

Initial Environmental Examination

Document stage: Final
Project Number: 43253-027
August 2018

IND: Karnataka Integrated Urban Water Management Investment Program (Tranche 2) – Improvements for 24 x 7 Water Supply System for Town Municipal Council in Kundapura

Package No. 02KDP01

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

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CURRENCY EQUIVALENTS

(as of 20 August 2018)

Currency unit	–	Indian rupee (₹)
₹1.00	=	\$0.014
\$1.00	=	₹69.772

ABBREVIATIONS

ADB	–	Asian Development Bank
CFE	–	consent for establishment
CFO	–	consent for operation
CGWB	–	Central Ground Water Board
CPCB	–	Central Pollution Control Board
CRZ	–	Coastal Regulation Zone
DLIC	–	District Level Implementation Committee
EHS	–	Environmental, Health and Safety
EIA	–	environmental impact assessment
EMP	–	environmental management plan
GRC	–	grievance redress committee
GRM	–	grievance redress mechanism
HSC	–	house service connection
H&S	–	health and safety
IEE	–	initial environmental examination
IFC	–	International Finance Corporation
KCZMA	–	Karnataka Coastal Zone Management Authority
KIUWMIP	–	Karnataka Integrated Urban Water Management Investment Program
KSPCB	–	Karnataka State Pollution Control Board
KUDCEMP	–	Karnataka Urban Development and Coastal Environmental Management Project
KUIDFC	–	Karnataka Urban Infrastructure Development and Finance Corporation
MoEFCC	–	Ministry of Environment, Forest and Climate Change
NGO	–	nongovernment organization
OHT	–	overhead tank
O&M	–	operation and maintenance
PIU	–	project implementation unit
PMD CSC	–	project management, design and construction supervision consultant
PMU	–	project management unit
PWD	–	Public Works Department
REA	–	rapid environmental assessment
ROW	–	right-of-way
RPMU	–	regional program Management Unit
SEIAA	–	State Environment Impact Assessment Authority
SEMP	–	site-specific environmental management plan
SPS	–	Safeguard Policy Statement
ULB	–	urban local body
UWSS	–	Urban Water Supply and Sanitation
VHPP	–	Varahi Hydal Power Project
WTP	–	water treatment plant

WEIGHTS AND MEASURES

m ³	-	cubic meter
cusec	-	cubic feet per second
dB	-	decibel
°C	-	degree Celsius
dia	-	diameter
kl	-	kiloliter
km	-	kilometer
lpcd	-	liters per capita per day
m	-	meter
μ/cm	-	microcentimeter
μg/m ³	-	microgram per cubic meter
mg/l	-	milligram per liter
mm	-	millimeter
MLD	-	million liters per day
km ²	-	square kilometer

NOTE

In this report, "\$" refers to United States dollars.

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EXECUTIVE SUMMARY

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 while strengthening relevant institutions to enhance efficiency, productivity and sustainability in water use. Kundapura 24/7 water supply subproject is one of the subprojects proposed in Tranche 2.

Kundapura is an important town in Udupi District and is located about 36 kilometer (km) from Udupi, 435 km from State Capital Bangalore and 95 km from Mangalore. Kundapura is spread over an area of 14.01 square kilometer (km²) with a population of 30,450 (2011 Census). First organized water supply system was implemented in Kundapura in 2008 with Varahi River as the source under the Asian Development Bank (ADB) funded Karnataka Urban Development and Coastal Environmental Management Project (KUDCEMP). This was designed to cater the demand of 75,663 population for ultimate year 2026 with a treatment capacity of 7.60 million liters per day (MLD). However, the infrastructure coverage is not comprehensive due to a lack of funds. To optimally utilize the assets created under KUDCEMP, ADB assisted KIUWMIP seeks to provide 24/7 water supply in entire town including peri urban areas of Kundapura.

Categorization. ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in its Safeguard Policy Statement (SPS) 2009. The proposed projects are categorized as A, B, C or FI to determine the level of environmental assessment required. Kundapura 24/7 Water Supply Subproject is classified as Environmental Category B as per the SPS as no significant impacts are envisioned. Accordingly, this initial environmental examination (IEE) has been prepared and assesses the environmental impacts and provides mitigation and monitoring measures to ensure no significant impacts as a result of the subproject.

Subproject Scope. The subproject formulated under this investment program to address gaps in current water supply system. Detailed design of all the subproject components are completed prior to the bidding, and as per the detailed design the subproject includes the following components: (i) rehabilitation works and replacement of electromechanical equipment in Jack well at Jambu (Japthi village) to sufficiently supply 9.37 MLD of raw water to the water treatment plant (WTP), and provision of a new diesel generator set for the un-interrupted power supply; (ii) rehabilitation of the existing 7.60 MLD WTP in Japthi village; including provision of backwash water recirculation and sludge management system, (iii) laying of 4.8 km feeder main tapping from existing clear water main with 200 mm diameter pipe to feed to the proposed overhead tank (OHT) located in Kodi for the newly added zone 4; (iv) construction of 2 OHTs with a total capacity of 0.9 million liter (ml); (v) extension of 31.64 km distribution network of diameter of 75 mm to 250 mm; and (vii) replacement of 4,200 existing meters and providing new metered house service connection (HSC) of 2,250 for uncovered households.

Implementation Arrangements. Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC) is the executing agency responsible for overall technical supervision and execution of all subprojects funded under the Investment Program. Implementation activities are overseen by program management unit (PMU) established in its head office at Bangalore in coordination with its regional office (regional program management unit or RPMU) in Mangalore. PMU and RPMU are staffed with technical, administrative and financial officials, including safeguards specialists, to manage and monitor program implementation. The implementing

agencies are the respective urban local bodies (ULBs). For this package, implementing agency is Kundapura Town Municipal Council (TMC). A program implementation unit (PIU) has been set up for implementation of day-to-day activities in the field. A consultant team, Project Management, Design and Construction Supervision Consultant (PMDSCS), assists PMU, RPMU and all PIUs in subproject planning and management, assures technical quality of design and construction, design the infrastructure, and supervises construction including conducting all safeguards tasks.

Description of the Environment. The subproject components are located in Kundapura urban area except the water intake on Varahi river located at a distance of 11 km from the Town. Kundapura is a coastal town, located along the western coast of India. Town is surrounded by the Arabian Sea in the west, Gangolli River in the north and Haladi River in the east. There are no environmentally-sensitive areas such as protected areas, wetlands, mangroves, or estuaries in or near the subproject locations. Municipal areas located close to the sea coast fall under the Coastal Regulation Zone (CRZ) II, and any works in this zone requires prior permission (no objection certificate) for construction. As per the CRZ Notification, CRZ II is defined as “the area that have already been developed up to or the shoreline. For this purpose, ' Developed Area' is referred to as that area within the municipal limits or in other legally designated urban areas which is already substantially built up and which has been provided with drainage and approach roads and other infrastructural facilities, such as water supply and sewerage mains”. Kodi area, an extension area of Kundapura TMC which is part of the subproject, falls in CRZ II, and the proposed components like clear water main, OHT and distribution lines in this requires prior permission (in the form of no objection certificate, NOC) from Karnataka Coastal Zone Management Authority (KCZMA). This has already been obtained. The Intake well with Varahi water source was implemented in 2007 under KUDCEMP.

Source Sustainability. The water source to Kundapura is from river Varahi. During design phase field investigation, it is observed that Varahi River is a reliable and sufficient source concerning the quantity of water during all seasons. No gauge is installed to measure the actual flow in the river. According to the Varahi Hydrel Power Project, the flow out of the power plant is 8.5 cubic meter per seconds (cumecs). With a water demand of 7.60 MLD in 2026, which is equivalent to 0.11 cumecs, the river provides sufficient water to serve the town Kundapura. The same river is proposed for water supply to the upstream major town of Udupi under the central government funded AMRUT scheme. This scheme will withdraw 0.56 cumecs of water (41 MLD) from the river. From the Kundapura intake at Jambu, the river flows down for about 12-13 km and discharges into the Arabian Sea. The combined withdrawal for Kundapura and Udupi will be 0.676 cumecs, which is just about 8% of total water availability, leaving 92% water downstream. Therefore, Varahi River is considered more than enough for the projected water supply of 7.60 MLD and no major changes envisaged from water abstraction from river and remain same at current level, and abstraction from underground source will not be needed.

Potential Environmental Impacts. No significant impacts are anticipated either due to location or design of the subproject as the sites are selected and fixed ensuring components are not located in environmentally-sensitive areas. Potential impacts were identified in relation to location, design, construction and operation of the improved infrastructure and mitigation measures have recommended.

All the components of the subproject sites are located in existing right of ways (ROW) and government-owned land. The proposed two OHTs are to be constructed on Government land. No private land required for this sub project. The proposed OHT site at Kodi falls under CRZ - II, an existing road bifurcates the site and the coastline/beach. The site is covered with coconut

trees. There are six coconut (*Cocos nucifera*) trees in the demarcated parcel of land for OHT. The layout of the OHT is finalized to save trees as much as possible; of the six trees, two will be retained in the layout and four will be cut with prior approval from the Tree Officer, Forest department. Site is not prone for flooding and access road is available. Clear water main connecting the Kodi OHT and distribution lines in Kodi area also fall under the CRZ - II. CRZ permission has already been obtained. At Halekote OHT site, a large mature tree (Rain Tree, *Albizia saman* or *Samanea saman*) is located just next to the proposed site. This tree is required to be pruned of a branch to construct the OHT, which has a staging height of 15 m. This will be carried out with the prior permission and guidance of the Tree Officer, so that there is no notable damage to the tree.

10. During the construction phase, impacts mainly arise from the need to dispose of moderate quantities of waste soil. The proposed work requires significant quantities of soil excavation (22,780 m³) however, given the small diameter pipes, more than 98% will be utilized for refilling and remaining small quantity (380 m³) of soil will be used for construction purposes within the subproject (for example for ground leveling) or disposed off at the existing landfill for use as waste cell cover in the land fill operation. To avoid inconveniences of soil piling on roads, surplus soil, if any, from the pipe laying activity will be removed from the site daily at end of the day's work and transported for reuse or disposal. Disturbance to residents, businesses, and traffic during pipe laying which are common temporary impacts of construction in urban areas, and there are well developed methods for their mitigation. Providing planks to create access, soil filling, watering and compaction measures such as conducting work in dry season to avoid risk of silt movement and minimizing inconvenience by best construction methods will be employed. There is no natural habitat in these sites, and therefore no impacts on ecological resources envisaged. Pipelines work will be taken up in sections-wise. Excavation, pipe laying and refilling work will be conducted in small sections in sequence, and at any point of time not more than 30-40 m section will be open for work at any work site. There will be no open trenches at the end of each day of work. 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 affecting small areas only.

Environmental Management Plan. The environmental management plan (EMP) aims 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.

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

A copy of the updated EMP/ SEMP must be kept on work sites at all times. The 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.

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.

Mitigation measures for identified impacts include: (i) implementing a health and safety (H&S) plan and providing regular orientation to workers; (ii) noise-producing activities will be kept at minimum by using silencers and working during periods when it will be least affecting sensitive receptors; (iii) water spraying of surroundings to minimize dust; (iv) implementing traffic management plan in coordination with local traffic enforcers; (v) reuse of waste soils; and (vi) improving the sewerage system as part of KIUWMIP. Contractors will be providing planks to create access to ensure businesses are not affected.

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 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. There will also be regular and periodic monitoring surveys for quality of water (at intake, reservoirs and at consumer end).

Consultation, Disclosure and Grievance Redress. The stakeholders were involved in developing the IEE through discussions on-site and public consultation, after which views expressed were incorporated into the IEE and in the planning and development of the subproject. Draft IEE was disclosed and this final IEE report and this final IEE will also be made available at public locations and will be disclosed again to a wider audience via the ADB and KUIDFC websites. The consultation process will be continued and expanded during project implementation to ensure that stakeholders are fully engaged in the project and can participate in its development and implementation. A project-specific grievance redress mechanism (GRM) is proposed and described in the IEE to ensure any public grievances are addressed quickly.

Monitoring and Reporting. The PMU, RPMU, PIUs, consultants will be responsible for monitoring the contractors. PMDCSC will submit monthly monitoring reports to RPMU, and the PMU will send semi-annual monitoring reports to ADB. ADB will post the environmental monitoring reports on its website.

Permits and Clearances Required. Environmental Clearance requirement per Government of India Environmental Impact Assessment Notification is not applicable to this subproject. CRZ clearance for OHT and for proposed pipelines in Kodi area located in CRZ II has already been obtained from KCZMA. Permission from highway authorities (central and state) will be required for laying of pipelines in some stretches, these will be obtained during construction.

Conclusions and Recommendations. The citizens of Kundapura will be the major beneficiaries of this subproject as the environmental condition and over-all health of the community will be improved. They will be provided with a constant supply of better quality water,

piped into their homes. The replacement of old distribution lines shall avoid cross contamination and have positive benefit on health by avoiding diseases such as diarrhea and dysentery, resulting in less expenses on healthcare, improve working days and their economic status.

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 Government of India EIA Notification, 2006.

I. INTRODUCTION

A. Introduction to Karnataka Integrated Urban Water Management Investment Program

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 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 within an Integrated Water Resource Management (IWRM) context.

2. 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). Kundapura, Mangalore, Puttur and Udupi are the four towns chosen to benefit from the Tranche 2 of the investment.

3. The expected outcome will be urban water resource management in four coastal towns (Kundapura, Mangalore, Puttur, and Udupi). The outputs are: (i) urban water supply and sanitation infrastructure expanded and upgraded; (ii) water resource planning, monitoring and service delivery improved; and (iii) institutional capacity of executing agency and urban local bodies strengthened. This initial environmental examination (IEE) is based on an assessment of water supply projects within the project area, i.e., Kundapura.

4. **Subproject Scope.** The subproject formulated under this Investment Program to address gaps in current water supply system. Detailed design of all the subproject components are completed prior to the bidding, and as per the detailed design the subproject includes the following components: (i) rehabilitation works and replacement of electromechanical equipment in Jack well at Jambu (Japthi village) to sufficiently supply 9.37 million liters per day (MLD) of raw water to the water treatment plant (WTP), and provision of a new diesel generator set for the un-interrupted power supply; (ii) rehabilitation of the existing 7.60 MLD WTP in Japthi village including provision of backwash water recirculation and sludge management system; (iii) laying of 4.8 kilometer (km) feeder main tapping from existing clear water main with 200 millimeter (mm) diameter pipe to feed to the proposed overhead tank (OHT) located in Kodi for the newly added zone 4; (iv) construction of 2 OHTs with a total capacity of 0.9 million liter; (v) extension of 31.64 km distribution network of diameter of 75 mm to 250 mm; and (vii) replacement of 4,200 existing meters and providing new metered house service connection (HSC) of 2,250 for uncovered households.

B. Background of Initial Environmental Examination

5. **Categorization.** ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in its Safeguard Policy Statement (SPS), 2009. The proposed projects are categorized as A, B, C or FI to determine the level of environmental assessment required.¹ Rapid environmental

¹ Per ADB SPS, the environmental categorization and level of environmental assessment required for each category are as follows: (i) **Category A:** A proposed project is classified as category A if it is likely to have significant

assessment (REA) using ADB's REA checklist for Water Supply Scheme components were conducted (Appendix 1), and results of the assessments show that Kundapura water supply subproject is classified as Environmental Category B as per ADB SPS, 2009. Accordingly, this IEE report has been prepared.

6. **Scope of the Initial Environmental Examination.** IEE is prepared based on detailed engineering design of the subproject. Assessment of potential impacts is based 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. This IEE will be further updated/ revised, if required, to reflect any changes in project location, design, or construction during implementation by the contractor.

7. **Report Structure.** This IEE was prepared following KIUWMIP's environmental assessment and review framework² and ADB SPS, 2009. This report contains 10 sections: (i) Executive Summary, (2) Introduction, (3) Description of Project components, (4) Policy and Legal Framework, (5) Description of the Environment, (6) Screening of Potential Environmental Impacts and Mitigation Measures, (7) Public Consultation and Information Disclosure, (8) Grievance Redress Mechanism (GRM), (9) Environmental Management Plan, and (10) Conclusion and Recommendations.

