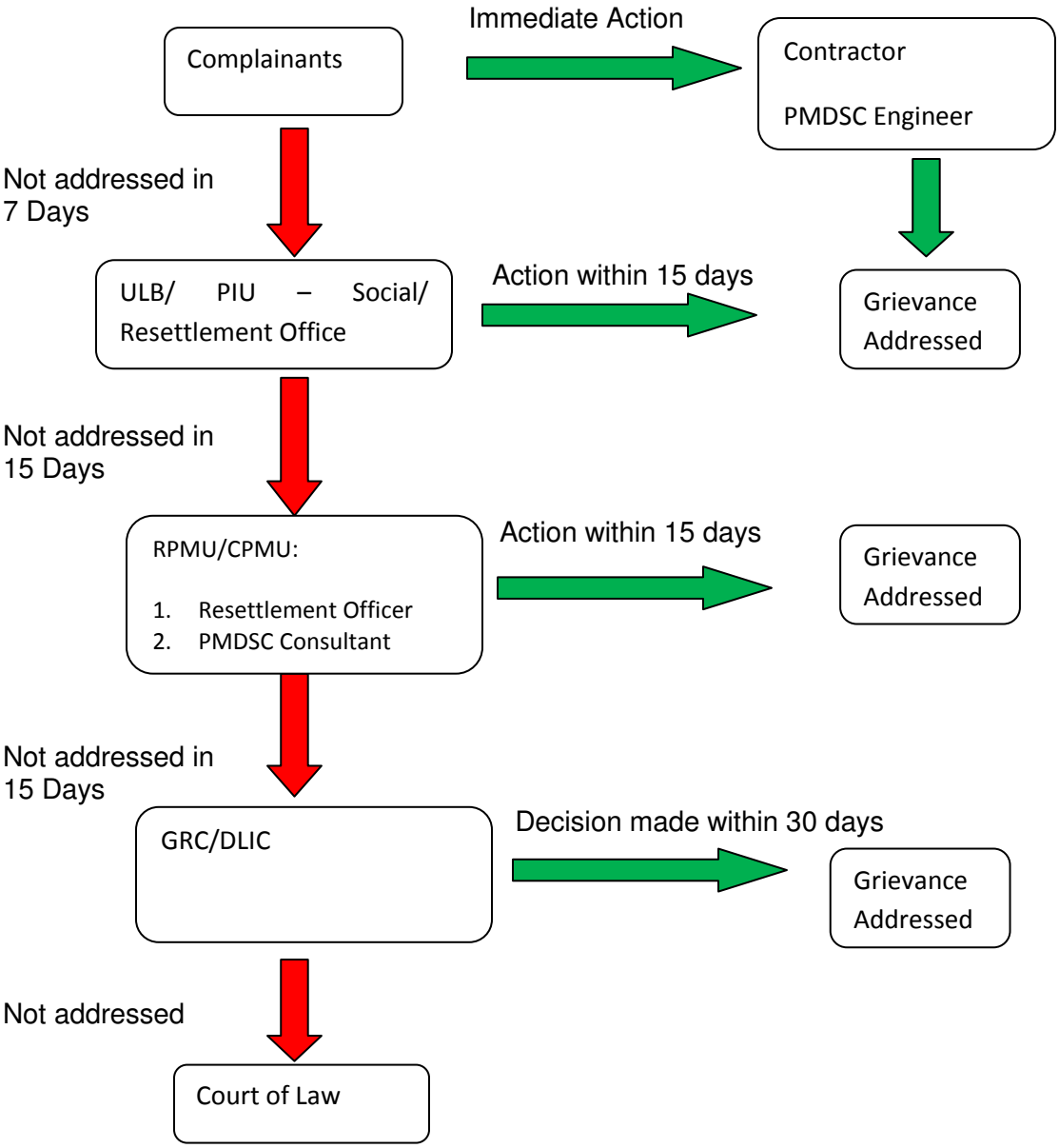

Figure 7: Grievance Redress Process

VI. ENVIRONMENTAL MANAGEMENT PLAN

A. Environmental Management Plan

120. 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.

121. 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.

122. 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.

123. **Table 7 to Table** 912shows the potential adverse environmental impacts, proposed mitigation measures, responsible parties, and estimated cost of implementation. This EMP will be included in the bid documents and will be further reviewed and updated during implementation.The subproject is divided into two construction packages, one for bulk water supply component, and the two for distribution system component.**The bulk water supply component includes a single work of pipeline laying (8.7 km 400 mm diameter pipe), which is similar to the pipeline works in distribution package. The impacts and mitigation measures as discussed in the previous section are similar, and therefore to avoid repetition, common EMP is given for both for both the packages for pre-construction and construction stages.These need to be appended to both the bids/contracts.** The operation phase EMP and environmental monitoring plans are however provided separately.

Table 7: Environmental Management Plan–Pre-Construction

(applicable for both Bulk Water 01WS02 & Distribution network 01WS03)

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 and traffic management plan (Appendix 6 and 7)	Contractor in collaboration with ULB.	(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, and traffic management plan	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 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 recognized and measures are taken to ensure they are protected and conserved.	Contractor, PMU &PMDCSC	Chance Finds Protocol	No cost required. Mitigation measures are part of ToR of PMU, design engineers, and supervising consultants.
Construction work camps, hot mix plants, stockpile areas, storage 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	PMU and Contractor to determine locations prior to beginning of	(i) List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas,	No cost required. Mitigation measures are part of ToR of PMU, design

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
and disposal areas.		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 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.	construction works.	and disposal areas. (ii) Written consent of landowner/s (not lessee/s) for reuse of excess spoils to agricultural land	engineers, and supervising consultants.
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 required after construction is started, inform construction contractor to obtain a written	ULB and Contractor to prepare list of approved quarry sites and sources of materials with the approval of CSS	(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
		approval from PMU.			
Structural and seismic stability of storage reservoir (OHT) 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 PMDCSC	Incorporated in final design and communicated to contractors.	No cost required. (**Applicable only for distribution system component**) 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 PMDCSC	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/TMC of the nature and location of all water supply infrastructure (ii) Develop an AC pipe protocol (iii) Require all personnel (including manual laborers) to undergo training as per AC pipe protocol	ULB/TMC and design engineers	(i) Detailed design drawings showing alignment of AC pipes (ii) AC pipe protocol (iii) Trainings as per AC pipe protocol	No cost required. Mitigation measures are part of ToR of PMU, design engineers, and supervising consultants.

Table 8:Environmental Management Plan-Construction
(applicable for both Bulk Water 01WS02& Distribution net work 01WS03)

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 / PMU / PMDCSC	(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/PMDCSC 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 and machinery with air pollution control devices which are operating correctly.	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.
Surface water quality	Mobilization of settled silt materials, and chemical contamination from fuels and lubricants during installation of pipelines can contaminate nearby	(i) Prepare and implement a spoils management plan as the part of the Construction Management Plan. (ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;	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;	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
	surface water quality.	(ii) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; (iii) Place storage areas for fuels and lubricants away from any drainage leading to water bodies; (iv) Dispose any wastes generated by installation of pipeline in designated sites; and (v) Conduct surface quality inspection according to the Environmental Management Plan (EMP).		(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	
Noise Levels	Increase in noise level due to earth-moving and excavation equipment, and the transportation of equipment, materials, and people	(i) Plan activities in consultation with PMU/PMDCSC 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.	Construction Contractor	(i) Complaints from sensitive receptors; (ii) Use of silencers in noise-producing equipment and sound barriers; (iii) Equivalent day and night time noise levels (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
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 (ii) Avoid stockpiling of excess excavated soils; (iii) Coordinate with ULB/TMC 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) Report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.	Construction Contractor	(i) Complaints from sensitive receptors; (ii) Worksite clear of hazardous wastes such as oil/fuel (iii) 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.
Existing Infrastructure and Facilities	Disruption of service and damage to existing infrastructure at specified project location	(i) Obtain from PMU/PMDCSC the list of affected utilities and operators if any; (ii) Prepare a contingency plan to include actions to be done in case of unintentional interruption of service iii) The public should be given notice at least three days in advance and any accidental breaking should be rectified immediately.	Construction Contractor	Existing Utilities Contingency Plan	Cost for implementation of mitigation measures responsibility of contractor.
Ecological Resources –	Loss of vegetation and tree cover	No tree cutting is envisaged as part of this sub project. But in	Construction Contractor	PMU/CSS to report in writing the no of trees	Cost for implementation of

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Terrestrial		future, if found required (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.		cut and planted.	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 conflicts near project locations and haul road	Traffic Management Plan should be part of the Construction Management Plan. (i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites; (ii) Schedule transport and hauling activities during non-peak hours; (iii) Locate entry and exit points in areas where there is low potential for traffic congestion; (iv) Keep the site free from all unnecessary obstructions; (v) Drive vehicles in a considerate manner; (vi) Coordinate with Traffic Police for temporary road diversions and with for 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	Construction Contractor	(i) Traffic route during construction works including number of permanent signages, barricades and flagmen on worksite (Appendix 7); (ii) Complaints from sensitive receptors; (iii) Number of signages placed at project location.	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
		concerns/complaints. (viii) Plan and execute the work in such a way that the period of disturbance/ loss of access is minimum; and (ix) Provide pedestrian access in all the locations until normalcy is restored.			
Socio-Economic – Income.	Impede the access of residents and customers to nearby shops	(i) Prepare and implement spoils management plan (ii) Leave spaces for access between mounds of soil; (iii) Provide walkways and metal sheets where required for people; (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.	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) Procure construction materials from local market. (iii) Comply with core labor laws	Construction Contractor	(i) Employment records; (ii) Records of sources of materials (iii) Compliance to core labor laws (See appendix 4 of this IEE)	Cost for implementation of mitigation measures responsibility of contractor.
Occupational	Occupational	(i) Comply with all national, state	Constructio	(i) Site-specific OH&S	Cost for

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Health and Safety	hazards which can arise during work	and local core labor laws (See Appendix 4of this IEE) (ii) Develop and implement site-specific occupational health and safety (OH&S) Plan, and include in the Construction Management plan. The OH & S plan 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 mask 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; (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	n Contractor	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; (x) 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. (xi) Compliance to core labor laws (See appendix 4 of this IEE)	implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		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.			
Asbestos Cement	Health risks	(i) Left AC pipes in-situ.	Constructio	(i) Site-specific OH&S	Cost for