II. DESCRIPTION OF THE PROJECT COMPONENTS

8. Kundapura is located in Udupi District in Karnataka and is the headquarters of the Kundapura Taluk placed 92 km from Mangalore and 416 km from Bangalore (Figure 1). Geographically, Kundapura Town is located at a latitude of 13°08'N and longitude of 74°07'E at an average altitude of 80 m above the mean sea level (msl). The municipality spreads in an area of 14 square kilometer (km²) and consists of Kundapura Kasaba and Vaderahobli villages, with 23 municipal wards. Population of Kundapura is 30,450 (2011 Census). Kundapura is well connected to other parts of the state and country by highways and railways. National highway (NH-66) passes through the town. Nearest airport is Mangalore International Airport, 87 km from Kundapura. Kundapura is also connected to the Konkan Railway, which runs from Mumbai to Mangalore. Nearest railway station is at about 4 km from the town.

adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required. (ii)

Category B: A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible and, in most cases, mitigation measures can be designed more readily than for category A projects. An initial environmental examination is required. (iii) **Category C:** A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed. (iv) **Category FI:** A proposed project is classified as category FI if it involves investment of ADB funds to or through a financial intermediary.

² The environmental assessment and review framework has been prepared in 2014 during KIUWMIP loan approval. This has been updated during Tranche 2 to include recent Government of India's environmental laws, rules and regulations and Tranche 2 project components.

9. Kundapura Town Municipal Council (TMC) provides urban services to the people efficiently and is well recognized by the state and central governments. Kundapura TMC has been awarded following certificates of appreciation by the Government of Karnataka:

- (i) Best Urban Local Body in the year of 1996-1997;
- (ii) Best Urban Local Body Award in the 2009-2010;
- (iii) Second Best Practices Award in the year 2010 for Reduction of Nonrevenue Water Supply;
- (iv) Third Best Practices Award-2010 for Solid Waste Management (SWM) for providing excellent Municipal Services, maintaining Healthy Environment;
- (v) The best Utilization of reserved Fund for the social Service Activities; and
- (vi) Town Municipal Council also grabbed Green Leaf Award-2009, Nation Urban Water Awards-2009, and ICONSMW Award-2011 in National level.

Figure 1: Aerial View of the Town Center of Kundapura



Source: Google Earth.

A. Need for Infrastructure Improvement in Kundapura

10. River Varahi is the main surface source of water supply to Kundapura. The intake works, located in Jambu beside Jambukeshwara Temple, about 11 km from Kundapura, pump raw water to the WTP constructed on a hillock in Japhthi village at a distance of about 2.5 km from the intake works by 400 mm diameter mild steel (MS) rising main. Treated water from WTP is pumped through a 400 mm diameter MS rising main to the 500 kiloliter (kl) capacity OHT at Ashraya Colony, 500 kl capacity OHT at Gandhi Park and 500 kl capacity OHT at Halekote. The clear water transmission main passes through Kundapura-Shimoga Road and pass through four-enroute villages viz., Japhthi, Balkur, Basrur and Koni. A Schematic diagram of the existing water supply system is shown in the Figure 2.

Figure 2: Existing Water Supply System in Kundapura

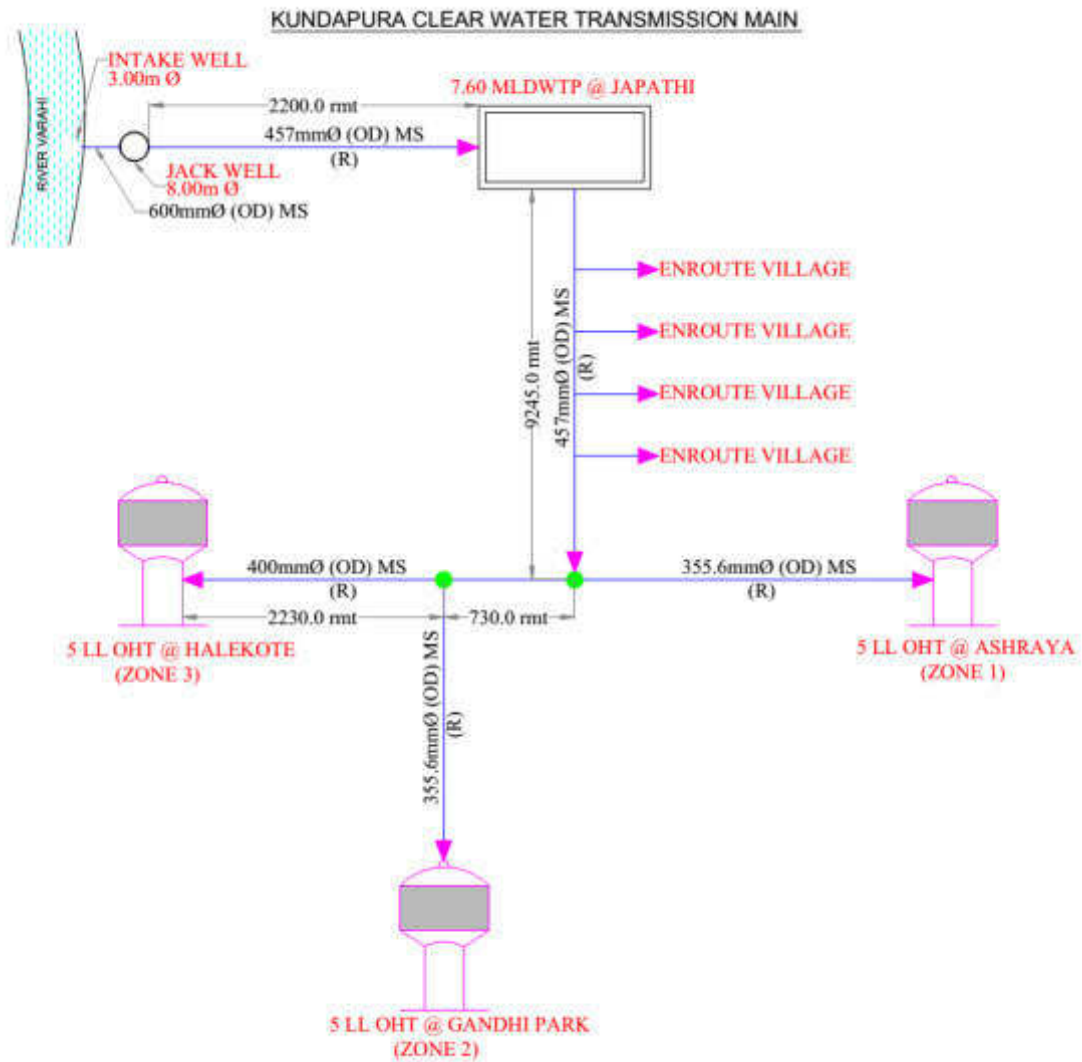


Figure 3: Photographs of Existing Water Supply Infrastructure



Intake Structure in the River Varahi



Jack Well



WTP – Aerator



WTP –Clariflocculator



Filter Bed



Clear Water Reservoir



Back Wash Water Tank



Existing Service Reservoirs

	WTP Location	Capacity (MLD)	Treatment Process	Preliminary Design Stage? (Y/N)	Distance of WTP to nearest receptors in meters	Receiving Water of WTP Backwash /Wastewater Discharge	Uses of the receiving water (swimming, boating, fishing, irrigation, others [please specify])
2	Japthi, Kundapura	7.6	Inlet chamber ,Parshall flume,Flash Mixer , Clriflocculator Filterhouse, Chlorination,	Existing WTP Rehabilitation	79	Discharged to drain	Irrigation

11. A detailed assessment of the existing situation was carried out. the study concluded that the first organized water supply system implemented in 2008 with Varahi River as the source under Karnataka Urban Development and Costal Environmental Management Project (KUDCEMP) was designed to cater to the demand of a population of 75,663 until 2026 with a treatment designed capacity of 7.60 MLD. In the same study, it was concluded that the present water production of 7.60 MLD is insufficient to meet Kundapura's water demand Kundapura until 2046 per national standards. Apart from Kundapura town, water supply covering 6 en-route villages located between the WTP and town need to be provided under the same subproject investment, i.e., Kodi area. The average household size of the town is 4.89, based on ULB data. Kodi, with a population of 4,483, does not have HSCs to treated water. KUDCEMP also ran out of funds in the process of installing water supply infrastructure. KIUWMIP intends to address this gap. To optimally utilize the assets created under KUDCEMP, the ADB assisted KIUWMIP seeks to improve the urban water supply in Kundapura including in its peri urban areas.

B. Description of the Subproject

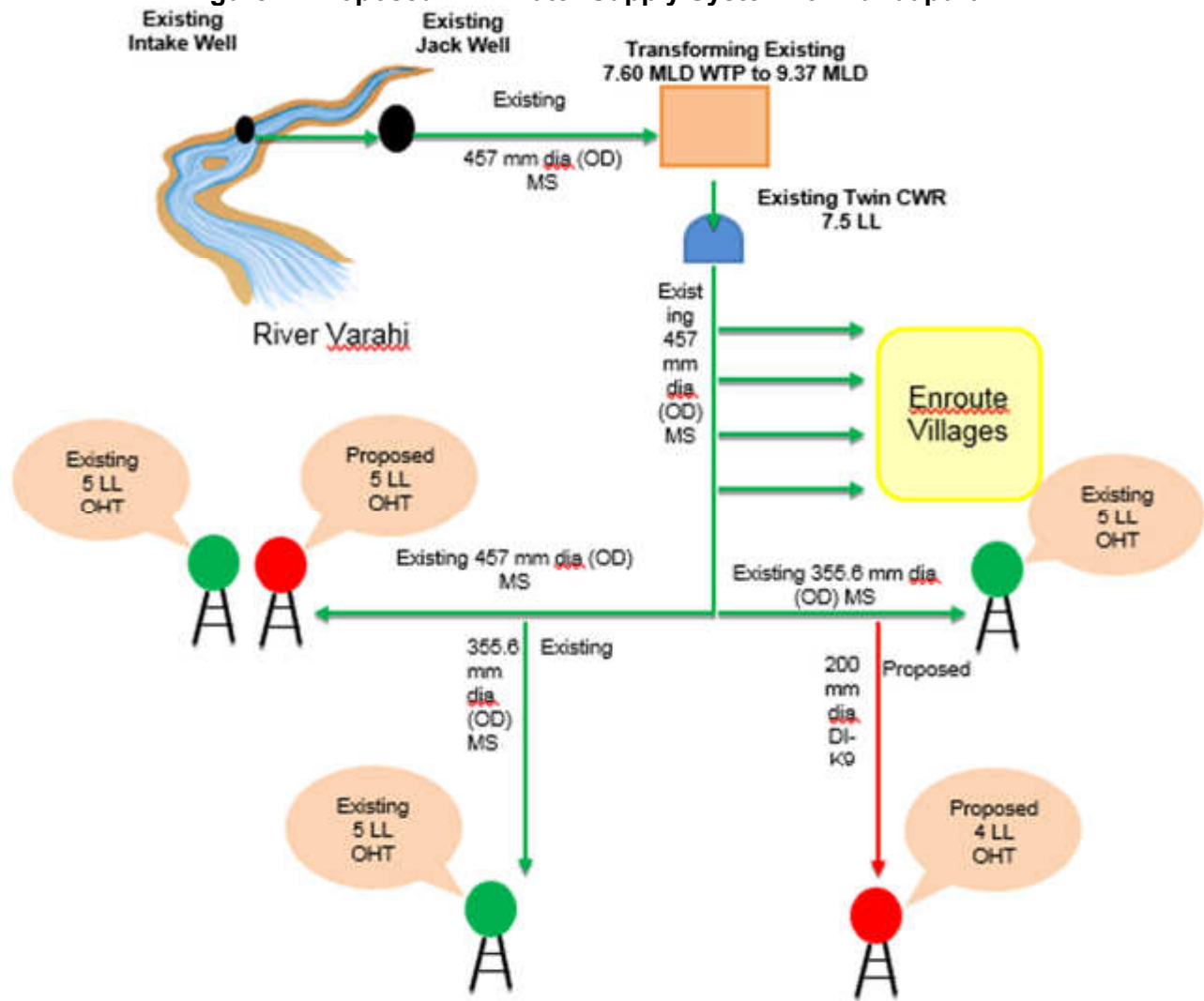
12. Following Table 1 provides details of the KIUWMIP Tranche 2 subproject components in Kundapura based on the detailed engineering design of the subproject. Schematic diagram of water supply system in Kundapura is shown in Figure 4. Locations of proposed components in Kundapura are shown in Figure 5. Figure 6 to 24 show layout plans and pipeline alignment drawings, and Figure 25 shows the typical cross section of trench for laying pipes. The position of the pipe alignment shown on road section is not exact due to mapping scale and underground utilities, and it will be fixed exactly during the pipeline laying work on site. All pipelines will be laid in the road shoulder, wherever it is available, or into the edge of road carriage way. At river crossing, feeder main will be laid on the existing road bridge. Figure 7 and 8 show the layout plan and hydraulic flow diagram of WTP with the proposed backwash recirculation and sludge management system.

Table 1: Proposed Components for 24x7 Water Supply Systems

Infrastructure	Function	Description	Location
Jack well and Pump House	Pumping raw water to water treatment plant (WTP)	Rehabilitation works in Jack well by replacing mechanical equipment inside the pump house (pressure gauges, dewatering pumps, and electrical improvements) Provision of diesel generator set of 200 kilovolt ampere (kVA) for the un-interrupted power supply to the Jack well.	Works will be conducted within the existing Jack well near Jambukeshwara Temple in Jambu village
WTP	Treats raw water	Rehabilitation works in WTP by replacement equipment (flow meters, valves, pressure gauges, flash mixer, clari-floculator, alum and lime mixer, chlorinator, lab equipment etc.), Provision of diesel generator set (160 kVA) at WTP. Provision of backwash water recirculation and sludge management system to cater to total capacity of WTP (7.6 MLD); clarified water will be re-circulated to WTP inlet and accumulated sludge will be disposed in sanitary landfill	Works will be conducted within the existing WTP at Japthi village Sufficient land available within the WTP campus to develop backwash and sludge management facilities (see Figure 7)
Clear Water	Conveys clear	4.8 kilometer (km) length 200 millimeter	Pipeline will be laid from the

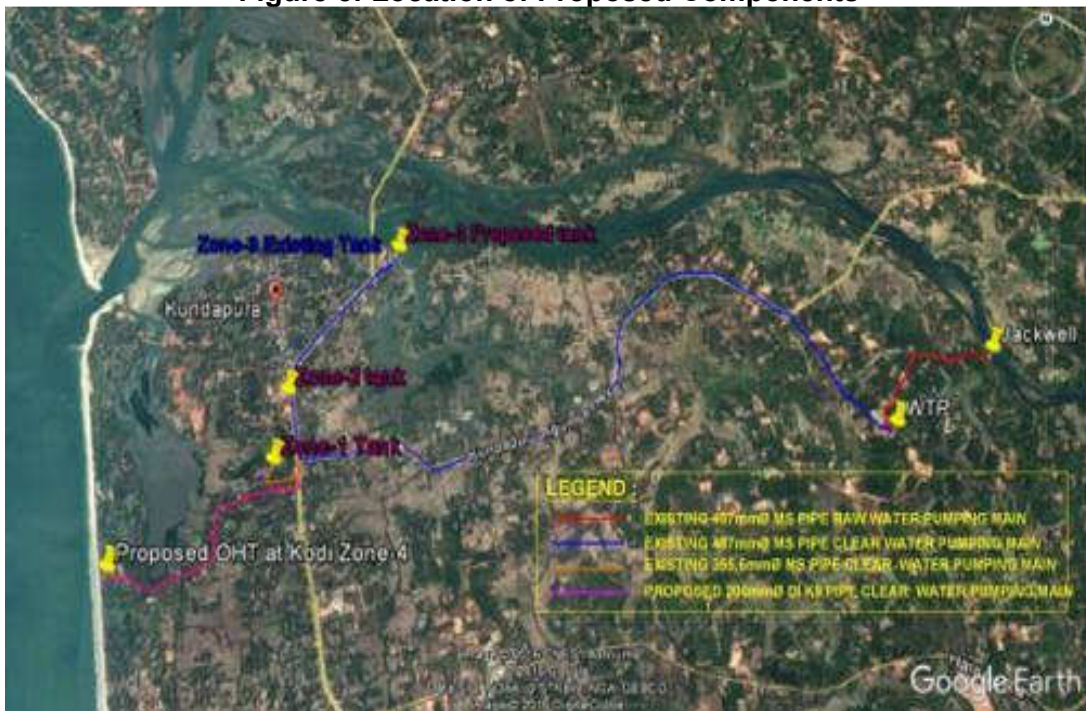
Infrastructure	Function	Description	Location
Transmission Main	water to service reservoirs	(mm) diameter ductile iron pipe	existing clear water main on NH-66 near Vinayaka theater to proposed new overhead tank (OHT) Kodi. Alignment is all along Kodi Road Alignment and profile drawings are shown in Figures 9 to 16.
Water service reservoirs	Water storage for supply	2 no. OHTs (of reinforced cement concrete, RCC) including compound walls at the sites: 500 kiloliter (kl) capacity for Zone-3 at Halekote 400 kl capacity for Zone-4 at Kodi	Site is vacant and owned by TMC Site is vacant and owned by Government of Karnataka Layout plans and elevations of OHTs are shown in Figures 17 to 20.
Distribution system Pipelines	Distributes clear water to the houses for the entire Town	31.64 km length diameter 75 - 250 mm high density poly ethylene (HDPE) pipes 75 mm dia -12.01km 90 mm dia - 5.89 km 110 mm dia - 7.08 km 160 mm dia - 2.27 km 200 mm dia - 2.33 km 250 mm dia - 2.06 km	Distribution pipes will be laid along the roads, within the road right of way, in 4 zones in Kundapura Town Municipal Council (TMC) area. Distribution zones with existing and proposed pipelines are shown Zone wise in Figures 21 to 24.
House Service Connections (HSC)	Individual houses get water after HSC.	HSC with Class B Multijet water meters 2,250 new 4,200 replacement	All households in four zones

Figure 4: Proposed 24/7 Water Supply System for Kundapura



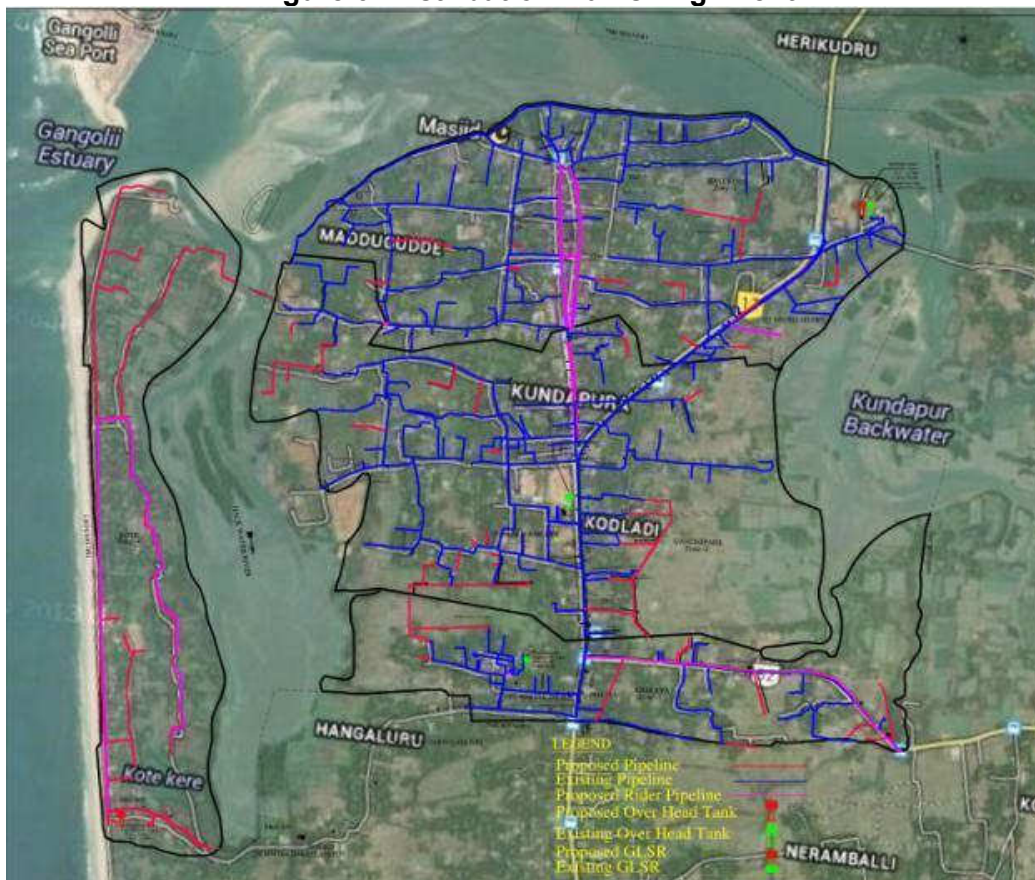
CWR = clear water reservoir, dia = diameter, LL = lakh liter, mm = millimeter, MLD = million liters per day, MS = mild steel, OHT = overhead tank, WTP = water treatment plant.

Figure 5: Location of Proposed Components



Source: Google Earth.

Figure 6: Distribution Mains Alignment



Source: Google Earth.

Figure 7: Layout Plan of WTP with Backwash and Sludge Management System

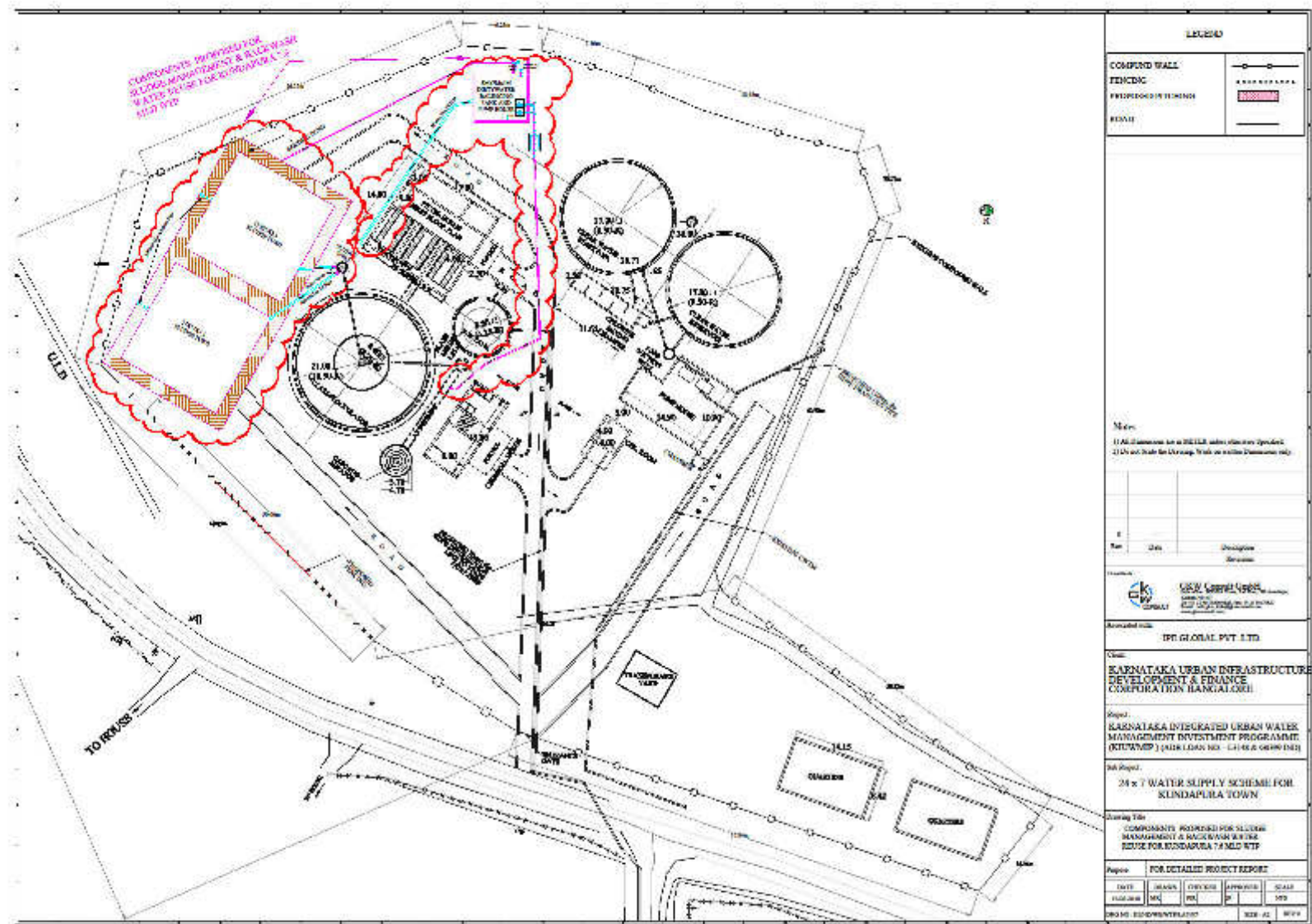


Figure 8: Layout Plan of WTP with Backwash and Sludge Management System

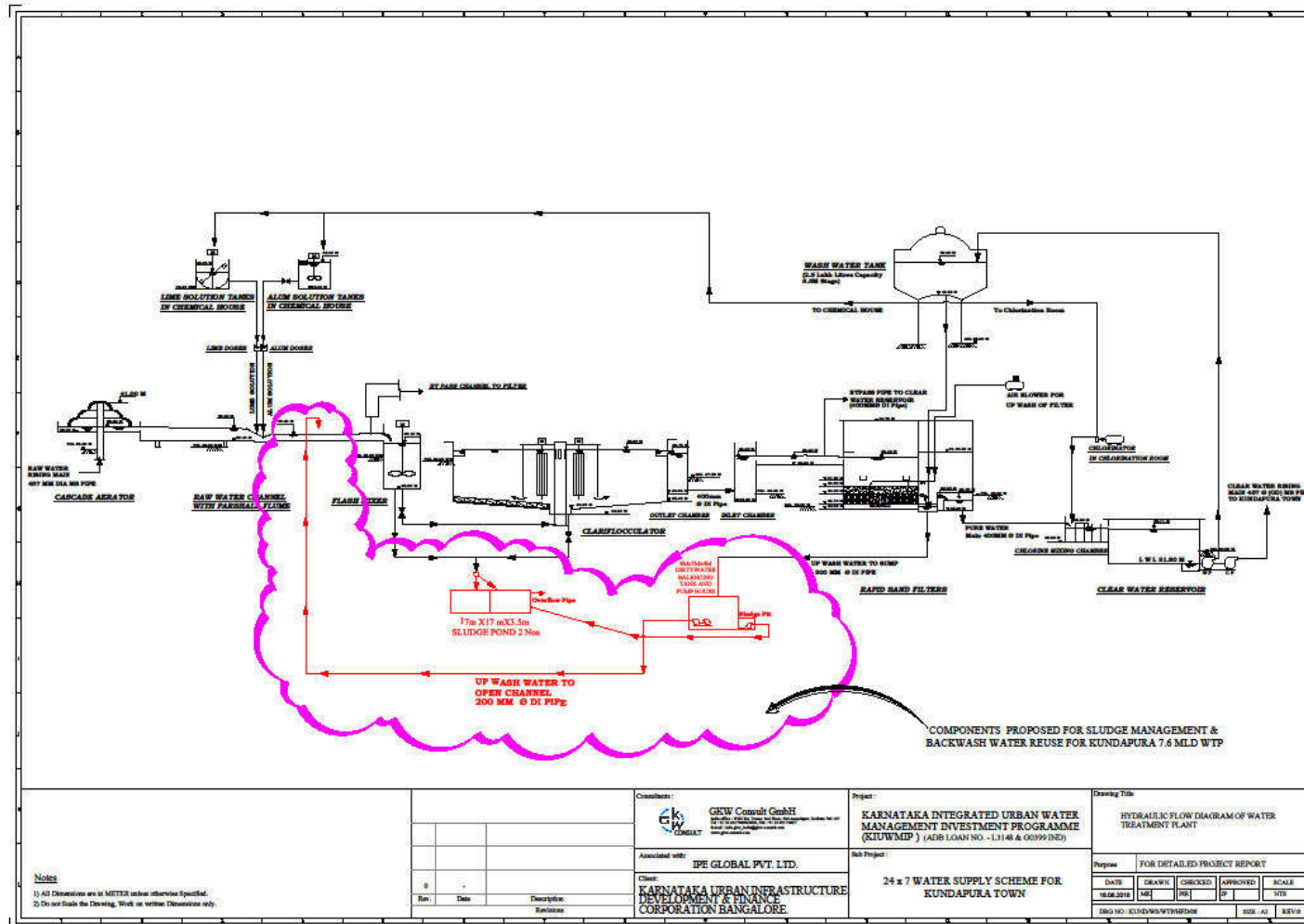


Figure 10: Detailed Alignment and Profile of Transmission Main (0-625 m)

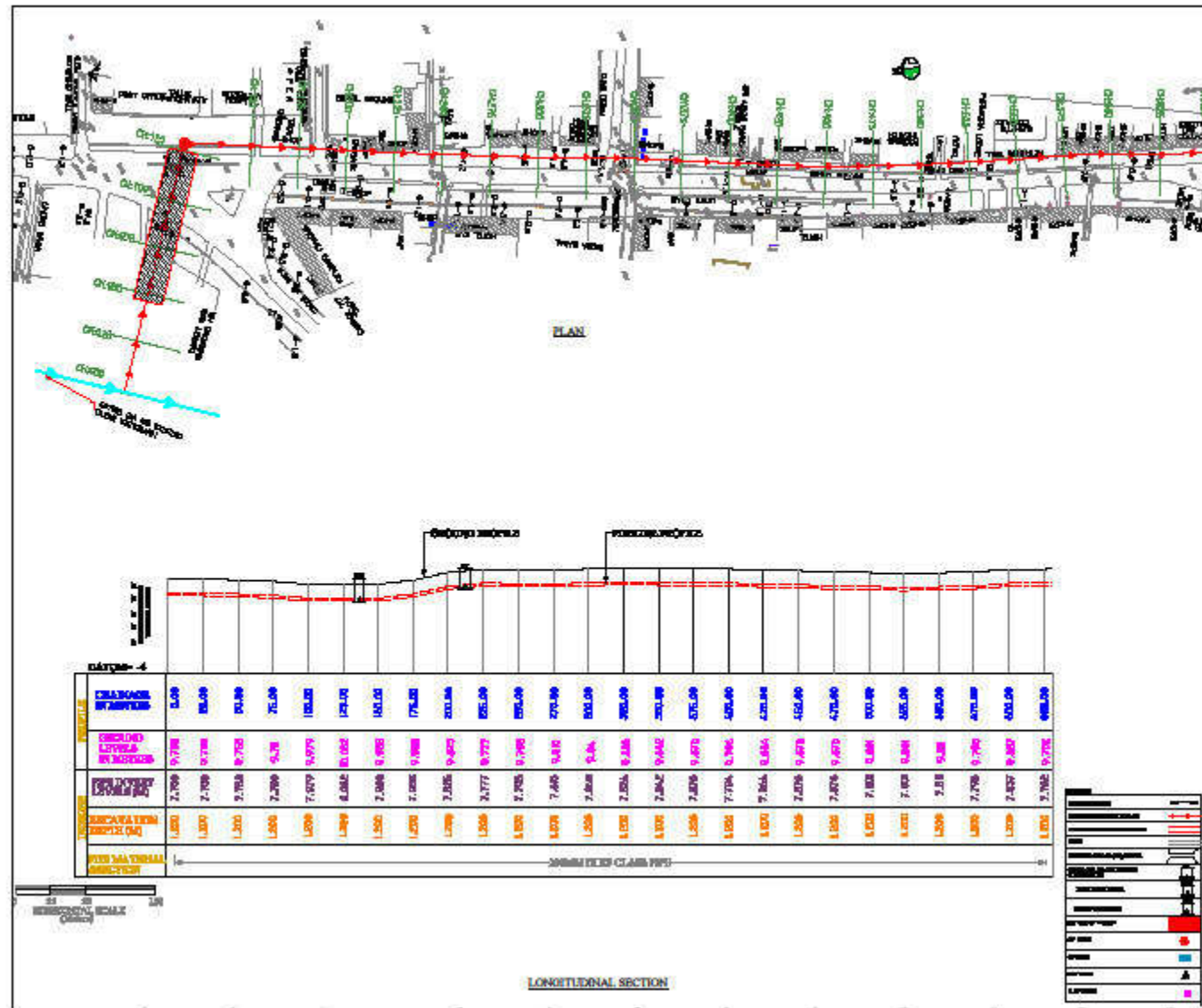


Figure 11: Detailed Alignment and Profile of Transmission Main (625 – 1275 m)