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
(AC) Materials	associated with AC pipes	(ii) Training of all personnel (including manual laborers) 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 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.	n Contractor	Plan including AC pipe protocol (ii) record of OH&S orientation on AC Cement Materials Protocol (iii) personal protective equipment for AC materials (iv) sign boards for pipe alignment identified as AC pipes.	implementation of mitigation measures responsibility of contractor.
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/PMDCSC 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.	Constructio n Contractor	(i) Traffic Management Plan; (ii) Complaints from sensitive receptors	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
Work Camps and worksites	Temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants Unsanitary and poor living conditions for workers	(i) Consult with PMU/ PMDCSC 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; 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 especially children are not allowed in any worksite at any given time.	Construction Contractor	(i) Complaints from sensitive receptors; (ii) Drinking water and sanitation facilities for employees	Cost for implementation of mitigation measures responsibility of contractor.
Social and Cultural Resources	Risk of archaeological chance finds	(i) Strictly follow the protocol for chance finds in any excavation work; (ii) Request PMU/ PMDCSC or any authorized person with archaeological field training to observe excavation; (iii) Stop work immediately to allow	Construction Contractor	Records of chance finds	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
		further investigation if any finds are suspected; (iv) Inform PMU/ PMDCSC if a find is suspected, and take any action they require ensuring its removal or protection in situ.			
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 (ii) All excavated roads shall be reinstated to original condition. (iii) All disrupted utilities restored (iv) All affected structures rehabilitated/compensated (v) The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up. (vi) All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be topsoiled and re-grassed using the guidelines set out in the re-vegetation specification that forms part of this document. (vii) The contractor must arrange the cancellation of all temporary services.	Construction Contractor	PMU/ PMDCSC 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
		(viii) Request PMU/PMDCSC to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.			

Table 9:Environmental Management Plan– Operation -Bulk Water Supply 01WS02

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Check for blockage and leakage problems reducing the water losses	It may affect the water supply system	Effectiveness of leak detection and water auditing to reduce the water losses	Byadgi TMC	Byadgi TMC	TMC cost
Asset management	Reduction in NRW Increased efficiency of the system	Preparation of O & M Manual	Byadgi TMC	Byadgi TMC	TMC cost

Table 10:Environmental Management Plan – Operation-Distribution network 01WS03

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Check for blockage and leakage problems reducing the water losses	It may affect the water supply system	Effectiveness of leak detection and water auditing to reduce the water losses	Operator / Byadgi TMC	Byadgi TMC	CMC cost
Repair works during O & M	Local disturbances during maintenance work	- Contractor shall inform shopkeepers, residents and road users of repair works in advance. - If trenches are dug to locate and repair leaks or remove and replace lengths of pipe or illegal connections, the removed material will be replaced in the trench so there will be no waste. The refilled trench shall be re-compacted and brought to the original condition as soon as the repair works are over. Works shall be completed quickly at sensitive areas. - Proper access shall be provided to the residents during the repair works - If any major maintenance works is to be taken up contractor shall prepare and operate H&S plan to protect workers and public. Contractor may request police to divert traffic if necessary.	Operator / Byadgi TMC	Byadgi TMC	CMC cost
Asset management	Reduction in NRW Increased efficiency of the system	Preparation of O & M Manual	Operator / Byadgi TMC	Byadgi TMC	CMC cost
Emergency Response Plan	Non availability of Emergency Response Plan affect water supply system	- An Emergency Response Plan for emergencies such as indications of terrorism or acts of terrorism; Major disasters such as earthquakes, fires, flood, or explosion and Catastrophic incidents that leave extraordinary levels of mass casualties, damage, and disruption severely affecting the	Operator / Byadgi TMC	Byadgi TMC	CMC cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		population, infrastructure, environment, economy, etc. - Emergency Response Plan shall be prepared to address the eight core elements such as • System Specific Information; • Community Water System - Roles and Responsibilities; • Communication Procedures: Who, What and When; • Personnel Safety; • Identification of alternate water sources in emergencies; • Replacement equipment and chemical supplies; • Property protection and • Water sampling and Monitoring - Appropriate safety measures like fencing, notice boards to prevent entry of unauthorized persons shall be provided - All guide and hand railings shall be maintained in a safe and firm condition with WTP to ensure the safety of Personnel working at the plant.			
Health and Safety during O & M period	Impact on human health and safety issues	**Precautionary Working Practices:** - When working with pipes and fittings on site, ensure that they are protected from contamination by storing off the ground, capping the ends of pipes and liners, and keeping fittings in wrappings until the time of use. - Excavate trenches to below the pipe level to provide a sump, and keep as dry as possible to prevent water entering a pipe or fitting. - Ensure that sealing materials and lubricants are clean and certified as	Operator / Byadgi TMC	Byadgi TMC	CMC cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		suitable for contact with potable water supplies. - If a part of the distribution system has been taken out of service for an extended period, treat it as a potentially contaminated new installation. Apply the flushing, disinfection and microbiological sampling procedures that are normally applied to new installations. - As far as is practicable, if general purpose or specialized vehicles are used for water supply construction and repair duties, do not use those vehicles for other duties where contamination may be prevalent (e.g. sewerage work). - Employees and contractors involved in restricted operations should be trained in the hygienic implications of their work and basic hygienic practices. This training should include details of the personal symptoms that indicate a potential waterborne disease. All staff (employees and contractors) should be encouraged to report such symptoms without prejudice to their employment prospects. - Employers should provide adequate toilet and washing facilities to maintain personal hygiene. Wastes from portable or temporary arrangements should be disposed of without risk to water supplies or the environment.			
Grievance redressal during O & M	Non attending of grievances affect water supply system	- Appropriate registers shall be maintained to record complaints and Junior Engineer/s from ULB shall be assigned to track follow up action to ensure that the complaint is addressed	Operator / Byadgi TMC	Byadgi TMC	-

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		in a timely manner by the contractor. - If the complaint is such that it cannot be dealt with at his level, it can be referred to higher authority to take the required decision and followed up with the contractor for the compliance. - Concerned engineer from ULB shall do frequent vigilant checks at the areas from where maximum complaints have been received.			

Table 11: Environmental Monitoring Plan-Bulk Water supply01WS02

Sample	Site/s	Responsibility	Parameter to monitor	Frequency	Who	Cost (INR)
Construction Phase						
Ambient air quality – at Transmission pipeline location	1 point (shall be selected during construction)	Contractor	• PM 10, PM 2.5 SOx, Nox • Monitoring method as prescribed by CPCB	Once before start of construction Quarterly (yearly 4-times) during construction	Contractor	5 samples (over 1 year construction period) Rs. 10000 per sample – sum Rs. 50,000
Noise Level at Transmission pipeline location	1 point at work site (shall be selected during construction)	Contractor	• Noise level • Day and night	Once before start of construction Quarterly (yearly 4-times) during construction	Contractor	5 samples (over 1 year construction period) Rs. 2500 per sample – sum Rs. 12,500
Operation Phase						
Nil						

Table 12: Environmental Monitoring Plan -Distribution network 01WS03

Sample	Site/s	Responsibility	Parameter to monitor	Frequency	Who	Cost (INR)
Construction Phase						
Ambient air quality – at Transmission pipeline location	3 points (shall be selected during construction)	Contractor / O & M Operator	PM 10, PM 2.5 SOx, Nox Monitoring method as prescribed by CPCB	Once before start of construction Quarterly (yearly 4-times) during construction	Contractor / O & M Operator	33 samples (11 samples at each location over 30month construction period) Rs. 10000 per sample – sum Rs. 330,000
Noise Level at Transmission pipeline location	3 points (shall be selected during construction)	Contractor / O & M Operator	Noise level Day and night	Once before start of construction Quarterly (yearly 4-times) during construction	Contractor / O & M Operator	33 samples (11 samples at each location over 30 month construction period) Rs. 2500 per sample – sum Rs. 82,500
Operation Phase						
Quality of treated supplied to distribution	At clear water sump in WTP	Contractor / O & M Operator	All Drinking water parameters	Monthly once during operation	Contractor / O & M Operator	Operating costs
Supplied water at consumer end	Consumer end- random sampling in all zones (atleast 1 sample from 1 zone/ward)	Contractor / O & M Operator	All Drinking water parameters	Monthly once during operation	Contractor / O & M Operator	Operating costs

B. Institutional Arrangements

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

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

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

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

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

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

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

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

132. **Consultants:**Deputy Project Director is being assisted by a consultant team (PMDCSC) in project planning, preparation of project and cost estimates, coordination, technical guidance and supervision, financial control, training and overall project management. The consultant team includes an environment specialist to supervise the implementation of environmental safeguards at the RPMU level. The consultant team also includes a Resident Engineer (RE) at each ULB/TMC responsible for the supervision of project implementation including environmental safeguards at each ULB/TMC level.

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

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

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

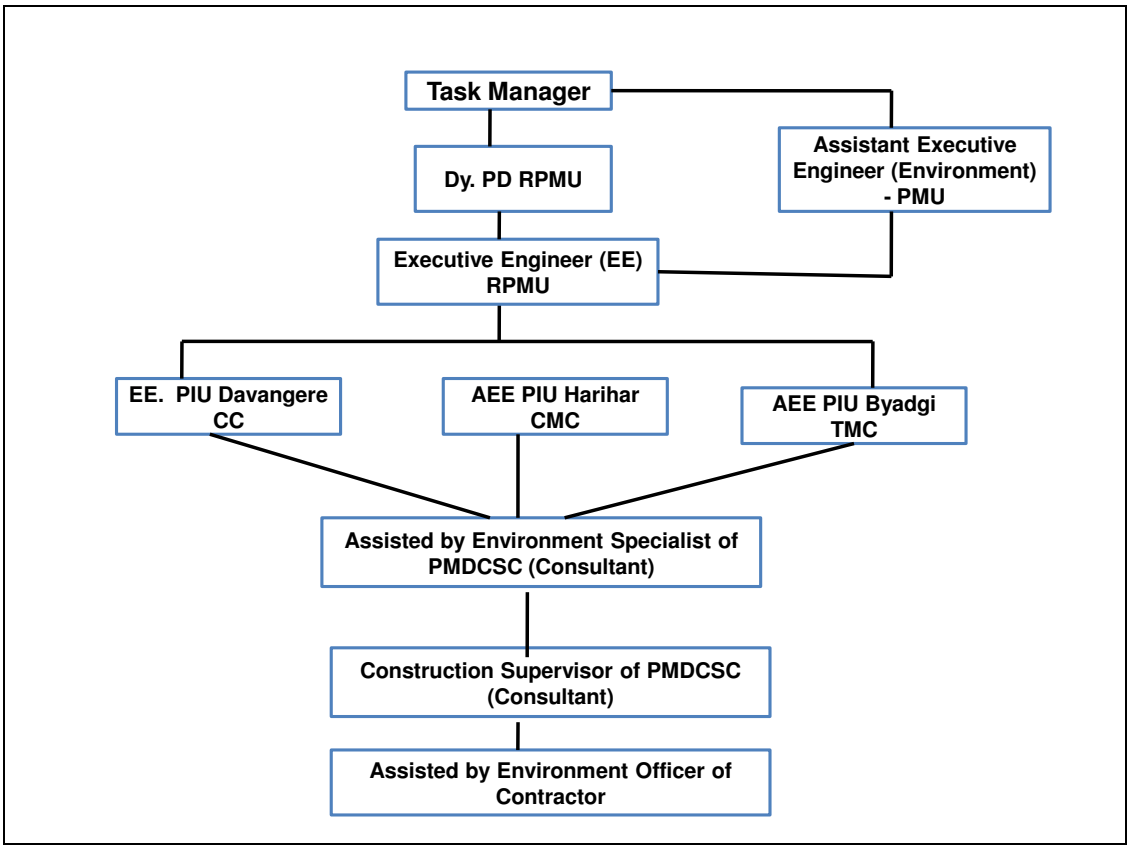

Figure 8: Environmental Safeguard Implementation Arrangements

Table 13:Institutional Roles and Responsibilities

Responsible Agency	Responsibility		
	Pre-Construction Stage	**Construction Stage**	**Post-Construction**
Task Manager	(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,/ TMCs and all staff involved in the project implementation on (a) ADB SPS, (b) Government of India national, state, and local environmental laws and regulations, (c) core labor standards, (d) OH&S, (e) EMP implementation especially spoil management, working in congested areas, public relations and ongoing consultations, grievance redress, etc. (vii) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs (viii) Organize an induction course for the training of contractors preparing them on EMP implementation, environmental monitoring requirements related to mitigation measures; and taking immediate actions to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of	(i) Task Manager is responsible for over-all environmental safeguards compliance of the project (ii) Review 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
Assistant Executive Engineer (Environment)		(i) Assist in the preparation of semi-annual monitoring reports (ii) 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 / divisional level (vi) Coordinate with regional level government agencies (vii) Assist in addressing any grievances brought about through the Grievance Redress 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;	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**
	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.	(ix) Coordinate with the General Manager, environmental Experts, ULBs/CMCs/TMCs, NGOs, consultants and contractors on mitigation measures involving the community and affected persons and ensure that environmental concerns and suggestions are incorporated and implemented	
ULB/TMC	(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 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	(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 reports. (vi) Address any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs	(i) Conducting environmental monitoring, as specified in the EMP. (ii) Issuance of clearance for contractor's post-construction activities as specified in the EMP.
Environment Specialist PMDCSC (Consultant)	(i) Assist ULBs/CMCs/TMC in preparation of REA checklists and EIAs/IEEs (ii) Assist ULBs/CMCs/TMC in obtaining all necessary clearances, permits, consents, NOCs, etc. Ensure provisions and conditions are	(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	(i) Assist in the inspection and verification of contractor's post-construction activities.

Responsible Agency	Responsibility		
	Pre-Construction Stage	**Construction Stage**	**Post-Construction**
	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.	(iv) Assist in the preparation of monthly reports and semi annual report (vi) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs	
Contractors	(i) Ensure EMP implementation cost is included in the methodology. (ii) Undergo EMP implementation orientation prior to award of contract (iii) Provide EMP 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.	(i) Implement EMP. (ii) Implement corrective actions if necessary. (iii) Prepare and submit monitoring reports including pictures to ULB/TMC (iv) Comply with all applicable legislation, is 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/TMCs and CSS are timely informed of any foreseeable activities related to EMP implementation. (vi) Address any grievances brought about through the Grievance Redress	(i) Ensure EMP post-construction requirements are satisfactorily complied (ii) Request certification from ULBs/CMCs/TMC

Responsible Agency	Responsibility		
	Pre-Construction Stage	Construction Stage	Post-Construction
		Mechanism in a timely manner as per the IEEs	

C. Training Needs

136. The following table (**Table 14**) presents the outline of capacity building program to ensure EMP implementation. The estimated cost is Rs. 85,000.00 (excluding trainings of contractors which will be part of EMP implementation cost during construction) to be covered by the project's capacity building program. The detailed cost and specific modules will be customized for the available skill set after assessing the capabilities of the target participants and the requirements of the project.

Table 14: Outline of Capacity Building Program on EMP Implementation

Description	Target Participants	Estimate (INR) – (Lump sum)	Cost and Source of Funds
1. Introduction and sensitization to environment issues (1 day) - ADB Safeguards Policy Statement - Government of India and Karnataka applicable safeguard laws, regulations and policies including but not limited to core labor standards, OH&S, etc - Incorporation of EMP into the project design and contracts - Monitoring, reporting and corrective action planning	All staff and consultants involved in the project	10,000	PMU cost
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	25,000	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	All staff and consultants involved in the project All contractors prior to award of contract or	25,000 25,000 (bulk water) 25,000 (distribution)	PMU cost Contractors cost as compliance to contract provisions

Description	Target Participants	Estimate (INR) – (Lump sum)	Cost and Source of Funds
- Chance find protocol - O&M plans - Post-construction plan	during mobilization stage.		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	25,000	PMU Cost
5. Contractors Orientation to Workers on EMP implementation (OH&S, core labor laws, spoils management, etc)	All workers (including manual laborers) of the contractor prior to dispatch to worksite	10,000 (bulk water) 10,000 (distribution)	Contractors cost as compliance to contract provisions on EMP implementation (refer to EMP tables)
Total cost for Capacity Building Programme on EMP Implementation		1,45,000	

PMU Fund	85,000.00
Contractor Cost (bulk water) 01WS02	35,000.00
Contractor Cost (distribution) 01WS03	35,000.00
Total cost for Capacity Building Programme	155,000.00

D. Monitoring and Reporting

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

138. During construction, results from internal monitoring by the contractor will be reflected in their weekly EMP implementation reports to the Resident Engineer. These weekly report will be retained in PMDCSCfor reference. Resident Engineerwill review and advise contractor for corrective actions if necessary. Monthly report summarizing compliance and corrective measures taken will be prepared by Resident Engineerto be reviewed and endorsed by ULB and consolidated monthly report will be submitted to PMU.

139. Based on monthly reports and measurements, PMU will draft, review, and submit to ADB, 6-monthly (twice a year) EMP implementation progress report (**Appendix.11**). Once concurrence from the ADB is received the report will be disclosed in the KUIDFC /ULB website.

140. ADB will review project performance against the KUIDFC's commitments as agreed in the legal documents. The extent of ADB's monitoring and supervision activities will be commensurate with the project's risks and impacts. Monitoring and supervising of environmental and social safeguards will be integrated into the project performance management system

E. EMP Implementation Cost

141. 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 ULB/TMC will be provided as part of their management of the project, so this also does not need to be duplicated here. Cost for the capacity building program is included as part of the project. The EMP cost includes the cost for providing water supply and sanitation facilities for the workers. In addition to this, hard barricades need to be provided at the work sites to prevent any entry of the public or animals into the worksite and to prevent any possible accident.

Table 15: Cost Estimates to Implement the EMP – Bulk Water supply 01WS02

No	Particulars	Stages	Unit	Number	Rate	Cost (INR)	Costs Covered By
A.	**Monitoring Measures**						
1	Air quality monitoring	Construction	Per Sample	5	10000	50,000	Civil works contract
3	Noise levels monitoring	Construction	Per Sample	5	2500	12,500	Civil works contract
	Sub Total					**62,500**	
B	**Capacity Building**						
1	Introduction and sensitization to environment issues	Pre-construction	lump sum	-	-	-	PMU (included in distributio n package)
2	EMP implementation	Construction	lump sum	-	-	-	
3	Plans and Protocols	Construction	lump sum	-	-		
			lump sum	-	-	25,000	Civil works contract
4	Experiences and best practices sharing	Construction/ Post-Construction	lump sum	-	-	-	PMU
5	Contractors Orientation to Workers on EMP implementation	Prior to dispatch to worksite	Lump sum	-	-	10,000	Civil works contract
	Subtotal (B)					**35,000**	
C	**Civil Works**						
1	Construction of shelters for workers including water supply, sanitation	Construction	Lump sum	**-**	**-**	2,00,000	Civil works contract
2	Barricades at the worksite (MS Sheet of 20 gauge of size 5 x 3 meters, having vertical support by MS flat	Construction	Lump sum		-	2,00,000	Civil works contract

No	Particulars	Stages	Unit	Number	Rate	Cost (INR)	Costs Covered By
	(65 x 65 x 6 mm) along the sides and at 1.5 m and 3.5m, horizontal support by MS flat (65 x 65 x 6 mm) along the sides and at the center, supported by 50mm MS hollow pies of 4 meter height at the ends and at the center.						
3	Retro reflectorized Traffic Signs as per IRC:67, M 15 grade, 80 x 60 mm rectangular; fixed over Aluminum sheeting supported on MS angle iron.	Construction	Per unit	6	3000	18,000	Civil works contract
4	Retro reflectorized Traffic Signs as per IRC:67, M 15 grade, 60 x 60 mm square; fixed over Aluminum sheeting supported on MS angle iron.	Construction	Per unit	3	2500	7500	Civil works contract
	Sub Total (C)					425,500	
	Total (A+B+C)					**523,000**	

Table 16:Cost Estimates to Implement the EMP – Distributionnetwork 01WS03

No	Particulars	Stages	Unit	Number	Rate	Cost (INR)	Costs Covered by
A.	**Monitoring Measures**						
1	Air quality monitoring	Construction	Per Sample	33	10000	330,000	Civil works contract
2	Noise levels monitoring	Construction	Per Sample	33	2500	82,500	Civil works contract
	Sub Total					**412,500**	
B	**Capacity Building**						
1	Introduction and sensitization to environment issues	Pre-construction	lump sum			10,000	PMU
2	EMP implementation	Construction	lump sum			25,000	PMU
3	Plans and Protocols	Construction	lump sum			25,000	PMU
			lump sum			25,000	Civil works contract