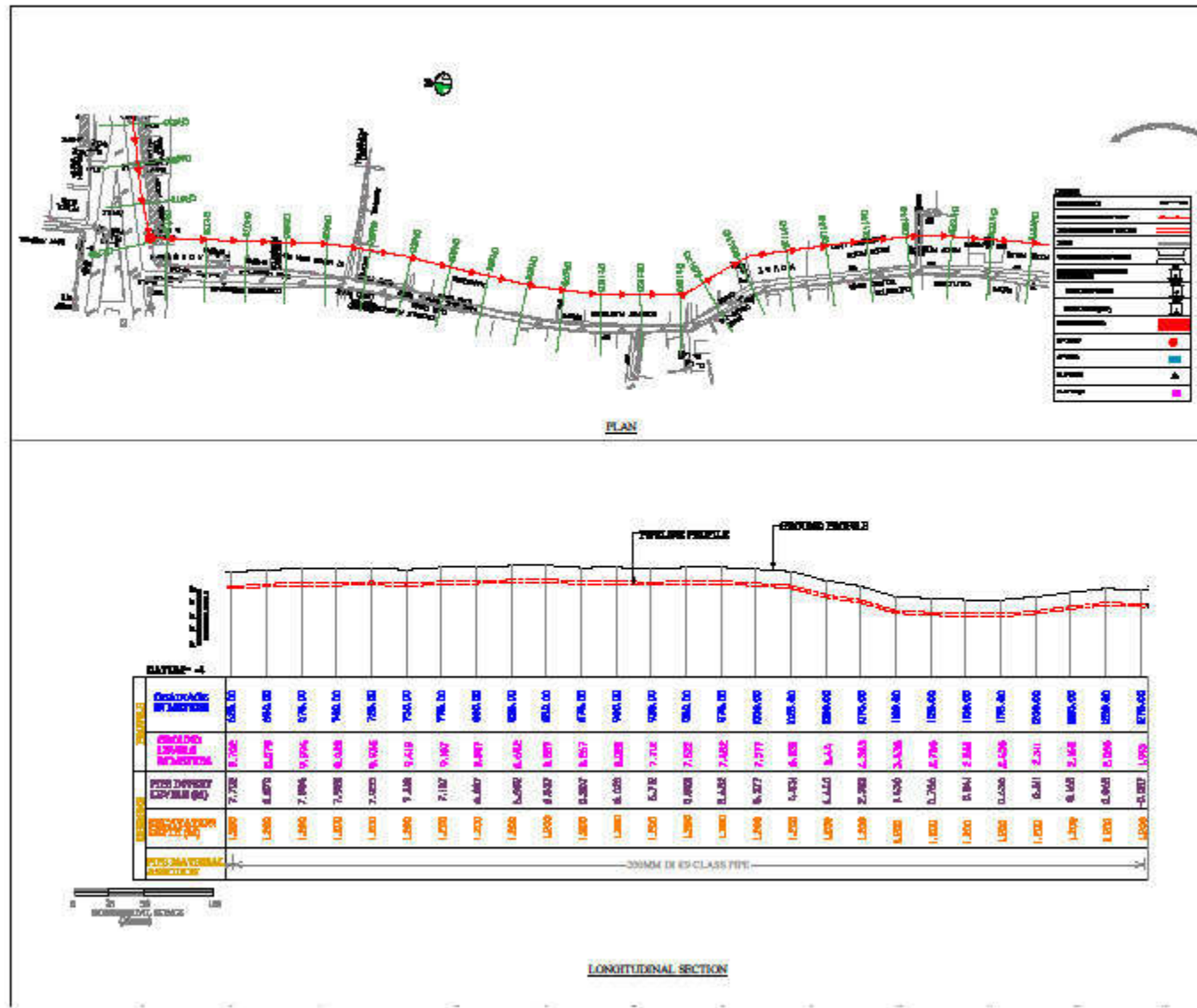


Figure 12: Detailed Alignment and Profile of Transmission Main (1275 – 1975 m)

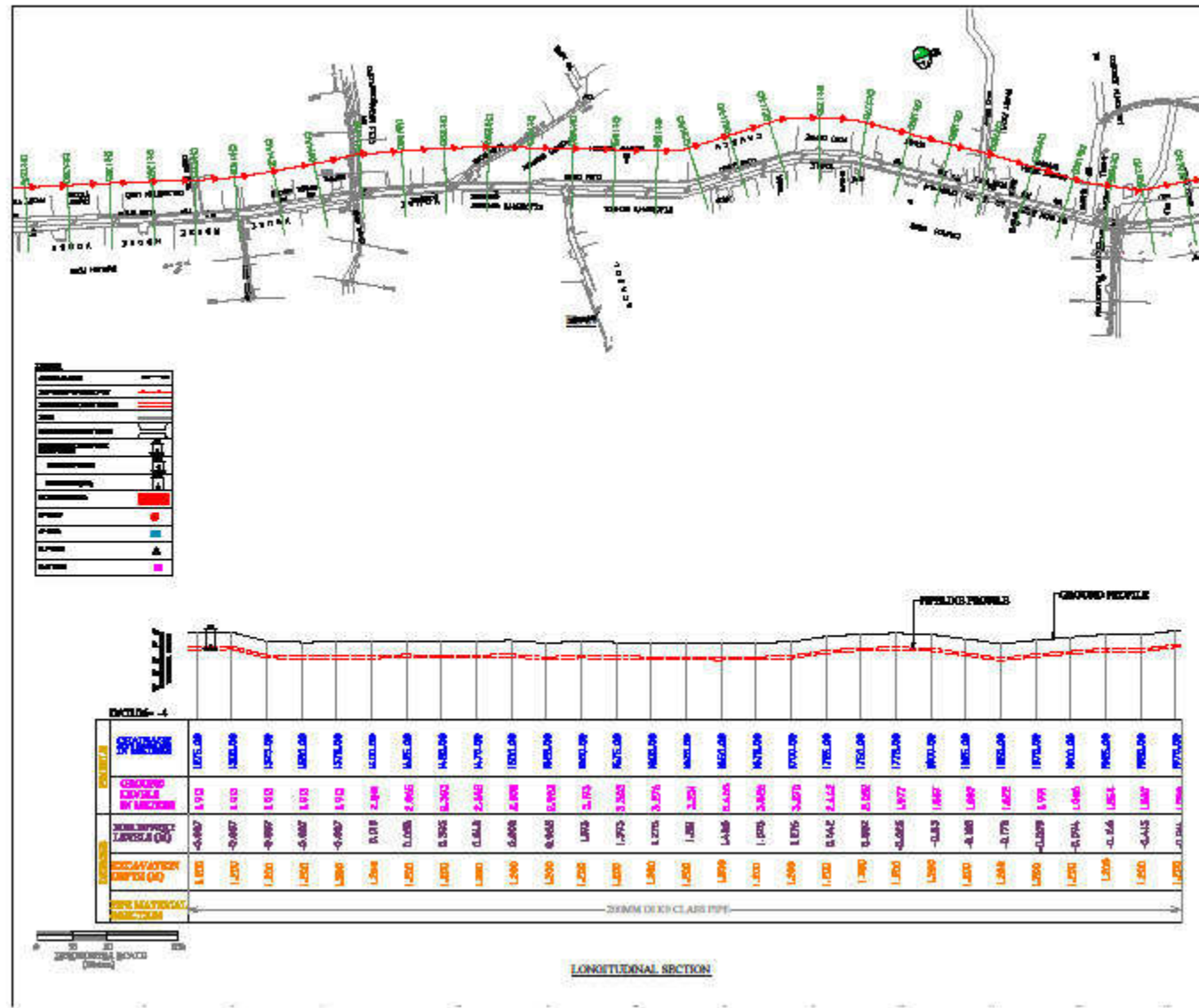


Figure 13: Detailed Alignment and Profile of Transmission Main (1975 – 2700 m)

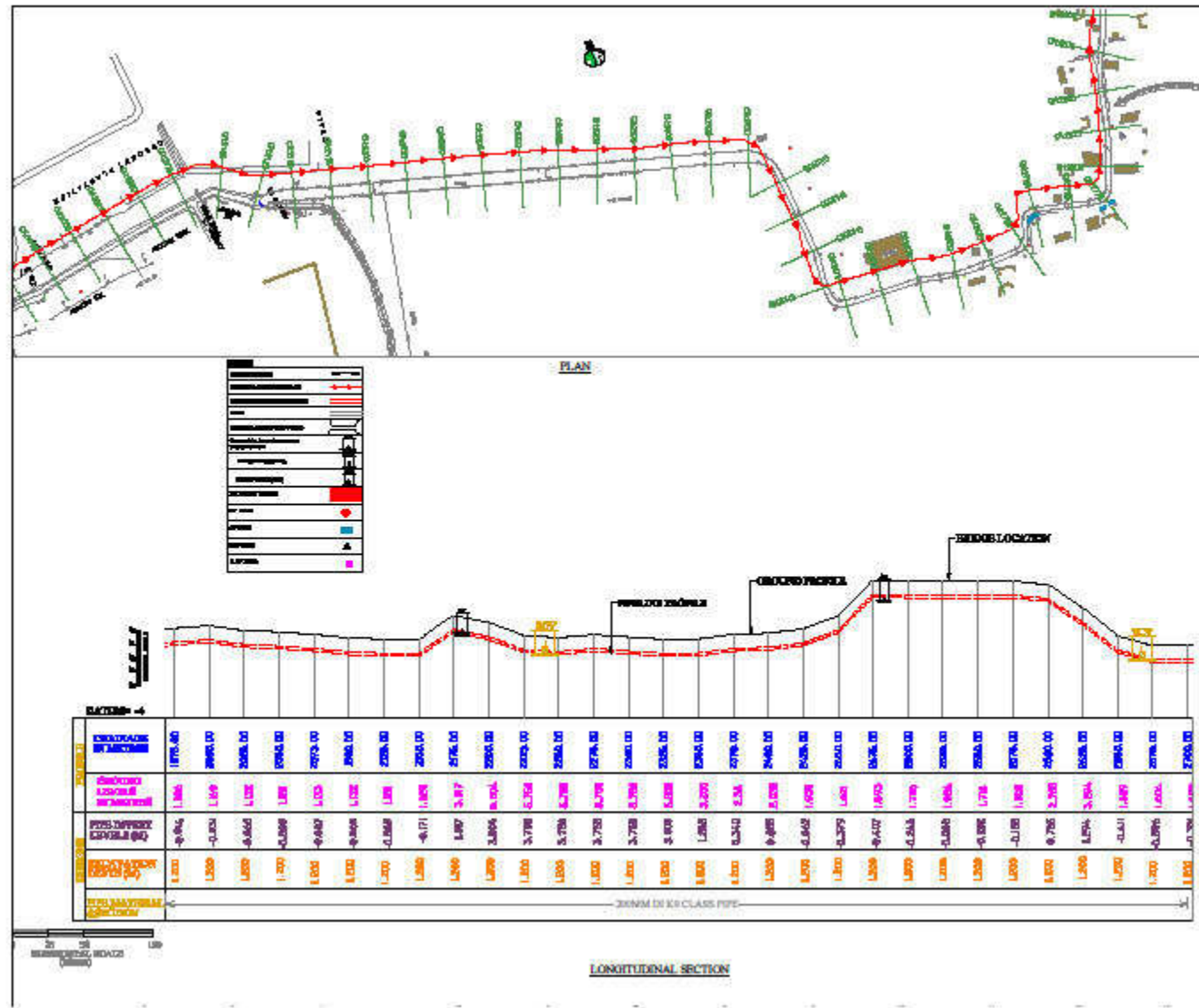


Figure 14: Detailed Alignment and Profile of Transmission Main (2700 – 3350 m)

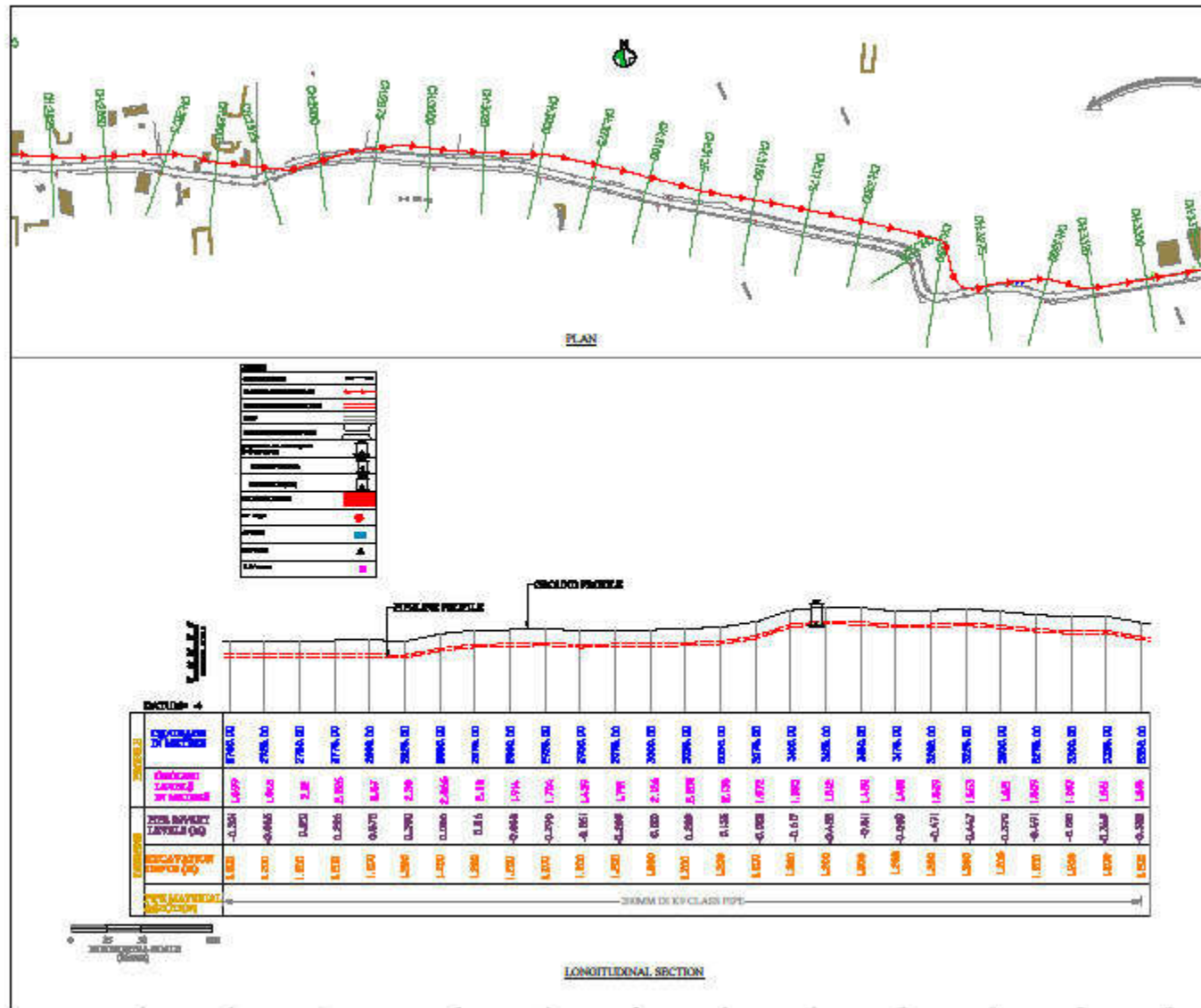


Figure 15: Detailed Alignment and Profile of Transmission Main (3350 – 4025 m)

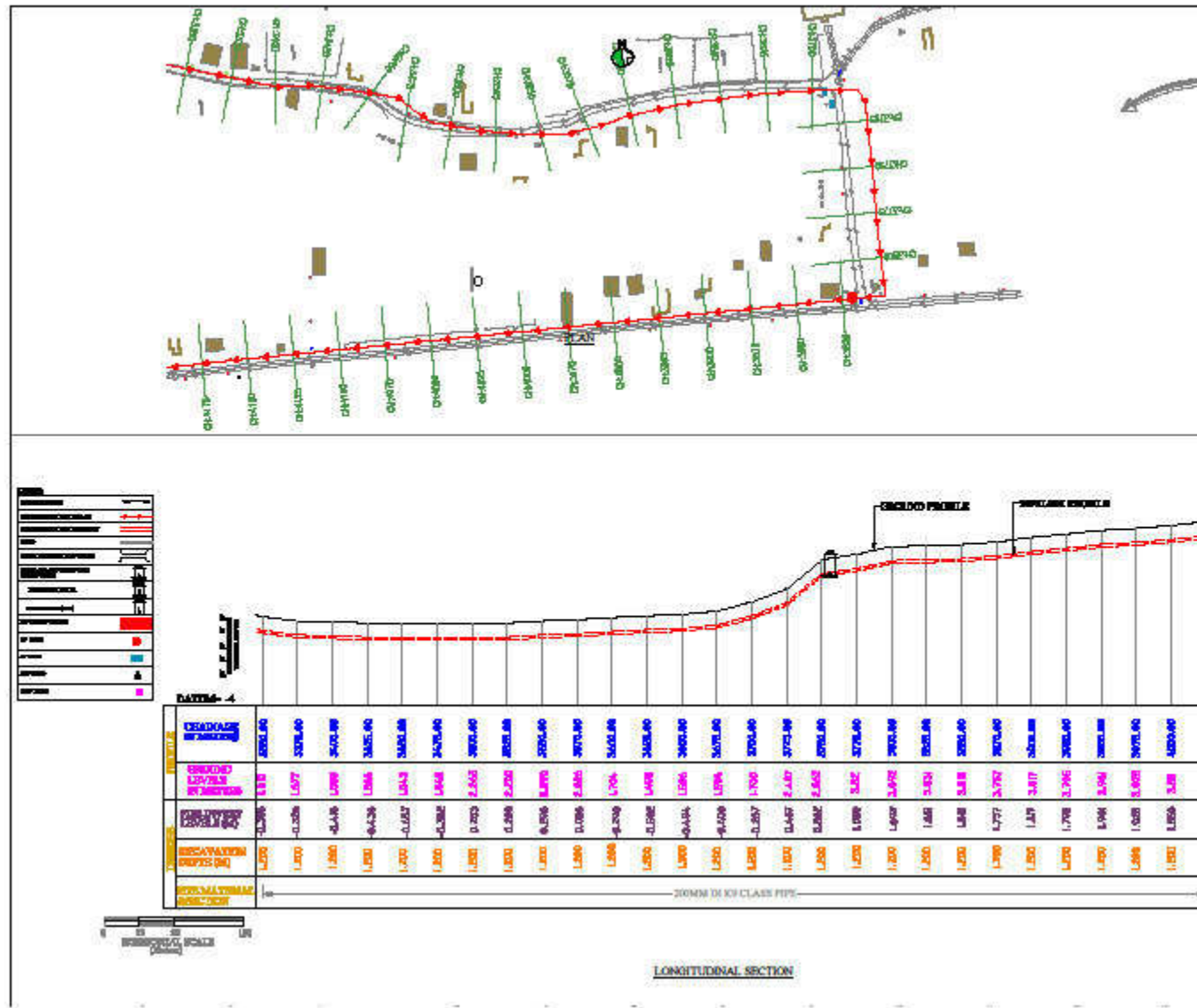


Figure 16: Detailed Alignment and Profile of Transmission Main (4025 – 4800 m)