No	Particulars	Stages	Unit	Number	Rate	Cost (INR)	Costs Covered by
4	Experiences and best practices sharing	Construction/ Post-Construction	lump sum			25,000	PMU
5	Contractors Orientation to Workers on EMP implementation	Prior to dispatch to worksite	Lump sum			10,000	Civil works contract
	Subtotal (B)					**1,20,000**	
C	**Civil Works**						
1	Construction of shelters for workers.	Construction	Lump sum			4,00,000	Civil works contract
2	Providing Water Supply Facility for the workers	Construction	Lump sum			1,00,000	Civil works contract
3	Providing Sanitation Facility for the workers	Construction	Lump sum			1,00,000	Civil works contract
4	Barricades at the worksite (MS Sheet of 20 gauge of size 5 x 3 meters, having vertical support by MS flat (65 x 65 x 6 mm) along the sides and at 1.5 m and 3.5m, horizontal support by MS flat (65 x 65 x 6 mm) along the sides and at the center, supported by 50mm MS hollow pies of 4 meter height at the ends and at the center.	Construction	Per unit	35	15,000	5,25,000	Civil works contract
5	Retro reflectorized Traffic Signs as per IRC:67, M 15 grade, 80 x 60 mm rectangular; fixed over Aluminum sheeting supported on MS angle iron.	Construction	Per unit	6	3000	18,000	Civil works contract
6	Retro reflectorized Traffic Signs as per IRC:67, M 15 grade, 60 x 60 mm square; fixed over Aluminum sheeting supported on MS angle	Construction	Per unit	3	2500	7500	Civil works contract
	Sub Total (C)					11,50,500	
	Total (A+B+C)					**16,83,000**	

PMU Fund - 85,000 (both bulk water & distribution components)
Contractor Cost - 5,23,500 (bulk water supply component)
Contractor Cost - 15,98,000 (distribution component)
Total - Rs 22,91,500

The total cost to implement EMP for water supply system is **Rs.22,91,500**

VII. FINDINGS AND RECOMMENDATIONS

A. Recommendation

142. The process described in this document has assessed the environmental impacts of all elements of the ByadgiWater Supply Systemsubproject being implemented under the components of Bulk Water Supply (raw water transmission main) and distribution system (waterreservoir,water distribution pipelines and house service connections). All potential impacts were identified in relation to pre-construction, construction, and operation phases.

143. 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.Subprojects do not include any new source development or augmentation measures. The social impacts (access disruptions) due to construction activities, however, are unavoidable, as the residential and commercial establishments exist along the pipeline routes in public roads. No major disruptions are expected due to laying of transmission which is mostly located outside the town, and along the wide main roads. However, there may be inconvenience and safety risk to road users as these main roads carry considerable traffic.

144. During the construction phase, impacts mainly arise from the need to dispose waste soil; and from the disturbance of residents, businesses, traffic and important buildings by the construction work. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation. Since the pipe line works are conducted along the roads, there is potential to create disturbance. To minimize this, the contractor should develop a Method Statement, which should be approved by the PIU prior to start of work, and should conduct the work strictly in line with the Method Statement.

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

146. 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.

147. Mitigation will be assured by a program of environmental monitoring conducted during construction and operation to ensure that all measures are implemented, and to determine whether the environment is protected as intended. This will include observations on- and off-site, document checks, and interviews with workers and beneficiaries, and any requirements for remedial action will be reported to the PIU/PMU. There will also be longer-term surveys to monitor the expected improvements in the quality of domestic water and the health of the population.

148. 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.

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

150. The EMP will assist the PMU, PMDCSC, 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.

151. 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.

152. The citizens of the Byadgi Town will be the 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 diarrhea and dysentery) will be reduced

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VIII. CONCLUSION

153. The ByadgiTownWater Supply Systemsubproject 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.

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

Appendix 1 REA Checklist
RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST
Byadgi 24 x 7 Water Supply Subproject

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting Is the project area			
▪ Densely populated?	x		Subproject activities extend to the entire city including the densely populated areas. There are no major negative impacts envisaged, because water supply/ sewer network will be located in unused government lands alongside the existing roads and can be constructed without causing disturbance to houses and commercial establishments. In narrow streets, disruption to road users is likely, and measures like best activity scheduling/ traffic management, alternative routes, and prior information to road users, houses and shops will minimize the impact to acceptable levels. The construction of the new overhead storage reservoir site is located on the outskirts
▪ Heavy with development activities?	x		Byadgi is a developing town; urban expansion is considerable.
▪ Adjacent to or within any environmentally sensitive areas?		x	
▪ Cultural heritage site		x	
▪ Protected Area		x	
▪ Wetland		x	
▪ Mangrove		x	
▪ Estuarine		x	
▪ Buffer zone of protected area		x	
▪ Special area for protecting biodiversity		x	
▪ Bay		x	
B. Potential Environmental Impacts Will the Project cause			
▪ Pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?		x	Subproject will utilize the existing surface sources; no source improvement / augmentation proposed in the subproject
▪ Impairment of historical/cultural monuments/areas and loss/damage to these sites?		x	There is no historical / cultural monument in the project location.
▪ Hazard of land subsidence caused by excessive ground water pumping?		x	No ground water source will be used for this project.
▪ Social conflicts arising from displacement of communities?		x	The subproject does not involve land acquisition or displacement.

SCREENING QUESTIONS	Yes	No	REMARKS
▪ Conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?		x	No source improvement/ augmentation proposed in the subproject
▪ Unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?		x	Subproject involves supply of treated water.
▪ Delivery of unsafe water to distribution system?		x	Subproject involves distribution of treated water supplies
▪ Inadequate protection of intake works or wells, leading to pollution of water supply?		x	Subproject will utilize the existing surface sources; no source improvement/augmentation proposed in the subproject
▪ Over pumping of ground water, leading to salinization and ground subsidence?		x	No ground water is proposed to be abstracted.
▪ Excessive algal growth in storage reservoir?		x	Regular cleaning of storage reservoir shall be ensured to avoid algal growth in the reservoir
▪ Increase in production of sewage beyond capabilities of community facilities?		x	Sewerage system of adequate capacity including treatment is proposed under the subproject
▪ Inadequate disposal of sludge from water treatment plants?		x	Subproject does not include water treatment works
▪ Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?		x	Subproject does not include pumping equipment/stations
▪ Impairments associated with transmission lines and access roads?	x		Anticipated during construction activities. However impacts are temporary and short in duration. The EMP includes measure to mitigate impacts.
▪ Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.		x	Subproject does not include the design and construction of chlorine facilities and receiving, storing and handling of other hazardous chemicals.
▪ Health and safety hazards to workers from the management of chlorine used for disinfection and other contaminants?		x	Subproject does not include constriction and/ or installation of chlorination unit.
▪ Dislocation or involuntary resettlement of people	x		There may be temporary disturbance to business and squatters/vendors during construction. A resettlement plan has prepared to mitigate/compensate these impacts.
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		x	Not applicable

SCREENING QUESTIONS	Yes	No	REMARKS
▪ noise and dust from construction activities?	x		Short term impact on air quality due to dust generation during construction activities is anticipated. Appropriate dust suppression measures will be taken to minimize dust generation due to construction activities at site. No significant increase in noise level is anticipated due to construction. All equipment and machineries will conform to the Statutory norms.
▪ Increased road traffic due to interference of construction activities?	x		Proper traffic management and planning will be ensured during construction.
▪ continuing soil erosion/silt runoff from construction operations?		x	Not expected
▪ delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?		x	Trained and skilled staff will be deployed for O&M. Also, quality of treated water will be regularly monitored through water sample testing to ensure delivery of safe water to consumers
▪ delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?		x	HDPE pipes will be used for distribution system and are non corrosive in nature.
▪ accidental leakage of chlorine gas?		x	Subproject does not include chlorination unit.
▪ Excessive abstraction of water affecting downstream water users?		x	Subproject will utilize the existing surface sources; no source improvement / augmentation proposed in the subproject.
▪ competing uses of water?		x	Not applicable.
▪ increased sewage flow due to increased water supply	x		Sewerage system of adequate capacity including treatment is proposed under the subproject
▪ increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant	x		Sewerage system of adequate capacity including treatment is proposed under the subproject
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		x	No such impact anticipated as the import of workforce will be limited to skilled workers; local communities in the vicinity of the project would be employed as much as possible.
▪ social conflicts if workers from other regions or countries are hired?		x	Not anticipated as local communities within the project vicinity will be employed as much as possible.

SCREENING QUESTIONS	Yes	No	REMARKS
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during operation and construction?		x	Not applicable. Construction will not involve use of explosives and chemicals.
▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning.		x	Operational area will be clearly demarcated and access will be controlled. Only workers and project concerned members will be allowed to visit the operational sites

A Checklist for Preliminary Climate Risk Screening

Country/Project Title: India/ Karnataka Integrated Urban Water Management Investment Program
Sector: Urban Development
Subsector: Water Supply
Division/Department: Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC)

Screening Questions		Score	Remarks[4]
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	0	
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	0	
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	0	
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

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

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

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

Appendix 2. National Ambient Air Quality Standards

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

Appendix 3. Applicable Noise Standards

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

Appendix 4. 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.

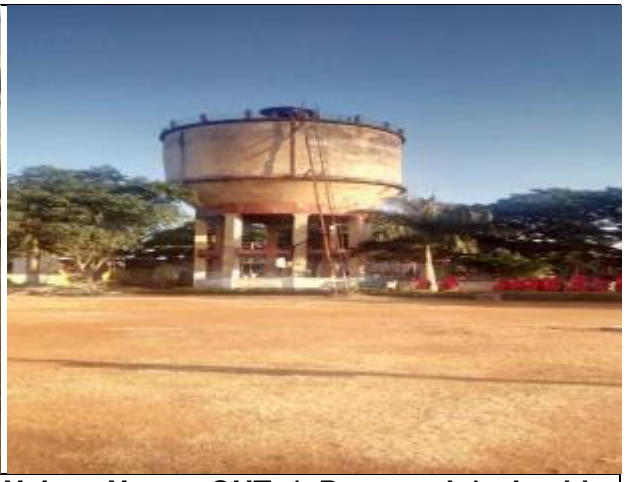
(xii) Trade Unions Act, 1926 - The Act lays down the procedure for registration of trade unions of workmen and employees. The trade unions registered under the Act have been given certain immunities from civil and criminal liabilities.

(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 5. Photo Illustration

	
Nehru Nagar existing OHT	**Nehru Nagar OHT (Proposed)- beside existing OHT**
	
Nehru Nagar area – Water distribution area	**Rattihalli Road- Water distribution area**
	
Agasanahalli OHT- existing water reservoir	**Gandhi Nagara OHT- existing water**

will be used	reservoir will be used
	
Existing WTP at Byadgi	**Existing WTP at Byadgi**
	
Location of Feeder main	**Location of Feeder main**

Appendix 6. Sample Outline of Spoil Management Plan

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

I. Spoils information

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

II. Spoils management

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

III. Documentation

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

Appendix 7. Traffic Management Planning (TMP)

A. Principles for TMP around the Water Pipes Sewer Construction Sites

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

(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 9to Figure 14** 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:

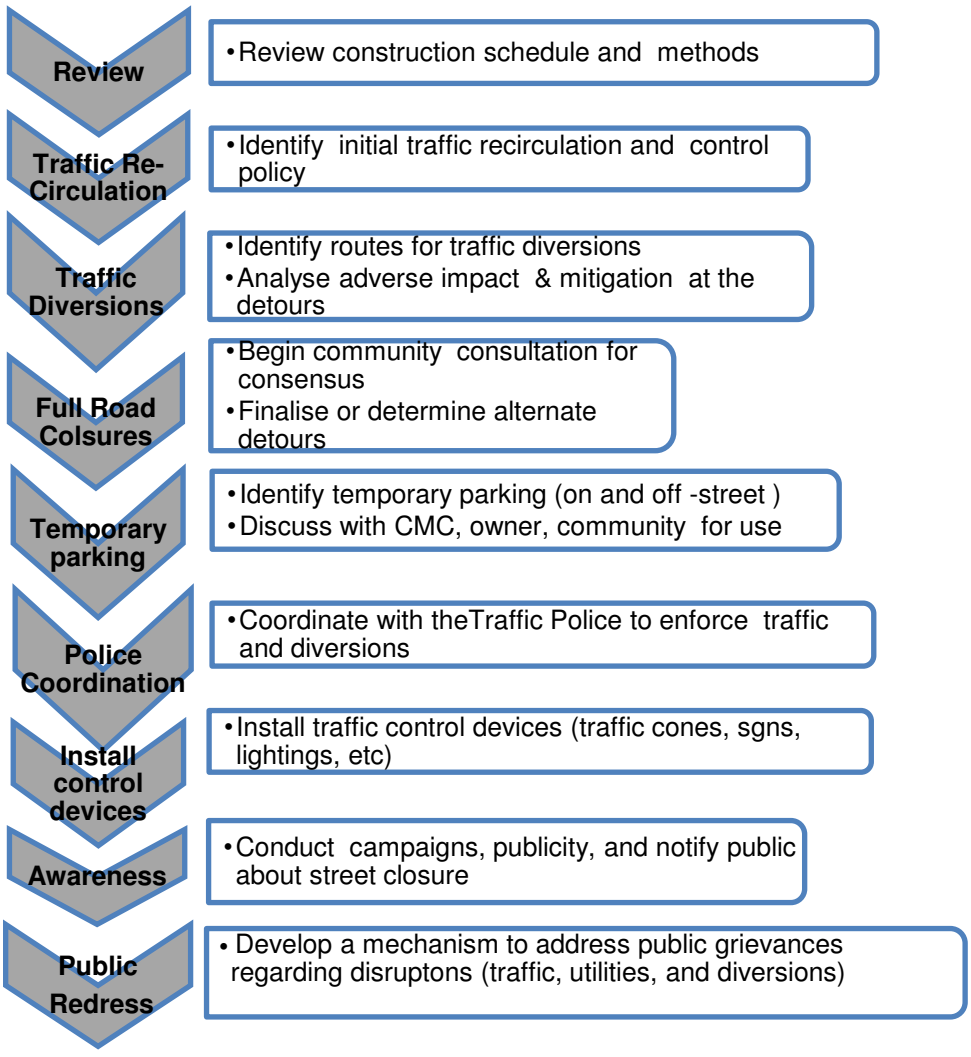
(i) approval from the ByadgiTown Corporation / Public Works Department (PWD) to use the local streets as detours;
(ii) consultation with businesses, community members, traffic police, PWD, etc, regarding the mitigation measures necessary at the detours where the road is diverted during the construction;
(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 9: Policy Steps for the TMP



D. Public awareness and notifications

6. As per discussions in the previous sections, there will be travel delays during the constructions, as is the case with most construction projects, albeit on a reduced scale if utilities and traffic management are properly coordinated. There are additional grounds for travel delays

in the area, as most of the streets lack sufficient capacity to accommodate additional traffic from diverted traffic as a result of street closures to accommodate the works.

7. The awareness campaign and the prior notification for the public will be a continuous activity which the project will carry out to compensate for the above delays and minimize public claims as result of these problems. These activities will take place sufficiently in advance of the time when the roadblocks or traffic diversions take place at the particular streets. The reason for this is to allow sufficient time for the public and residents to understand the changes to their travel plans. The project will notify the public about the roadblocks and traffic diversion through public notices, ward level meetings and city level meeting with the elected representatives.

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

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

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

10. The campaign will cater to all types of target groups i.e. children, adults, and drivers. Therefore, these campaigns will be conducted in schools and community 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

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

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

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

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

13**.** **Figure 9 to Figure** 14 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:

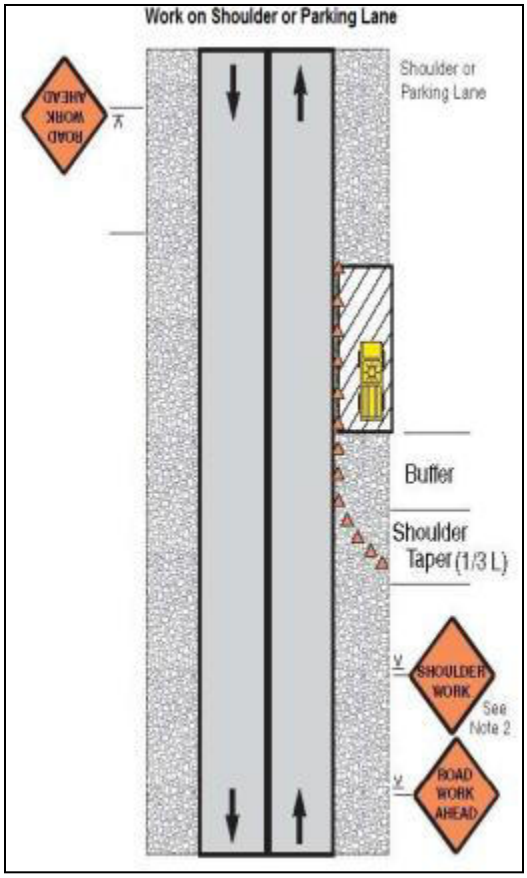
- Work on shoulder or parking lane
- Shoulder or parking lane closed on divided road
- Work in Travel lane
- Lane closure on road with low volume
- Lane closure on a two-line road with low volume (with yield sign)
- Lane closure on a two-line road with low volume (one flagger operation)
- Lane closure 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

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

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

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

Figure 10: Work on shoulder or parking lane & Shoulder orParking lane closed on divided road



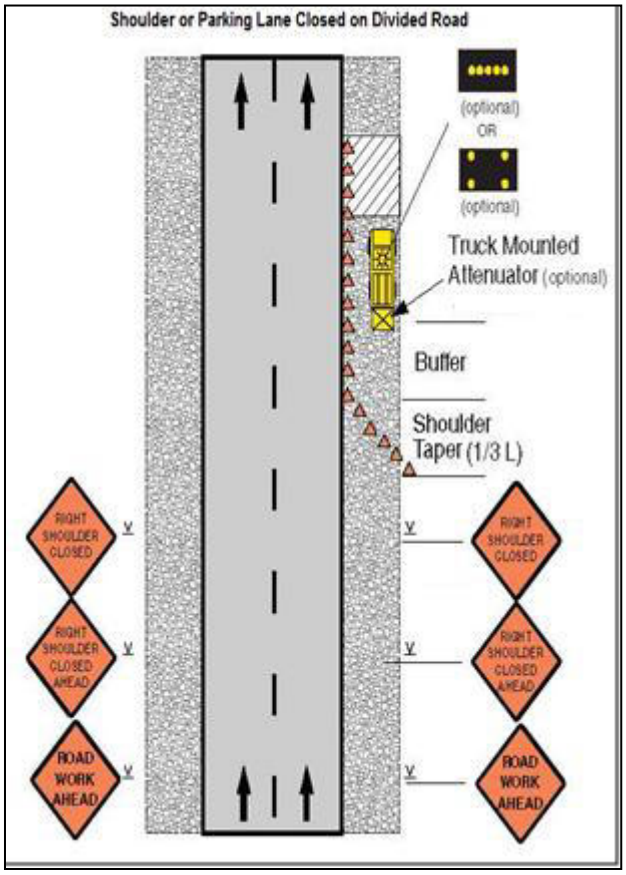
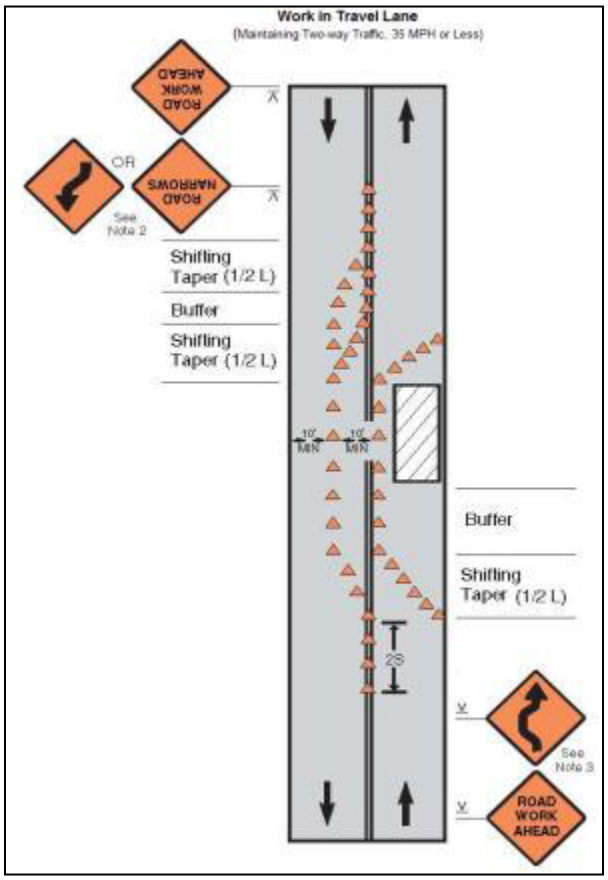