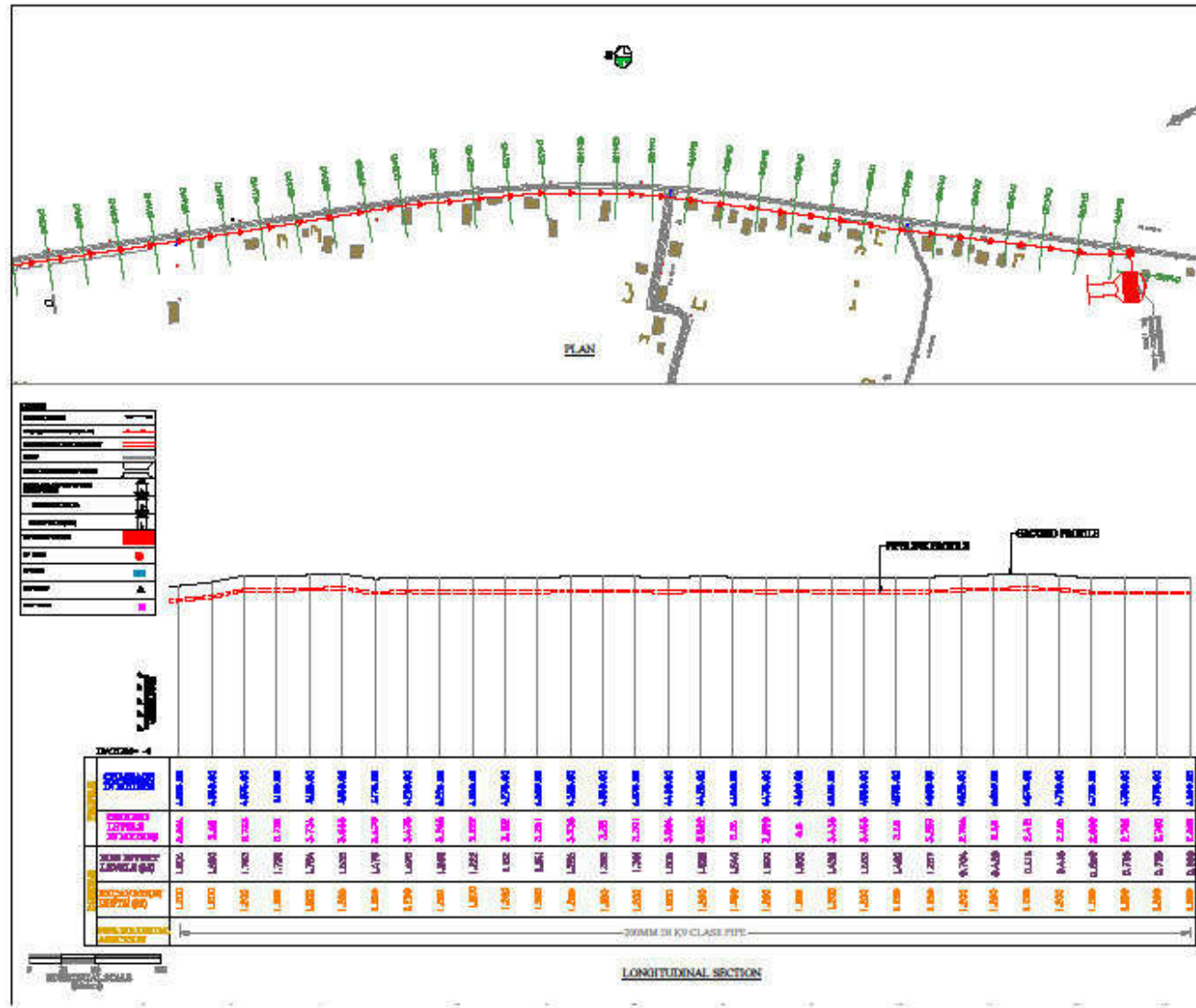


Figure 17: Proposed Layout Plan of OHT at Kodi



Figure 18: Sectional Plan and Elevation of OHT at Kodi

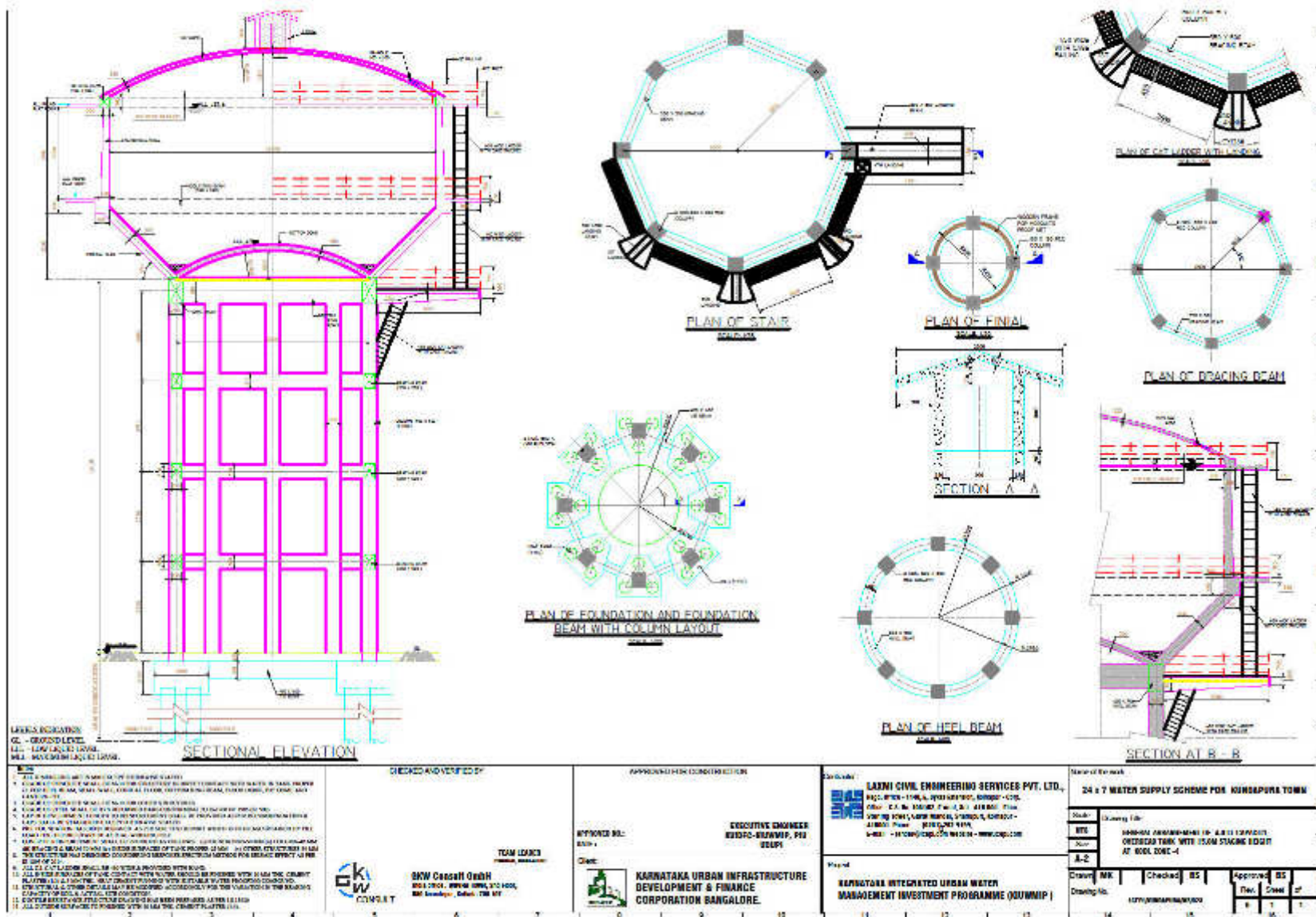


Figure 19: Proposed Layout Plan of OHT at Halekote

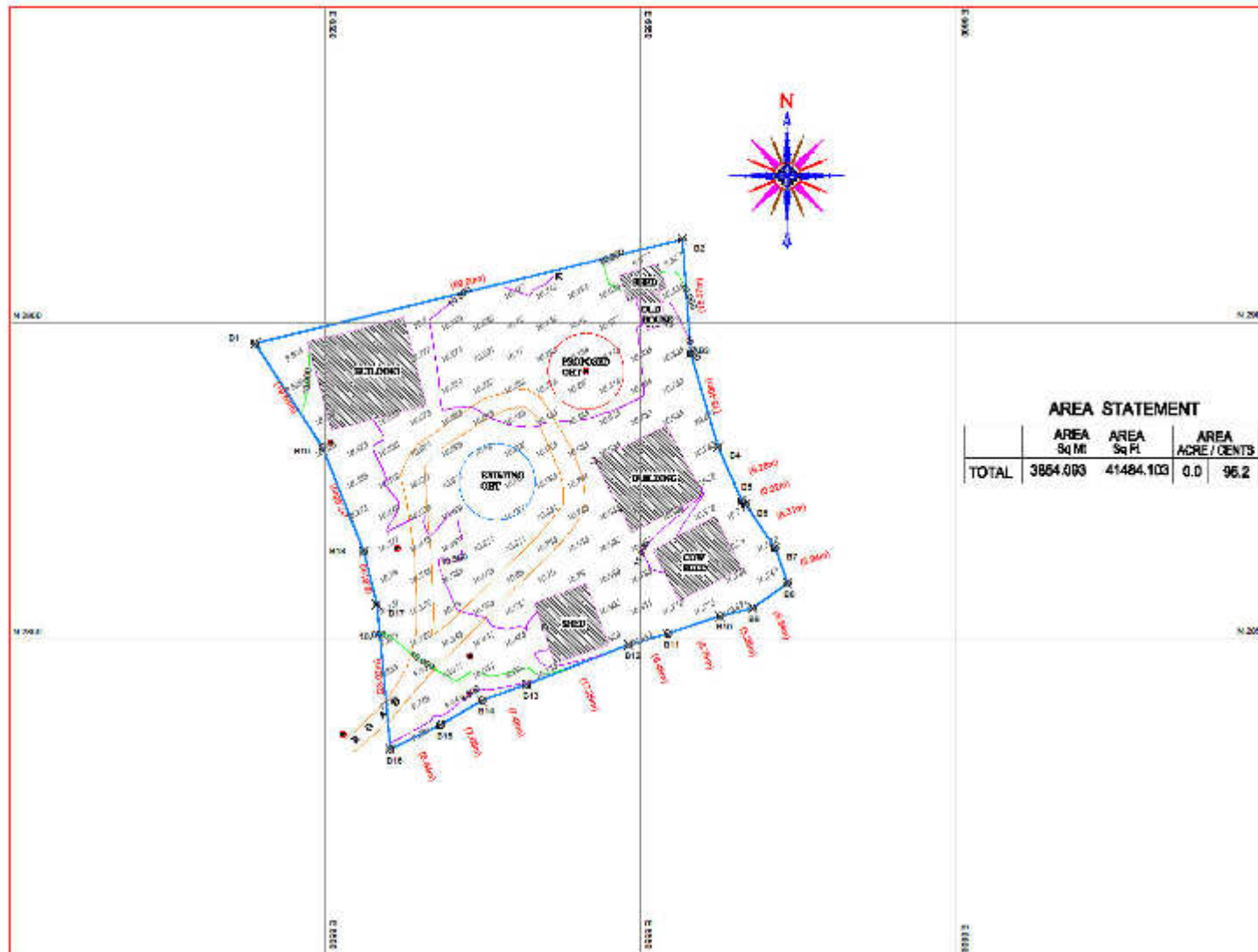


Figure 20: Sectional Plan and Elevation of of OHT at Halekote

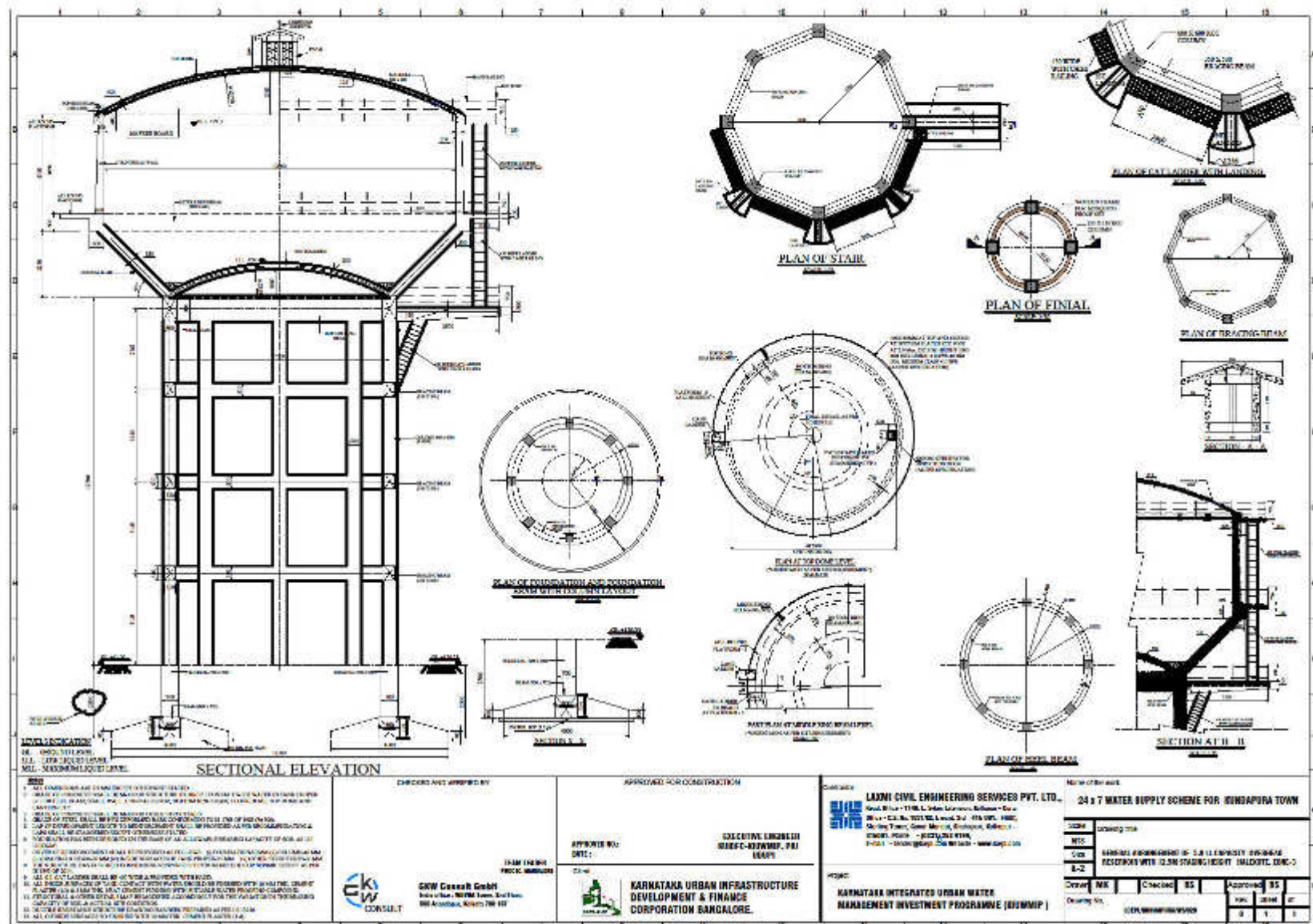


Figure 21: Existing and Proposed Distribution Lines: Zone 1

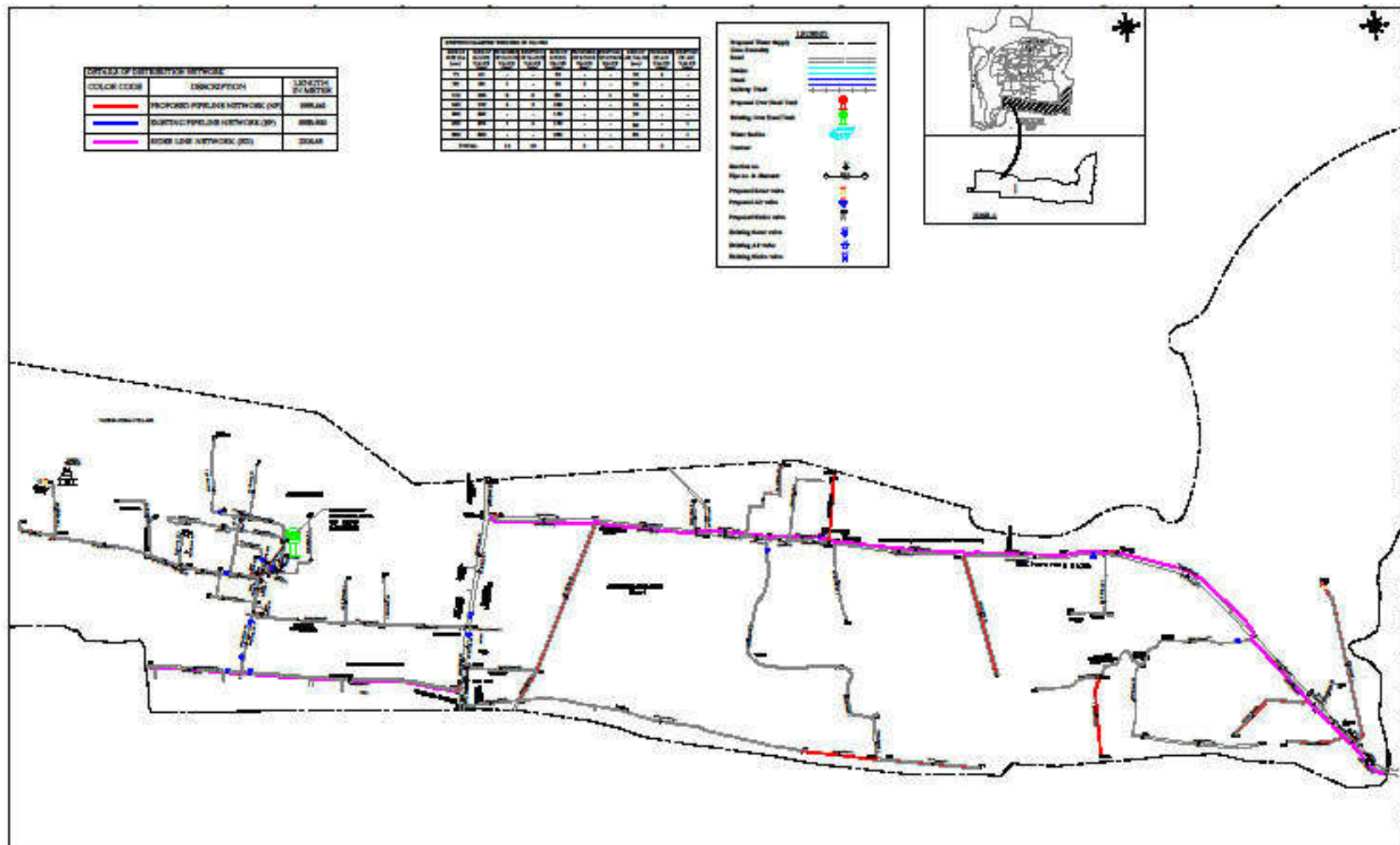


Figure 22: Existing and Proposed Distribution Lines: Zone 2

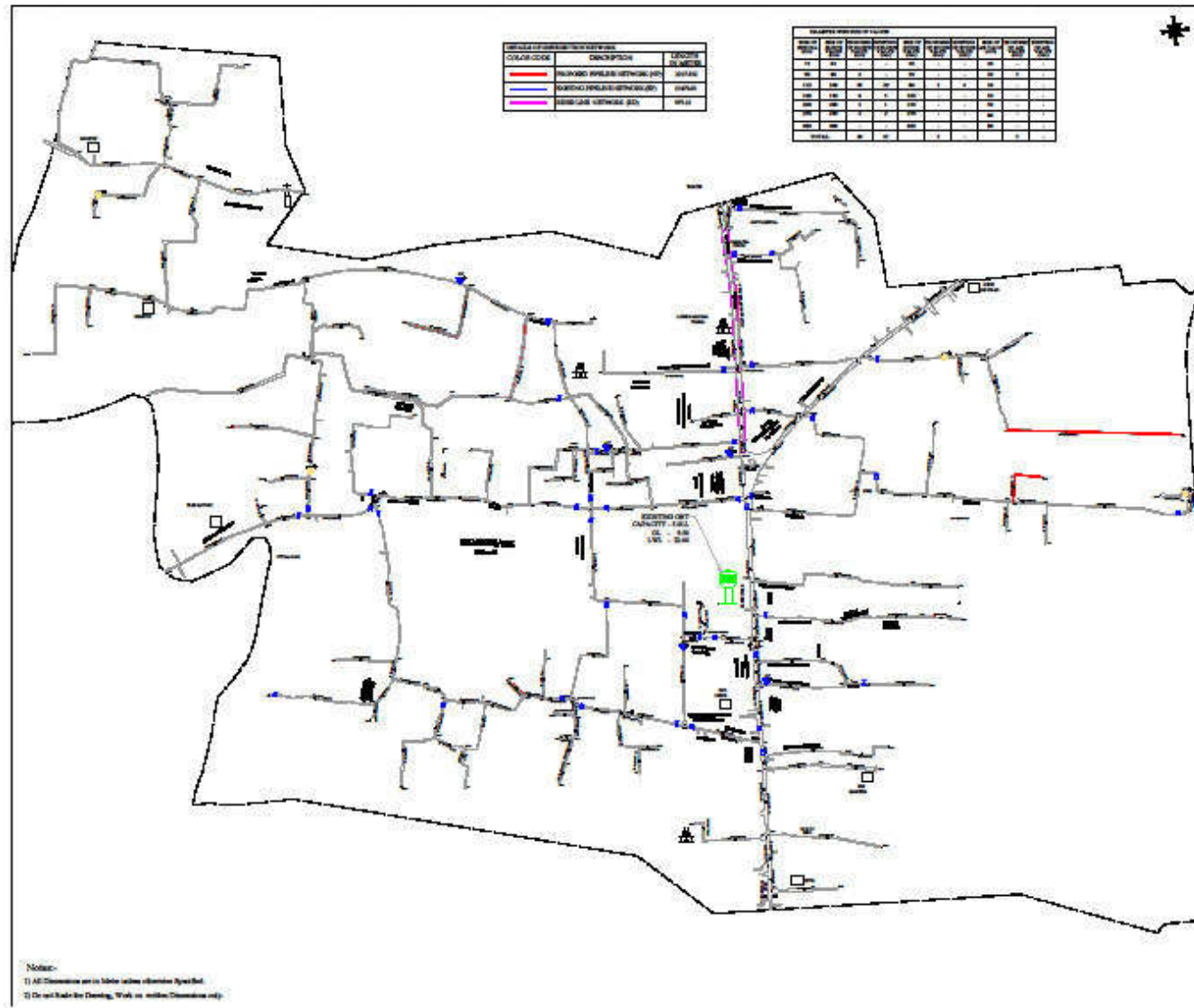


Figure 23: Existing and Proposed Distribution Lines: Zone 3

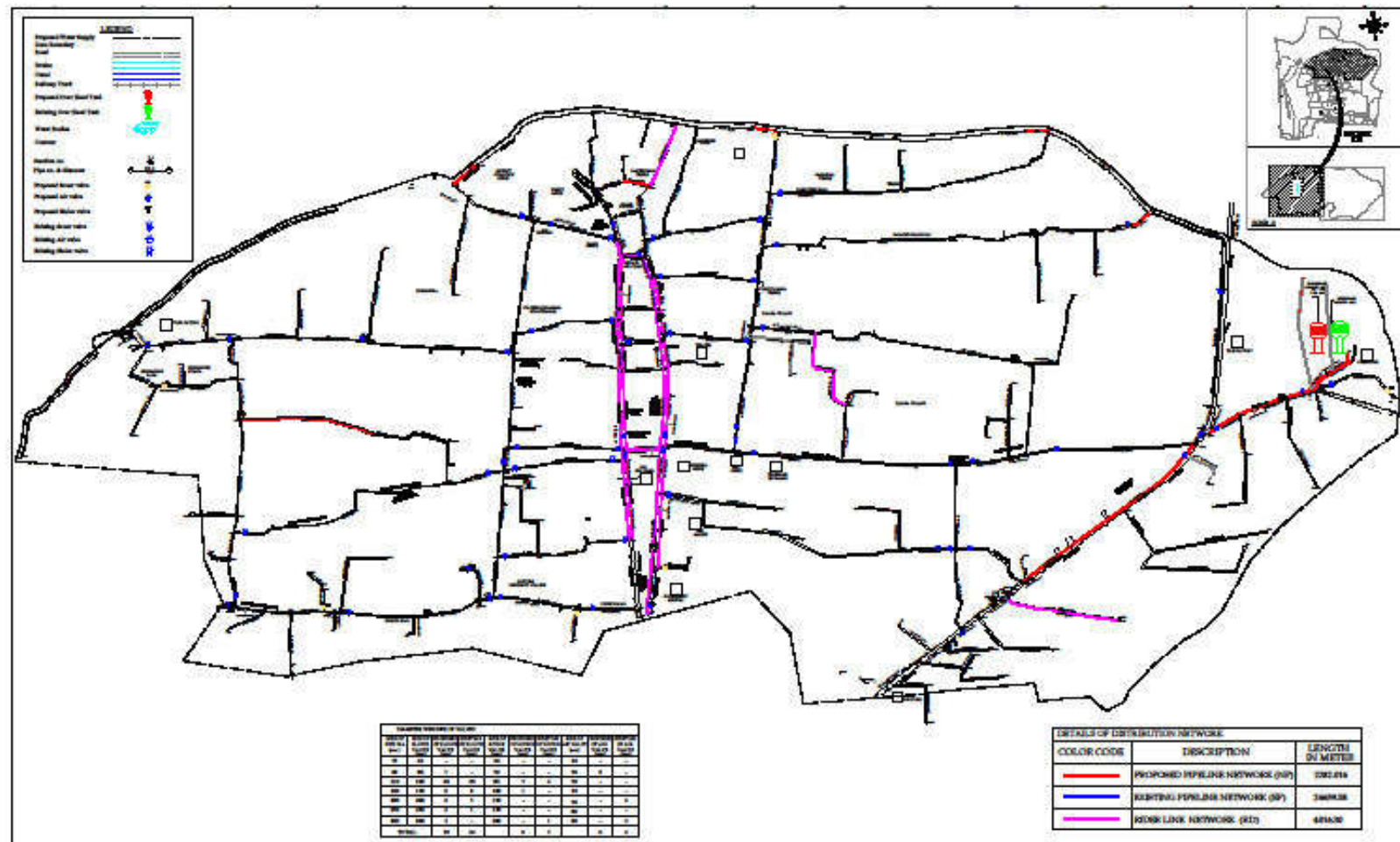


Figure 24: Existing and Proposed Distribution Lines: Zone 4

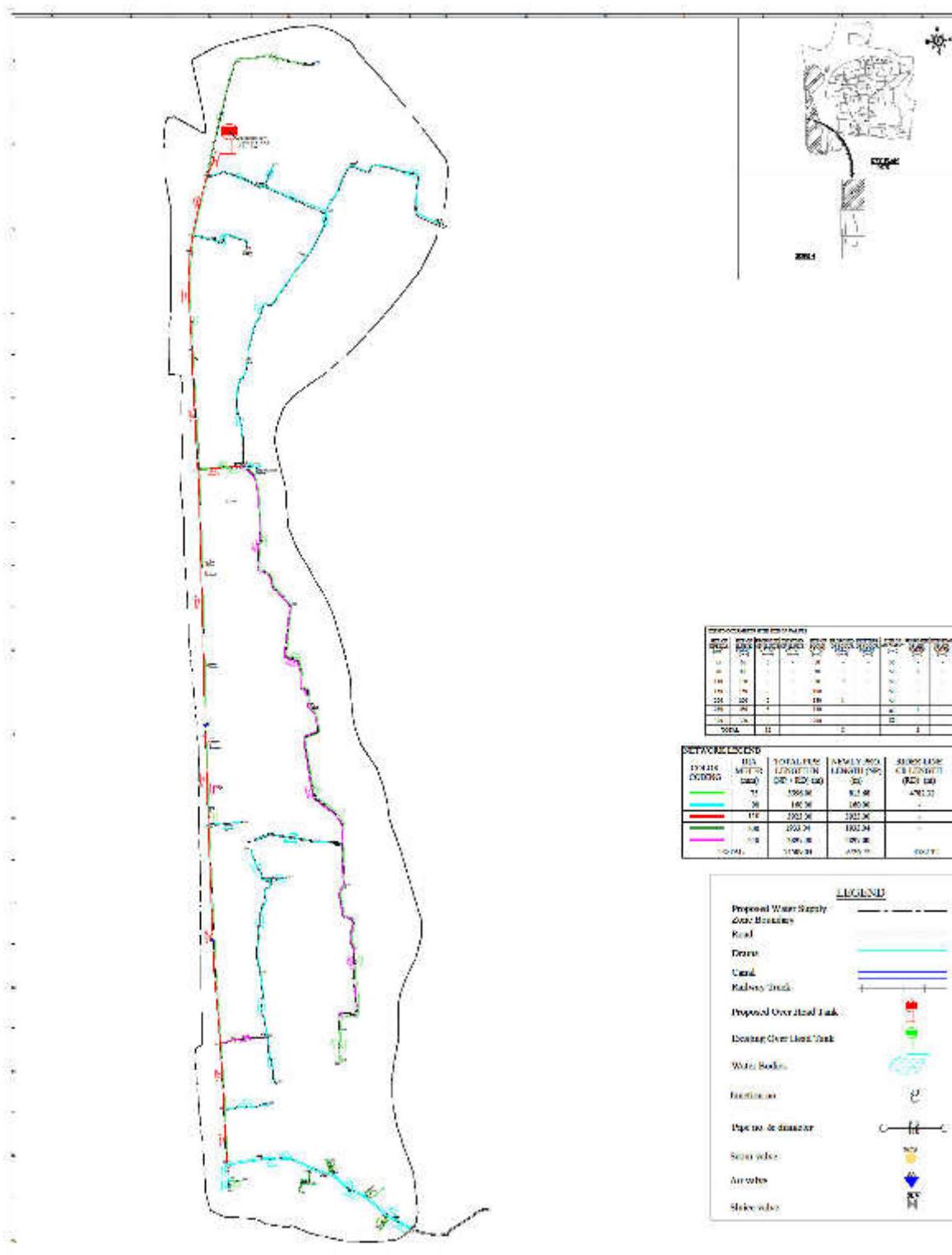
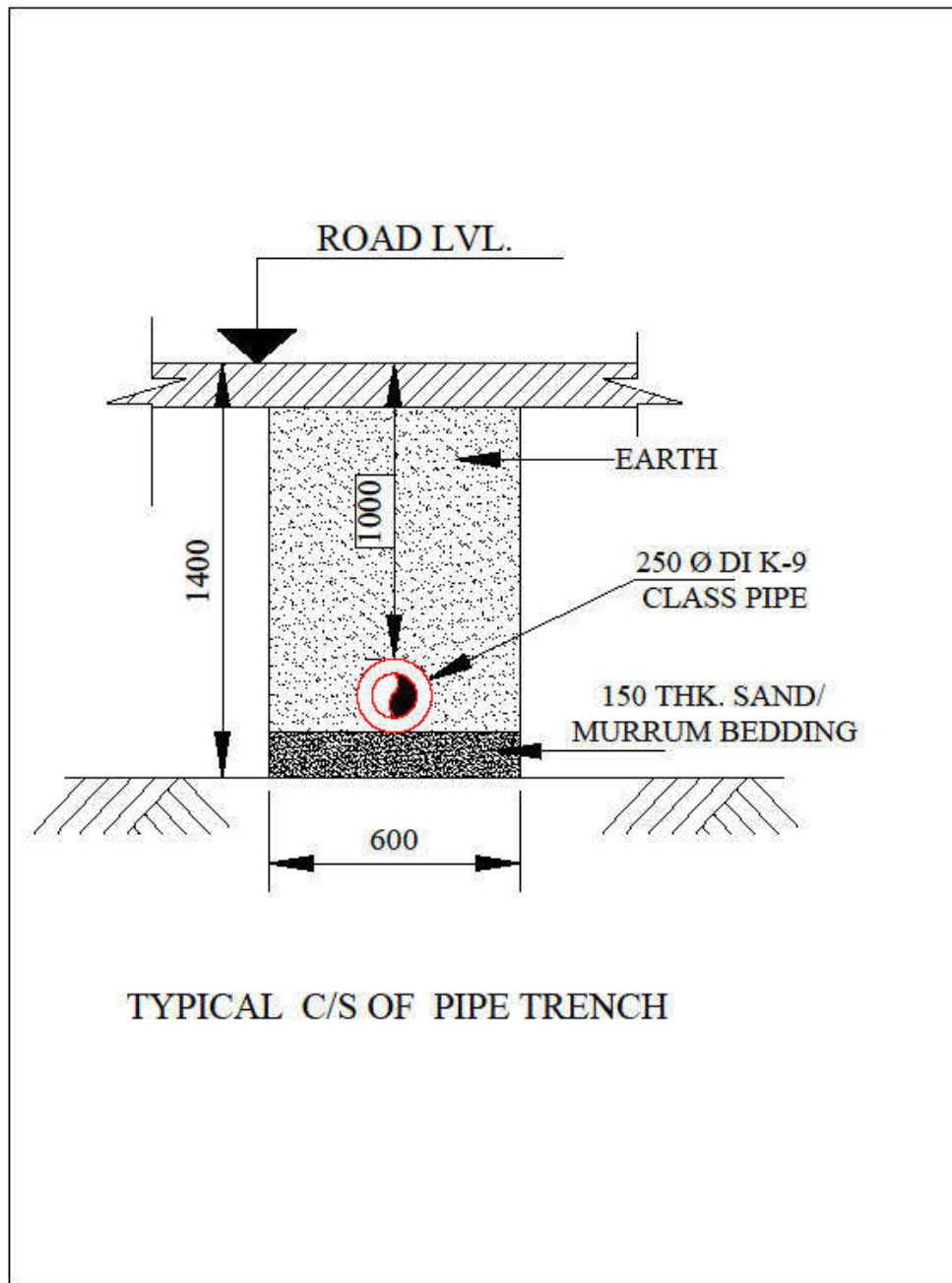