Figure 11: Work in Travel lane & Lane closure on road with low volume



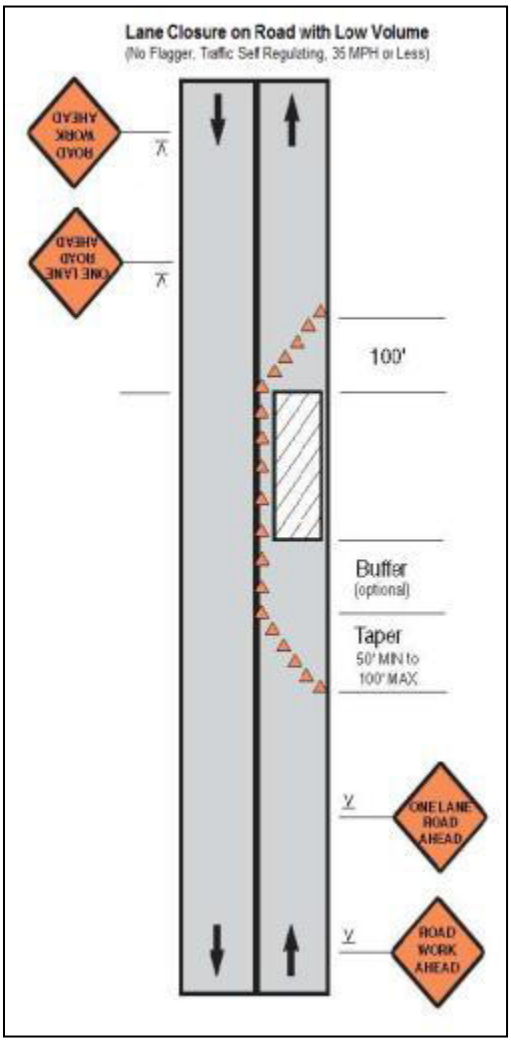
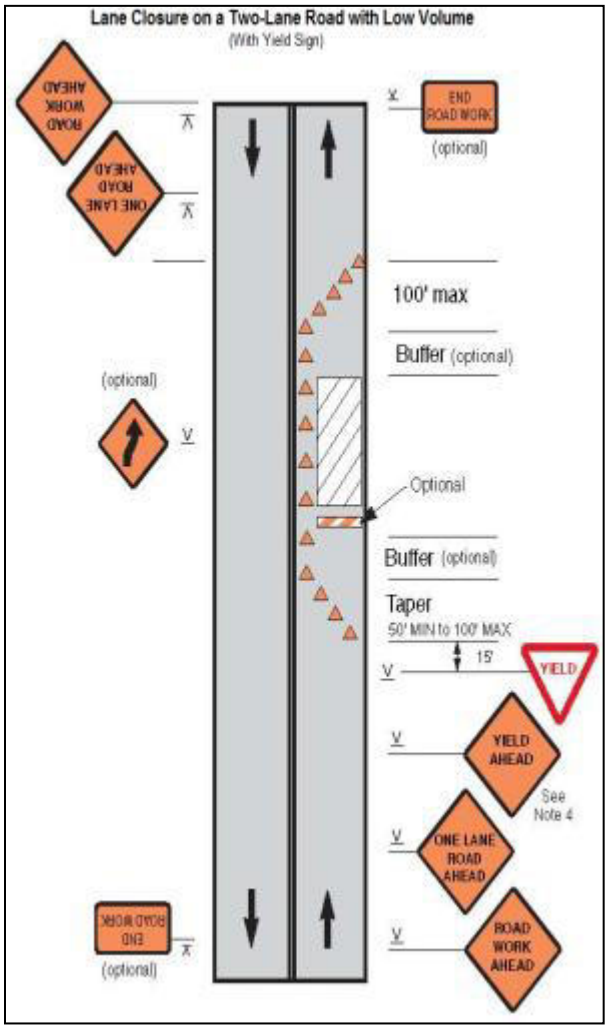


Figure 12: Lane closure on a two-line road with low volume (with yield sign) &Lane closure on a two-line road with low volume (one flagger operation)



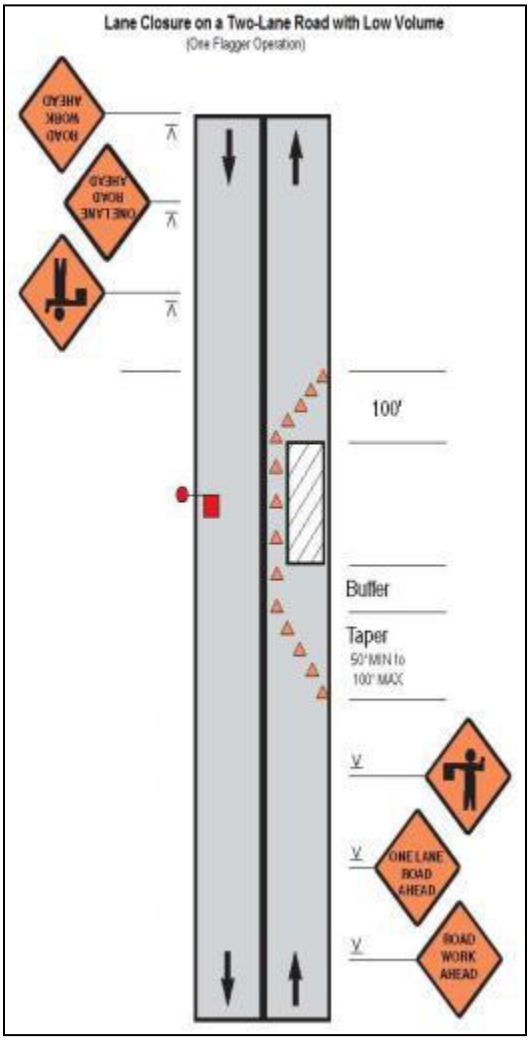
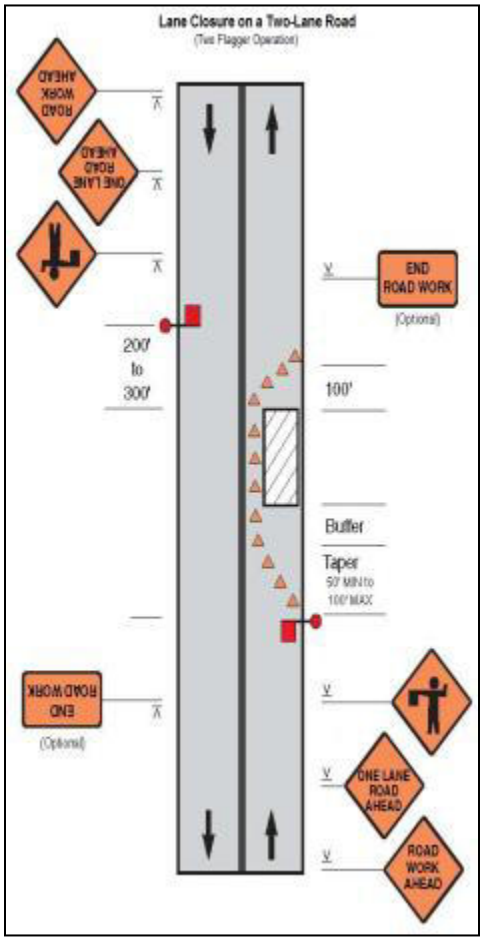


Figure 13: Lane closure on a two lane road (two flagger operation) &Lane closure on a four lane undivided Road



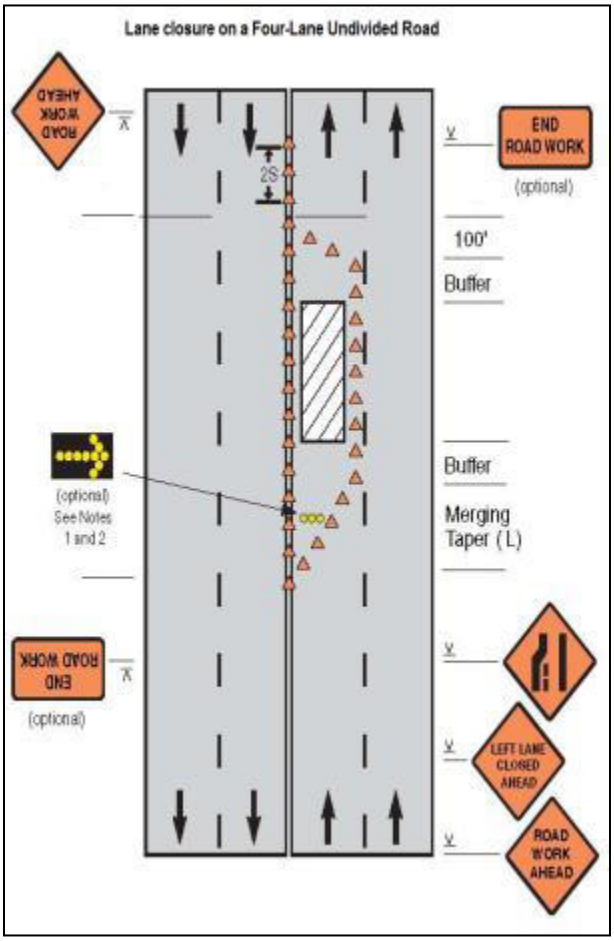
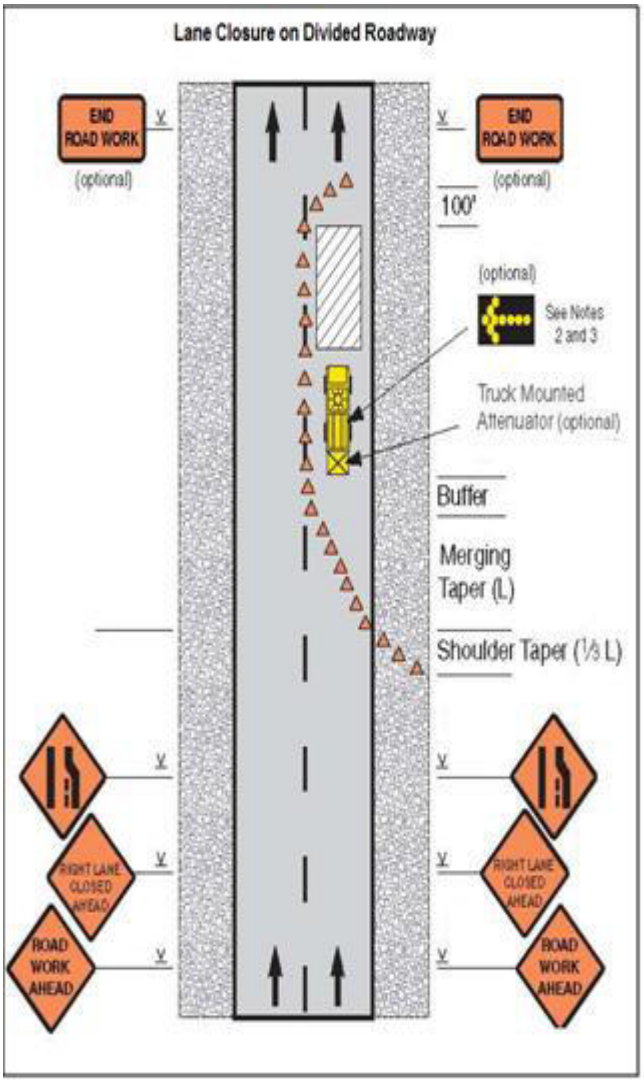


Figure 14: Lane closure on divided roadway &Half road closure on

multi-lane roadway



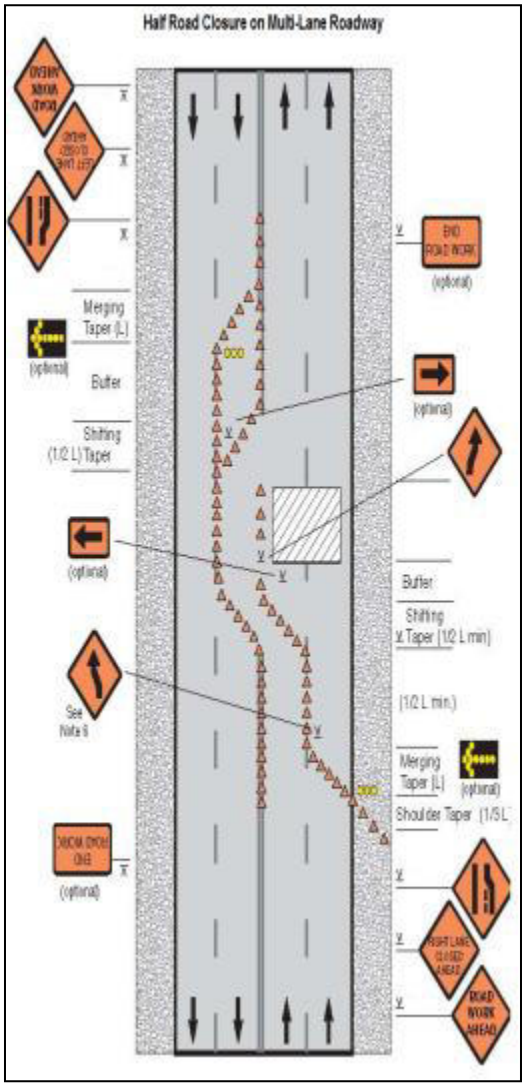
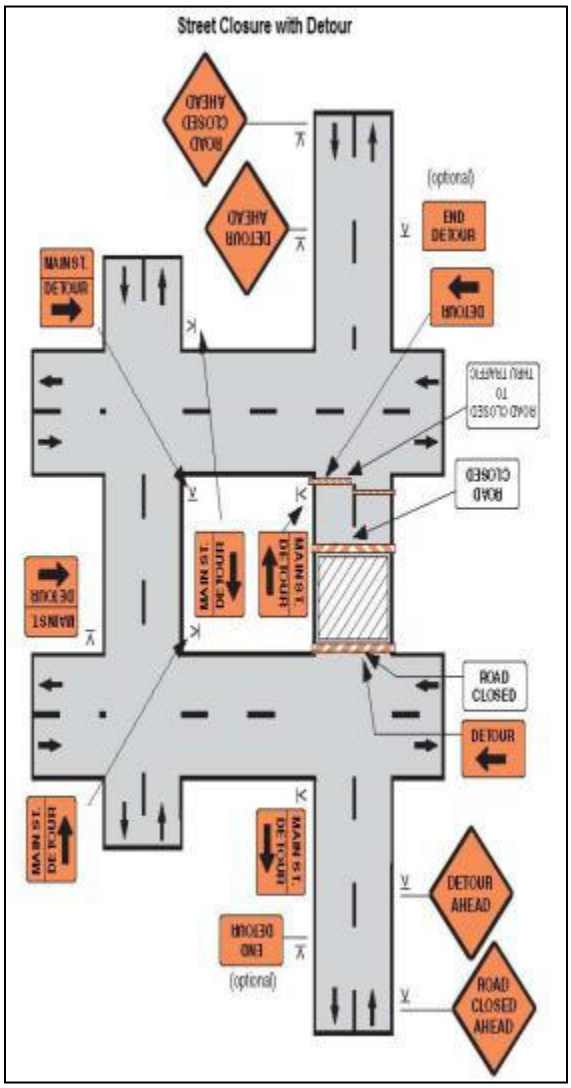


Figure 15: Street closure with detour



Appendix 8. List of Clearances Required

No	Permission	Water Network	Responsibility
1	KSPCB	NA	NA
2	National Highways / PWD	No Highway crossing as per present design	NA
3	Railway	No Railway crossing as per present design	NA
4	Utilities (ESCOM, BSNL)	Clearance Required, if crossing	ULB/PIU
5	Labour License	License Required	Contractor
6	Forest	NA	NA

Appendix 9. Minutes of the Stakeholder Consultation Meeting

Appendix 9a. Davanagere, 3rd October 2012

The meeting was attended by key stakeholders from four project towns of Byadgi, Ranebennur, Harihar and Davangere including public/elected representatives from each town, ULB officials, officials from other line departments and executing agency KUIDFC, and NGOs/CBOs. The meeting was chaired by Davangere District Deputy Commissioner,
The PPTA consultants made detailed presentations – in Kannada and English on overall program, pilot towns, technical studies, poverty social development aspects, and environmental and social safeguard issues related to proposed subprojects in respective towns.

DavangereTown Meeting Session

- Davanagere ULB commissioner offered help to resolve issues and to finalise the proposals to improve water and wastewater systems. He made following comments.
- O&M of the water supply and wastewater system is a major problem in the ULB without adequate staff.
- Expressed concern about WWTP not being used properly because of the shortage of staff in the ULB.
- Promised support and coordination during project implementation.
- Deputy Mayor of Davanagere, expressed concern about quality of work.

KUIDFC

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

Other discussions

- Provision for Sewer Connections – include connection cost as a separate item. Check with project staff of KMRP/NKUSIP.
- Surrounding areas of ULBs and gaps in the existing sewerage system of the town – Check whether the villages and settlements are within the ULB's jurisdiction/ boundary and also population densities.
- Demarcate the roads where larger diameter sewers and WS mains are proposed in all ULBs, to carryout sample surveys and to check impacts during construction. Identify streets where complete road closure is required?
- Wastewater treatment scenario in Davanagere without considering 19.45 MLD existing Waste Stabilisation Ponds – Review and check whether an additional treatment plant is required?
- Maps or drawings to be prepared to show proposals/ options for both water supply and wastewater system.
- Refine the cost estimates to show following items separately: Laying of sewer network: Road restoration cost; Construction of collection chambers and connections from individual properties to collection chambers; Land cost for WWTPs and Pumping Stations; Construction cost of WWTP
- Identify industrial demand and location for recycling treated wastewater

- Preparation of comparison table for the selection of pipe material for sewerage and water supply system.

Appendix 9b. Mallur Road, Byadgi. 16th December 2015
Attendees:

SL	Name	Designation	Phone Number
1	Sri. V M Pujar	Chief Officer, TMC, Byadgi.	9886491235
2	Kum. Nirmala V Nayak	Junior Engineer, TMC, Byadgi.	9164680590
3	Sri. Sadanand G Dadamode	RE, PMDCSC, Tranche-1	8884416590
4	Sri. Vishal Shenoy	Manager, PMDCSC, Tranche-1	9886775454
5	Sri. S SChori	Resident, Mallur, Byadgi.	9986577705
6	Sri. M C Bhagojikoppa	Resident, Vinayak Nagar, Byadgi	8453521087
7	Sri. Jamaldin	Resident, Mallur, Byadgi.	9964549989
8	Sri. A H Simpager	Resident, Bettadamane , Byadgi.	9663536254
9	Sri. B I Chandaragi	Resident, Mallur, Byadgi.	9164107868

Appendix 9c. Rattihalli road, Byadgi. 16th December 2015

Attendees:

SL	Name	Designation	Phone Number
1	Sri. V M Pujar	Chief Officer, TMC Byadgi.	9886491235
2	Kum. Nirmala V Nayak	Junior Engineer, TMC Byadgi.	9164680590
3	Sri. Sadanand G Dadamode	RE, PMDCSC, Tranche-1	8884416590
4	Sri. Vishal Shenoy	Manager, PMDCSC, Tranche-1	9886775454
5	Sri. VeerappaMallur	Resident, Bettadamane, Byadgi.	9164689719
6	Sri. SrikanthGoneppa	Resident, Rattihalli road, Byadgi	9743593105
7	Sri. VenkateshManappa	Resident, Bhovi Colony, Byadgi.	7829084340
8	Sri. Santhosh S Konnur	Resident, Teridahalli road , Byadgi.	7676767998
9	Sri. KrishnappaDoddamane	Resident, Gandhinagar , Byadgi.	9945624198
10	Sri. S SDoddamane	Resident, Melagiri Plot , Byadgi.	9902653336

Appendix 9d. ShivapuraBadavane, Byadgi. 16th December 2015

Attendees:

SL	Name	Designation	Phone Number
1	Sri. Sadanand G Dadamode	RE, PMDCSC, Tranche-1	8884416590
2	Sri. Vishal Shenoy	Manager, PMDCSC, Tranche-1	9886775454
3	Sri. Maula Ali	Resident, ShivapuraBadavane, Byadgi.	9945863260
4	Sri. Yallappa	Resident, ShivapuraBadavane, Byadgi.	8095511397
5	Sri. Mohammed Ali	Resident, ShivapuraBadavane, Byadgi.	9740009986
6	Sri. Anwar Saab	Resident, ShivapuraBadavane, Byadgi.	9986547031
7	Sri. Gadigeppa	Resident, Islampurhoni, Byadgi.	-
8	Sri. Smt. HemaSoler	Resident, Islampurhoni, Byadgi.	-
9	Sri. Channabasappa	Resident, Islampurhoni, Byadgi.	9591277208
10	Smt. SunithaBadiger	Resident, ShivapuraBadavane, Byadgi.	-
11	Smt. RekhaShanmukhappa	Resident, ShivapuraBadavane, Byadgi.	-
12	Smt. Jayamma	Resident, ShivapuraBadavane, Byadgi.	-
13	Sri. Asif	Resident, Islampurhoni, Byadgi.	9980104624