Figure 25: Typical Cross Section of Pipe Trench

Note: The 150 mm thick bedding sand / gravel bedding is proposed only in sections where there is rock; depth of bed rock is much deeper than 1.5 m in most of the areas, except in few isolated locations

C. Implementation Schedule

13. Project implementation schedule is given below. Construction work is likely to start in January 2018 and will be completed by January 2020.

Approval of Detailed Project Report	January 2017
Approval of Staff Appraisal Report	March 2017
Tender issue	June 2017
Contract Award	December 2017
Construction Period	24 Months
Operation and Maintenance (O&M)	8 years (96 Months) after construction period

III. POLICY AND LEGAL FRAMEWORK

A. ADB Safeguard Policy Statement, 2009

14. ADB SPS, 2009 requires the consideration of environmental issues in all aspects of the Bank's operations and requires environmental assessment of all project loans, program loans, sector loans, sector development program loans, financial intermediary loans and private sector investment operations.

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

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

16. The ADB REA checklist (General) in <http://www.adb.org/documents/guidelines/environmentalassessment/eaguidelines002.asp> was used to screen the project for environmental impacts and to determine the environment category. The complete checklist is given in Appendix 1.

17. ADB has classed this subproject as Category B and following procedure for multitranchise financing facility (MFF) loans has determined that one IEE will be conducted for each subproject, with a subproject being the water supply infrastructure improvements proposed in a subproject City.

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

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

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

20. During the design, construction, and operation of the project the pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Environmental, Health, and Safety (EHS) Guidelines -General EHS Guidelines: Occupational, Health and safety ([www.ifc.org/ifcext/enviro.nsf/Content/ Environmental guidelines](http://www.ifc.org/ifcext/enviro.nsf/Content/Environmental%20guidelines)) and EHS Guidelines for water and sanitation will be followed (<http://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B-%2BWater%2Band%2BSanitation.pdf?MOD=AJPERE>).

21. Employers and supervisors are obliged to implement all reasonable precautions to protect the health and safety of workers. Preventive and protective measures should be introduced according to the following order of priority:

- (i) Eliminating the hazard by removing the activity from the work process. Examples include substitution with less hazardous chemicals, using different manufacturing processes, etc.;
- (ii) Controlling the hazard at its source through use of engineering controls. Examples include local exhaust ventilation, isolation rooms, machine guarding, acoustic insulating, etc.;
- (iii) Minimizing the hazard through design of safe work systems and administrative or institutional control measures. Examples include job rotation, training safe work procedures, lock-out and tag-out, workplace monitoring, limiting exposure or work duration, etc.;
- (iv) Providing appropriate personal protective equipment (PPE) in conjunction with training, use, and maintenance of the PPE; and
- (v) Comply with: Child Labour (Prohibition and Regulation) Amendment Act, 2016; Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 as amended from time to time from appropriate authorities; Trade Unions Act, 1926; The Building and Other Construction Workers (Regulation of Employment and conditions of Service Act) 1996 and the Cess Act of 1996; The Factories Act, 1948; and Prohibition of Employment as Manual Scavengers and Their Rehabilitation Act 2013.

22. Following requirements of ADB SPS, PMO and RPMOs shall apply pollution prevention and control technologies and practices consistent with international good practice. When the Government of India regulations differ from these levels and measures, PMO shall achieve

whichever is more stringent. Appendix 3, 4 and 5 provide applicable standards. If less stringent levels or measures are appropriate in view of specific subproject circumstances, PMO will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

B. Government Law and Policies

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

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

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

26. None of the components of this water supply improvement subproject in Kundapura falls under the ambit of the EIA Notification 2006, and therefore Environmental Clearance is thus not required for the subproject.

27. **Environmental Rules, Laws, and Regulations.** Besides EIA Notification 2006, there are various other Acts, Rules, Policies and Regulations currently in force in India that deal with environmental issues that could apply to infrastructure development. These regulations are listed in Appendix 2. Table 2 below presents a summary of environmental regulations and mandatory requirements applicable to the subproject.

Table 2: Applicable Environmental Regulations

Law	Description	Requirement
Environmental Impact Assessment (EIA) Notification	The EIA Notification of 2006 and 2009, 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	Subproject is not a listed activity in Schedule I of this notification and hence environmental clearance is not required.

Law	Description	Requirement
	from the Ministry of Environment Forest and Climate Change (MoEFCC). Category B projects require Environmental Clearance from the State Environmental Impact Assessment Authority (SEIAA).	
Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments	Control of water pollution is achieved through administering conditions imposed in consent issued under provision of the Water (Prevention and Control of Pollution) Act of 1974. These conditions regulate the quality and quantity of effluent, the location of discharge and the frequency of monitoring of effluents. Any component of the Project having the potential to generate sewage or trade effluent will come under the purview of this Act, its rules and amendments. Such projects have to obtain Consent for Establishment (CFE) under Section 25 of the Act from Karnataka State Pollution Control Board (KSPCB) before starting implementation and Consent for Operation (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 Control of Pollution) Act of 1981, Rules of 1982 and amendments.	The projects having potential to emit air pollutants into the atmosphere have to obtain CFE under Section 21 of the Air (Prevention and Control of Pollution) Act of 1981 from KSPCB before starting implementation and CFO before commissioning the project. The occupier of the project/facility has the responsibility to adopt necessary air pollution control measures for abating air pollution.	For the project, the following will require CFE and CFO from KSPCB: 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 Central Pollution Control Board (CPCB) Environmental Standards.	Emissions and discharges from the facilities to be created or refurbished or augmented shall comply with the notified standards notified.	Appendix 3 provides applicable standards for ambient air quality and noise. Appendix 4 provides standards for discharge of effluents Appendix 3 and 4 respectively also provides a comparison of national standards and internationally recognized guidelines with respect to ambient air and noise, and effluent discharge. ADB SPS requires adoption of stringent values for project implementation.
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	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"	There are no protected monuments near project area in Kundapura. However, in case of

Law	Description	Requirement
Sites and Remains Act, 1958 and Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010	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.	chance finds, measures are suggested in Environmental Management Plan (EMP) to take prompt action to ensure its removal or protection in situ.
Land Acquisition Act of 1894	Private land acquisition is guided by the provisions and procedures in this Act. The District Collector or any other officer designated will function as the Land Acquisition Officer on behalf of the Government. There is a provision for consent award to reduce the time for processing if the land owners are willing to agree on the price fixed by the Land Acquisition Officer.	For Kundapura Town Water Supply Scheme two sites are required, and both are government land.
Labor Laws	The contractor shall not make employment decisions based upon personal characteristics unrelated to job requirements. The contractor shall base the employment relationship upon equal opportunity and fair treatment, and shall not discriminate with respect to aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment or retirement, and discipline. The contractor shall provide equal wages and benefits to men and women for work of equal value or type.	Appendix 2 provides applicable labor laws including amendments issued from time to time applicable to establishments engaged in construction of civil works.
Biodiversity Act of 2002	The Biodiversity Act 2002 primarily addresses access to genetic resources and associated knowledge by foreign individuals, institutions or companies, to ensure equitable sharing of benefits arising out of the use of these resources and knowledge to the country and the people.	Not applicable to Kundapura 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 Kundapura 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 Kundapura 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 Kundapura Town Water Supply Scheme as there is no forest area within or adjacent to the project area.
Indian Drinking Water Standards	Gives details of the permissible and desirable limits of various parameters in drinking water as per the Bureau of Indian Standards	Appendix 5 provides drinking water standards http://cgwb.gov.in/documents/wq-

Law	Description	Requirement
		standards.pdf
Karnataka Forest Act, 1963 and Karnataka Forest Rules, 1969	This Act makes the basis for declaration of Reserved Forests, constitution of village forest committees, management of reserved forests and penalties and procedures.	Not applicable to Kundapura 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.	At Kodi OHT site, four coconut Trees to be cut and at Halekote OHT site, pruning of a branch of large tree is required Permission will be obtained from the Tree Officer, Forest Department Compensatory plantation as stipulated in the tree cutting permission shall be adhered to.
Coastal Regulation Zone Notification Ministry of Environment and Forests	The proposed OHT site and some pipelines in Kodi area falls under Coastal Regulation Zone (CRZ) II. CRZ-II, includes the “developed area” within the existing municipal limits or in other existing legally designated urban areas which are substantially built-up and has been provided with drainage and approach roads and other infrastructural facilities, such as water supply and sewerage mains; buildings shall be permitted only on the landward side of the existing road. Construction involving more than 20,000 m ² built-up area in CRZ-II shall be considered in accordance with EIA notification, 2006 and in case of projects less than 20,000 m ² built-up area shall be approved by the concerned State Planning authorities in accordance with this notification after obtaining recommendations from the concerned CZMA and prior recommendations of the concern CZMA shall be essential.	No Objection Certificate (NOC) required for works located in CRZ II from Karnataka Coastal Zone Management Authority (KCZMA). NOC has already been obtained for construction of OHT (NOC is appended at Appendix 6) and Pipelines (Appendix 7) in CRZ II in Kodi area of Kundapura.

IV. DESCRIPTION OF THE ENVIRONMENT

A. Physical Environment

1. Location

28. Kundapura is located in Udupi District. Geographically, Kundapura Town is located at a latitude of 13°37'42" N and longitude of 74°41'20" E. Kundapura has the status of Town Municipal Council (TMC). The town is divided into 23 wards and spreading to an area of 14 km². The distance of the settlement from coasts is about 50 meters (m) – 60 m.

2. Topography, Soil and Geology

29. Kundapura is surrounded by the Arabian Sea in the west and the Western Ghats in the east and the Panchagangavalli River delta containing the rivers of Gangolli in the north and Haladi in the east entering in the Arabian Sea. The Panchagangavalli River emerges from the meeting of the rivers Souparnika, Varahi, Kedaka, Chakra and Kubja. There are no creeks and

estuaries in or near the project area. The aerial view of the town center of Kundapura is shown below. The average ground level is 80 m above msl.

Figure 26: Aerial View of Kundapura Town



Source: Google Earth.

3. Climate

30. During the monsoon from June to November, the town experiences heavy rain fall. The average annual rainfall is 4,097 mm. Average temperature during the summer, from March until May, varies between 32-33 °C and during the winters, from December to February, it varies between 23-25°C (Table 3).

Table 3: Climate Data for Kundapura

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high (°C)	33	34	34	34	33.3	29.7	28	28.4	29.5	30.9	32	33	31.58
Average low (°C)	21	22	24	25	25.1	23.4	22.9	23	23.1	23.1	22	21	22.95
Average precipitation (mm)	1.1	0.2	2.9	24	183	1,177.2	1,350	787	292	191	71	16	4,096.9

°C = degree Celsius, mm = millimeter.

Source: Climate-data.org. <https://en.climate-data.org/location/24113/>.

31. The maximum rainfall of about 81% occur during June, July and August impacting the construction activities. The construction schedule has considered the same for effective implementation.

4. Earthquake

32. Per the seismic zoning map of India, Kundapura town falls under the zone II.

5. Physiographic

33. **Karnataka Coastal Region.** The Karnataka Coastal Region, which extends between the Western Ghats edge of the Karnataka Plateau in the east and the Arabian Sea in the west, covers Dakshina Kannada, Udupi and Uttara Kannada districts. This region is traversed by several ridges and spurs of Western Ghats. It has difficult terrain full of rivers, creeks, waterfalls, peaks and ranges of hills. The coastal region consists of two broad physical units, the plains and the Western Ghats. The Coastal plains, represent a narrow stretch of estuarine and marine plains. The abrupt rise at the eastern flanks forms the Western Ghats. The northern parts of the Ghats are of lower elevation (450 m to 600 m) as compared to Southern parts (900 m to 1,500 m). The Coastal belt with an average width of 50 km to 80 km covers a distance of about 267 km from north to south. At certain places, the crest of adjoining Western Ghats reaches the sea as close as 13 km near Karwar. The average height is generally 75 m from the mean sea level. Kundapura is a coastal town, surrounded by Arabian Sea in the west, an extension area, Kodi, which is part of the subproject area, is located close to the sea and falls in the CRZ. However, within the subproject area there are no protected or environmentally sensitive areas.

6. Flora and Fauna

34. **Littoral vegetation.** The type of littoral vegetation is halophytic along estuaries. The limited mangrove formations occur in the riverine estuaries where the salinity gradient rises rapidly towards the sea. The best examples of halophytic vegetation are away from Kundapura town area. It is mostly of the Rhizophora - Avicenia - Bruguiera type. The trees and shrubs have to overcome the restrictions of a marshy saline habitat with strong tidal currents and fluctuations in water level as well as the asphyxiating conditions of a slushy soil. These littoral plant formations have ecological role in the balance of nature. The psammophytes help in preventing the sand of the beaches from being blown landwards on to agricultural lands and human habitations. They also protect the beaches for their recreational value. Mangroves stabilize the river embankments against erosion. They afford breeding ground to several fishes and other marine animals. No forest areas or mangroves located in the project area of Kundapura and nearby.

7. Soil

35. The soil in the Udupi district is mostly lateritic type, found distributed in the Pediplain area characterised by high iron and aluminium content. Lateritic soil is mostly red in color and yellow loamy, pale to bright red colours are also seen. Lateritic soil is suitable for Paddy, Sugarcane, Arecanut and Plantation crops, viz. crops like cardamom and plantains. Loamy red soils are distributed in the lower reaches of valleys. Red lateritic soil is the most dominant soil type in the area. The texture of the soil varies from fine to coarse. The soil in valleys and intermediate slopes is rich in loam whereas in upper slopes it is much coarse in nature. The soil responds well to irrigation and other soil -management practices. Silty and loamy soils are of transported origin and are found mostly along river banks and in valley plains. They have good infiltration capacity and are well-suited for agriculture due to their fertility.