Appendix 10. Environmental Disposal Standards

1. General Standards for Discharge of Environmental Pollutants Part - A: Effluents

Parameter	Inland surface water	Public sewers	Land for irrigation	Marine/coastal areas
Suspended solids mg/l, max.	100	600	200	(a) For process waste water (b) For cooling water effluent 10 per cent above total suspended matter of influent.
Particle size of suspended solids	shall pass 850 micron IS Sieve	-	-	(a) Floatable solids, solidsmax. 3 mm (b) Settleable solids, max 856 microns
pH value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
Temperature	shall not exceed 5oC above the receiving water temperature			shall not exceed 5oCabove the receiving water temperature
Oil and grease, mg/l max,	10	20	10	20
Total residual chlorine, mg/l max	1.0	-	-	1.0
Ammonical nitrogen (as N),mg/l, max.	50	50	-	50
Total kjeldahl nitrogen (as N);mg/l, max. mg/l, max.	100	-	-	100
Free ammonia (as NH3), mg/l,max.	5.0	-	-	5.0
Biochemical oxygen demand (3 days at 27oC), mg/l, max.	30	350	100	100
Chemical oxygen demand, mg/l, max.	250	-	-	250
Arsenic(as As).	0.2	0.2	0.2	0.2
Mercury (As Hg), mg/l, max.	0.01	0.01	-	0.01
Lead (as Pb) mg/l, max	0.1	1.0	-	2.0
Cadmium (as Cd) mg/l, max	2.0	1.0	-	2.0
Hexavalent chro-mium (as Cr + 6),mg/l, max.	0.1	2.0	-	1.0
Total chromium (as Cr) mg/l, max.	2.0	2.0	-	2.0
Copper (as Cu)mg/l, max.	3.0	3.0	-	3.0
Zinc (as Zn) mg/l, max.	5.0	15	-	15
Selenium (as Se)	0.05	0.05	-	0.05
Nickel (as Ni) mg/l, max.	3.0	3.0	-	5.0
Cyanide (as CN) mg/l, max.	0.2	2.0	0.2	0.2
Fluoride (as F) mg/l,	2.0	15	-	15

Parameter	Inland surface water	Public sewers	Land for irrigation	Marine/coastal areas
max.				
Dissolved phosphates (as P),mg/l, max.	5.0	-	-	-
Sulphide (as S) mg/l, max.	2.0	-	-	5.0
Phenolic compounds (as C6H50H)mg/l, max.	1.0	5.0	-	5.0
Radioactive materials: (a) Alpha emitters micro curie mg/l, max. (b)Beta emittersmicro curie mg/l	10^{-7} 10^{-6}	10^{-7} 10^{-6}	10^{-8} 10^{-7}	10^{-7} 10^{-6}
Bio-assay test	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent
Manganese	2 mg/l	2 mg/l	-	2 mg/l
Iron (as Fe)	3mg/l	3mg/l	-	3mg/l
Vanadium (as V)	0.2mg/l	0.2mg/l	-	0.2mg/l
Nitrate Nitrogen	10 mg/l	-	-	20 mg/l

These standards shall be applicable for industries, operations or processes other than those industries, operations or process for which standards have been specified in Schedule of the Environment Protection Rules, 1989.

Standards for Diesel Generator Sets: Stack Height

The minimum height of stack to be provided with each generator set can be worked out using the following formula:

H = h+0.2x ÖKVA

H = Total height of stack in metre

h = Height of the building in metres where the generator set is installed

KVA = Total generator capacity of the set in KVA

Based on the above formula the minimum stack height to be provided with different range of generator sets may be categorised as follows:

For Generator Sets	Total Height of stack in metre
50 KVA	Ht. of the building + 1.5 metre
50-100 KVA	Ht. of the building + 2.0 metre
100-150 KVA	Ht. of the building + 2.5 metre
150-200 KVA	Ht. of the building + 3.0 metre
200-250 KVA	Ht. of the building + 3.5 metre
250-300 KVA	Ht. of the building + 3.5 metre

Similarly for higher KVA ratings a stack height can be worked out using the above formula.

PART-E Noise Standards

Noise limits for domestic appliances and construction equipments at the manufacturing stage in dB(A).

Window air conditioners of 1 -1.5 tonne	68
Air coolers	60
Refrigerators	46
Diesel generator for domestic purposes	85
Compactors (rollers), front loaders, concentrate mixers, cranes (movable), vibrators and saws	75

Appendix 11. Monitoring and Reporting Formats

SAMPLE MONTHLY REPORTING FORMAT FOR CONSTRUCTION SUPERVISION SPECIALIST

1. Introduction

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

No.	Sub Project Name	Status of the Sub Project			List of works	Progress of works
		Pre-Construction	Construction	Operational Phase		
	ii.	**iii.**	**iv.**	**v**		

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

No	Sub Project Name	Statutory Environmental Requirements	Status of Compliance	Action Required
	ix.	**x.**	**xi.**	**xii.**

3. Compliance Status with Environmental Loan Covenants

No (List schedule and Paragraph Number of Loan Agreement)	Covenant	Status of Compliance	Action Required
xiii.	**x**	**xv.**	**xvi.**

4. Compliance Status with the Environmental Management and Monitoring Plan

- Provide the monitoring results as per the parameters outlined in the EMP. Append supporting documents where applicable, including Environmental Site Inspection Reports.
- There should be reporting on the following items which can be incorporated in the checklist of routine Environmental Site Inspection Report followed with a summary in the semi –annual report send to ADB. Visual assessment and review of relevant site documentation during the routine site inspection needs to note and record the following
  - ✓ What are the dust suppression techniques followed for site and if any dust was noted to escape the site boundaries.
  - ✓ If muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads
  - ✓ Adequacy of type of erosion and sediment control measures installed on site, condition of erosion and sediment control measures including if these were intact following heavy rain.
  - ✓ Are their designated areas for concrete works and refuelling
  - ✓ Are their spill kits on site and if there are site procedure for handing emergencies
  - ✓ Is there any chemical stored on site and what is the storage condition?
  - ✓ Is there any dewatering activities, if yes, where is the water being discharged ?
  - ✓ How are the stockpiles being managed ?
  - ✓ How is solid and liquid waste being handled on site
  - ✓ Review of the complaint management system
  - ✓ Checking if there are any activities being under taken out of working hours and how that is being managed.

Summary Monitoring Table

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

Overall Compliance with CEMP/ EMP

No.	Sub-Project Name	EMP/ CEMP Part of Contract Documents (Y/N)	CEMP/ EMP Being Implemented (Y/N)	Status of Implementation (Excellent/ Satisfactory/ Partially Satisfactory/ Below Satisfactory)	Action Proposed and Additional Measures Required
	xviii.	**xix.**	**xx.**	**xxi.**	**xxii.**
	xxiv.	**xxv.**	**xxvi.**	**xxvii.**	**xxviii.**
	xxx.	**xxxi.**	**xxxii.**	**xxxiii.**	**xxxiv.**

5. Approach and methodology for environmental monitoring of the project

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

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

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

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

Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Government Standards)		
			PM10 µg/m^3	SO_2 µg/m^3	NO_2 µg/m^3
	xxxvi.	**xxxvii.**	**xxxviii.**	**xxxi**	**xl**
	xlii.	**xliii.**	**xliv.**	**xl**	**xlvi**
Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM10 µg/m^3	SO_2 µg/m^3	NO_2 µg/m^3
	xlviii.	**xlix.**	**l.**	**li.**	
	liv.	**lv.**	**lvi.**	**lvii.**	

Noise Quality Results

Site No.	Date of Testing	Site Location	LAeq (dBA) (Government Standard)	
			Day Time	Night Time
	lx.	**lxi.**	**lxii.**	**lxiii.**
	lxv.	**lxvi.**	**lxvii.**	**lxviii.**
Site No.	Date of Testing	Site Location	LAeq (dBA) (Monitoring Results)	
			Day Time	Night Time
	lxx.	**lxxi.**	**lxxii.**	**lxxiii.**
	lxxv.	**lxxvi.**	**lxxvii.**	**lxxviii.**

7. Summary of key issues and remedial actions

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

8. Appendices

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

SAMPLE ENVIRONMENTAL SITE INSPECTION REPORT

Project Name
Contract Number
Name: _____ Date: _____
Title: _____ DMA: _____
Location: _____ Group: _____
Weather Condition: _____
Initial Site Condition: _____

Concluding Site Condition:
Satisfactory _____ Unsatisfactory _____ Incident _____Resolved _____ Unresolved _____

Incident:
Nature of incident:
_____

Intervention Steps:
_____

Incident Issues

Project Activity Stage	Survey	lxx
	Design	lx
	Implementation	lxx
	Pre-Commissioning	lxx
	Guarantee Period	lxxx

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 _____
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 night time 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						

Sl. No.	Safety Issues	Yes	No	Non-Compliance	Corrective Action	Penalty	Remarks
17	Regular inspection of work zone traffic control devices by authorized contractor personnel						
18	Construction workers' safety - Provision of personnel protective equipment						
19	A. Helmets						
	B. Safety shoes						
	C. Dust masks						
	D. Hand gloves						
	E. Safety belts						
	F. Reflective jackets						
	G. Earplugs for labor						
20	Workers employed on bituminous works, stone crushers, concrete batching plants, etc. provided with protective goggles, gloves, gumboots, etc.						
21	Workers engaged in welding work shall be provided with welder protective shields						
22	All vehicles are provided with reverse horns.						
23	All scaffolds, ladders, and other safety devices shall be maintained in safe and sound condition.						
24	Regular health check-up for labor/ contractor's personnel						
25	Ensuring sanitary conditions and all waste disposal procedures and methods in the camps.						
26	The contractor shall provide adequate circuit for traffic flow around construction areas, control speed of construction vehicles through road safety and training of drivers, provide adequate signage, barriers, and flag persons for traffic						

Sl. No.	Safety Issues	Yes	No	Non-Compliance	Corrective Action	Penalty	Remarks
	control						
27	Provision of insurance coverage for the contractor's personnel						

Contractor Consultant