8. Air Quality

36. There is no data on ambient air quality in Kundapura, which is not subject to monitoring by the Karnataka State Pollution Control Board (KSPCB). Located in coastal zone with limited development activities and no major air polluting sources, generally the air quality in the area is good. Traffic is the only significant pollutant, so levels of oxides of sulphur and nitrogen are

likely to be well within the National Ambient Air Quality Standards (NAAQS). No field monitoring (environmental) survey was conducted during IEE. An environmental monitoring program developed as part of the EMP will establish monitoring protocols for the contractor to comply with. The results will be reported as part of the environmental monitoring report and will be the basis to ensure no degradation will happen during subproject implementation.

9. Surface Water

37. Kundapura town is surrounded by rivers. Three rivers – Panchagangavalli, Gangolli and Haladi flow into the Arabian Sea near Kundapura. Panchagangavalli River emerges from the meeting of the rivers Souparnika, Varahi, Kedaka, Chakra and Kubja. There are no creeks and estuaries in or near the project area.

10. Groundwater

38. In Udupi district in general, including Kundapura Taluka (sub-district), the quality of ground water at certain depths in the sandy aquifer are found good and potable and in the adjoining areas covered by lateritic/weathered gneissic rocks, it is sweet to alkaline. The dug wells in the alluvial area generally yield saline water during summer months and get fresh water during monsoon periods. Per Central Ground Water Board (CGWB), Udupi district as a whole is classified as 'safe area' for groundwater development. In Kundapura Taluka, current groundwater utilization is only 32% (Table 4). The water samples collected from the dug wells /shallower zones during May 2006 indicate the electrical conductivity value as 500 to 10430 μcm at 25°C in the higher order and 200 to 500 μcm in the lower order. The electrical conductivity in some of the deeper bore well located at places recorded as high as 18830 μcm at 25°C is saline. Some parts of Udupi and Kundapura taluka have chloride concentration up to 4000 mg/l. Some groundwater in the area is contaminated from the salinity of tidal recharge. This contamination is more pronounced in wells along the stream courses up to the distance where tidal effect extends. Further, Ground water in proximity to stream course is contaminated with seepage of domestic waste. As a general rule, groundwater withdrawal must be distributed in time and space and there should not be any concentration of wells to avoid saline water ingress.³

Table 4: Groundwater Development in Kundapura Taluka, Udupi District

Particulars	Details (ha m)
Net annual ground water availability	12,592
Existing gross ground water draft for Irrigation	3,518
Existing gross ground water draft for Domestic and Industrial Water supply	680
Existing gross ground water draft for all uses	4,198
Allocation for domestic and industrial use for next 25 years	961
Net ground water availability for future irrigation development	8,473
Balance ground water irrigation potential available (ha)	14,361
Ground water development / utilization	32%

Source: CGWB, December 2008.

³ Central Ground Water Board. 2008. *Ground Water Information Booklet, Udupi District, Karnataka*. http://cgwb.gov.in/District_Profile/karnataka/UDUPI_BROCHURE.pdf.

B. Economic Development

1. Industry and Agriculture

39. Kundapura taluk main activity is agriculture with paddy, coconut, areca nut (*Areca catechu*) and cashew are main crops. Rubber plantations and other commercial crops like sugarcane, ground nut are also cultivated in certain parts of the taluka. Kundapura town imports clay and manufactures Tiles and bricks. There are agro based units for paddy (rice), areca nut and tobacco processing. There is a port at the confluence of Panchagangolli river. Even though National Highway (NH) 17 and Konkan railway pass near this port, development of this port has not taken place. This port is considered mainly for fishing. The Department of Fisheries has proposed to take up new projects like a fish landing center at Koderi in Udupi taluk, open type fishing harbour at Maravanthe, construction of breakwater at Shirur- Alvegadde, Gangolli, construction of jetty at Kodi in Kundapura, extension of the wharf at Alvekodi and improvements at Thenginagundi fish landing centers. These projects would be fully-funded from the state government funds.

2. Transportation

40. Kundapura is well connected to other parts of the country by a national highway - NH66. State highway (SH52) connects to Shimoga District and other neighboring cities and towns of different states. Kundapura is also connected to the Konkan Railway, which runs from Mumbai to Mangalore. The railway station is 4 km from the town. Nearest airport is Mangalore International Airport, situated at Bajpe 87 km (54 miles) from Kundapura.

C. Socio-Cultural Resources

1. Demography

41. Kundapura TMC population as per Census 2011 is 30,450. Over the last decades, the population has been steadily growing and in recent years, the population growth has stabilized at an average annual growth rate of 0.65%. Per projected estimate the current population in Kundapura town is 30,921. The population of the en-route villages (6 no.) is 27,250 nos. Hence the total population considered for this subproject including floating and en-route villages is 58,171. Males constitute 49% of the population and female's 51%.

42. Population of children with age of 0-6 is 2,614 which is 8.59% of total population of Kundapura TMC. Sex ratio is 1051 against state average of 973. Child sex ratio in Kundapura is 970 compared to Karnataka state average of 948.

43. Literacy rate of Kundapura Town is 90.52% higher than state average of 75.36%. In Kundapura, male literacy is 94.34% while female literacy rate is 86.91%.

2. History, Culture and Tourism

44. The name Kundapura can be traced to the Kundeshwar temple built by Kundavarma in the vicinity of the Panchagangavalli river. The name of the town may be derived from Kundavarma who ruled the area. Kunda means 'pillar' in Kannada, which refers to the traditional method of constructing houses. Pura means town. Kundapura is surrounded by water from three sides. To the north lies the Panchagangavalliriver. To the east lies the Kalagharriver. To the west lie the Kodi back waters and the Arabian Sea, leaving the south side as the main

connecting land mass. All connecting roads to Kundapura enter the Town from southern direction. North side of the town is vast backwaters of Panchagangavali river and a bridge has been constructed across it.

45. The town consists mainly of Hindus of many communities such as GoudSaraswat Brahmins, Bunts, Shivalli Brahmins, Vishwakarmas, Poojarys, Kota Brahmins, Havyaka Brahmins, Mogaveeras, Kulals, Madivalas, Vokkaligas, Devadigas, Billavas Namadhari Naiks, Ganigas, Ramakshatriyas, Daivajnas, Kunabis, ChitrapurSaraswat Brahmins, Padmashali (Shettigar)s, Kharvis, Christians and Muslims. The town mainly consists of Kannadigas who speak the Kundagannada dialect. Others are Konkanis and Tuluvas. The GoudSaraswat Brahmins, the Kharvi community, the Christian community and some Muslim community people speak Konkani Language. A dialect of Kannada called Kundagannada is predominantly spoken in Kundapura town and Kundapura Taluk. In the olden days, Tulu was widely spoken in the region and the historical town of Barkur served as the capital Town of Tulu Nadu.






46. Kundapura is famous for many tourism places around the town. A nature's basket, Padukone Village is nearly 17 km away from Kundapura adorned with strings of coconut trees, Kudru and Souparnika River. One of the seven sacred places established by Lord Parshuram and an important religious hub, Shankaranarayana Temple attracts a large number of devotees. Located 12 km north of Kundapura, Trasi is mainly known for its beautiful beach, a beach resort and Turtle bay. The beach is one kilometer long and serves as a picnic spot. Lying on a hill in Kumbhashi, nearly 9 km away from Kundapura, AneguddeVinayaka Temple is dedicated to Lord Ganesha. It is believed that at this very site Sage Agasthya performed penance to attract Indira. An ancient temple established by sage Parshuram is located in the proximity to the town of Kundapura. The most enticing feature of the temple is its 10 feet tall wooden idols depicting the warrior uniform made probably in the memory of a war took place somewhere in 1600-1700. Located in the vicinity of Kundapura town, Kodi Beach is an amazing picnic spot with water on its three sides. Kodi meaning 'shore' in Kannada language, is popular as spot for swimming. Uppinakudru or Salt Island is a place which is religiously rich and profound. Once served as the center of trading for salt and sea food, today the place is occupied with several ancient and popular temples Lord Gopala Krishna Temple being one of them. Once again dedicated to Lord Ganesha, this ancient temple is lying close to the base of huge granite rock resembling an elephant in sleeping form. The idol of presiding deity Lord Ganesha is in sitting position.

47. Holy Rosary Church is a beautiful building situated on the banks of River Panchagangavalli on the west side of the town. Created by Rev. Fr. Joseph Vaz in year 1681 in the honour of Our lady of Rosary. One of the most sought after temple in this whole district of Udupi, Kundeswara Temple is dedicated to Lord Shiva. Situated nearby the Panchagangavalli River, the town is also named after this temple. Dedicated to Goddess MahalasaNarayani, this temple is located on the banks of River Varahi and once served as the hub of trade. It is a holy place for GoudSaraswati Brahmin Community and was regularly visited by the sages of Mutts like KashiSamsthana and GokarnaParthaggali Mutt. A popular getaway located on the National Highway near the Baindoor Village, Otinere is mainly known for its entrancing sunset view. An ancient Ganesha temple with its roots going back to 8th century, SiddiVinayaka temple is lies in the Hattiangadi Village near to Kundapura. Also referred to as the Hattiangadi Temple, you will witness the presiding deity of the temple in form of a 2.5. Sri Mookimba Temple is believed to once be the site where rishis use to perform penance. Today, located in the Kodachaadri peak Valley, this temple is dedicated to Goddess Mookimba. However, there are no protected monuments of History, culture, tourism in Kundapura town area.






D. Environmental Settings of Investment Program Component Sites







48. There are no environmentally-sensitive feature and no significant physical and cultural resources within or adjacent to the subproject sites. All the OHT sites selected are on government-owned land parcels, and all the pipelines are proposed along the roads, where there is space along the ROW to lay the pipeline. There are no protected areas or monuments/places or significant environmental sensitive features in the subproject locations. There are four coconut trees at a OHT site that needs to be cut and prior permission from Tree Officer, Forest Department shall be obtained. Table 5 presents the environmental features of the subproject components.

Table 5 : Component Site Environmental Features

Subproject Component	Proposed Site Setting	Site Photograph
Rehabilitation works in Jack well at Jambu, village	Replacement of minor mechanical equipment's inside the pump house. Diesel generator set has been proposed for the un-interrupted power supply to the Jack well. Works will be conducted within the existing jack well. Access road is available. All the works will be conducted within the available land of existing jack well facility.	
Rehabilitation works in water treatment plant (WTP) at Japthi	Existing WTP is located at about 12 km east of Kundapura. Site is owned by Kundapura TMC. Land is undulating/hilly, and well utilized for construction of WTP. All the proposed rehabilitation works, mainly electro-mechanical works, will be conducted within the WTP units. Proposed backwash water recirculation and sludge management units will be constructed in the vacant land available within the WTP campus. This is undulating and vacant land, partly covered with shrubs and bushes. WTP site is mostly surrounded by agricultural lands.	 Existing WTP
		
Existing backwash collection well with underground drainout pipes	Land proposed for developing back wash and sludge management system	

Subproject Component	Proposed Site Setting	Site Photograph
		
Municipal compost yard	Municipal sanitary landfill; sludge from WTP will be disposed	
<p>Laying of 2.95 km clear water transmission main tapping from existing transmission main to overhead tank (OHT) proposed with 200 mm dia DI K-9 Class pipe.</p>	<p>On road side all along the road from Vinayaka theatre at NH-66 to Kodi OHT. Alignment details are provided below:</p> <p>(i) Alignment crosses national highway (NH 66) at Shastri Circle to connect to the existing pumping main. A flyover is under construction on NH. Pipeline will be laid using trenchless method to cross the junction to avoid disruption of NH traffic. Trenchless launching pit will be constructed on NH service road on one end, and on footpath at other end. NH service road at this point needs to be closed during the trenchless work.</p> <p>(ii) From Shartri circle to Church Road (about 800 m), pipeline will be laid along Kundapura main road – a busy four lane divided road, Commercial establishments abutting the entire stretch. Pipeline will be laid on vacant road shoulder, between the carriageway and lined trees. Trench width required for this 200 mm dia pipeline is 600 mm. Shoulder is surfaced with concrete tiles, which will be removed and replaced after construction. No trees will be cut. Traffic will not be effected, but there will be disturbance to traffic in one lane, parking and access to shops during works.</p> <p>(iii) Church road: except at the junction with Kundapura main road where there are commercial activities abutting the road, this road is abutted by residential houses with large vacant lands. This is a two lane road, with shoulder. Shoulder is surfaced with concrete tiled, and width in some sections is very narrow,</p>	<p> Shastri Circle</p> <p> Flyover under construction</p> <p></p> <p></p>

Subproject Component	Proposed Site Setting	Site Photograph
	<p>and in some sections do not exists. Pipeline will be laid into road carriage way. Traffic will not be blocked, but there will be limited disturbance to traffic in one lane.</p> <p>(iv) After Church road, pipe line crosses Panchagangavali River; pipeline will be laid on the road bridge into the edge.</p> <p>(v) After crossing the bridge, the alignment is mainly along a narrow road in rural setting with residential houses and coconut plantations. Traffic is very low, but this is the only access road to houses. There will be inconvenience to the traffic but will not be blocked. Pipe will be laid in the earthen shoulder along the black top carriageway. Part of the pipeline will be laid along coastal road to reach the OHT. This stretch falls under CRZ II. There are no trees or any structures along the alignment.</p>	
		 Panchagangavali river
Water Service reservoir/OHT in Zone-3 (5 Lakh Liter capacity is proposed) at Halekote	The proposed site for OHT (5 LL) is identified owned by municipality. The site is vacant. There is a large tree near the site, however, OHT will be constructed without cutting the tree. Pruning of braches will be required, which will be done with the permission and guidance of forest department. Site is not prone for flooding. Access road is available	
		

Subproject Component	Proposed Site Setting	Site Photograph	
Water Service reservoir/OHT in Zone-4 (4 Lakh Liter capacity is proposed) at Kodi	The proposed site for Kodi OHT (4 LL) is owned by municipality. Land falls under CRZ - II. Site is separated with coast/beach by an existing road. The site is covered with coconut trees and four trees need to be cut for OHT. Permission from forest department will be obtained for cutting the trees. Site is not prone for flooding. Access road is available		
Distribution system - 31.64 km length diameter 75 - 250 mm high density poly ethylene (HDPE) pipes	<p>All the pipelines are proposed along the roads; pipes will be laid into edge of the roads; New distribution network is proposed in Zone 4, which is mostly of rural character, and in other zones, rehabilitation of pipelines proposed. Given the small diameter pipelines, no traffic blockages expected, except disturbance / inconvenience during the works in narrow and commercial areas</p> <p>Most of the pipelines in the city require cutting of road surface (bitumen / cement concrete)</p>		
			

V. SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Introduction

49. 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.

50. 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 proposed 24x7 Water Supply Scheme for Kundapura Town.

- (i) **Location Impacts.** There are no environmentally-sensitive feature and no significant physical and cultural resources within or adjacent to the subproject sites. All the OHT sites selected are on government-owned vacant land parcels, and all the pipelines are proposed along the roads, where there is space along the ROW to lay the pipeline. There are few trees in the selected site in Kodi. Works related to jackwell and WTP will be implemented within the existing facilities.
- (ii) **Design Impact.** Includes impacts arising from technology used and method for pipelaying works, and construction of OHTs. No design impacts envisaged from rehabilitation works in Jackwell and WTP. In fact, the design measures included in the subproject, such as provision of backwash water recirculation and sludge management, will improve the environmental performance of the existing WTP and will have positive impacts.
- (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) **Operation and Maintenance Impacts.** Include impacts arising from the O&M activities of the infrastructure facility. These include routine management of operational waste streams and occupational health and safety issues.

B. Pre-Construction Impact

51. **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.

52. In case of water supply lines, no significant impacts are anticipated since the laying of water line will be along the already built up area. There are two OHT sites proposed in government land and there is no need to procure any other land. Proposed subproject sites are carefully selected to avoid encroachment into sensitive areas and minimize the impacts on people livelihoods and homestead.

53. 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 town, will not cause direct impact on biodiversity values.

54. The Kundapura TMC should obtain all necessary clearances before the starting of the work. The clearances from NH/SH Authorities for pipe laying need to be obtained before the any works start. The applicable clearances are given in Appendix 8.

55. **Tree Cutting at Project Sites.** All sites are carefully selected, and layouts designed to minimize the tree cutting. Kodi OHT site is selected in land covered with coconut plantation. There are six (6) coconut trees in the demarcated land. Two (2) trees are integrated into layout plan of OHT, and only four trees will be required to cut for the OHT construction. The OHT site at Halekote is vacant, but there is a big old tree (Rain Tree, *Albizia saman* or *Samanea saman*) next to the selected site, and to construct the OHT with 15 m staging height, branches will be required to be pruned. Branches will be cut / pruned carefully with the guidance of forest department to avoid damage to the entire tree. Works at WTP and Jack well are located within the existing facilities, and therefore it involves no tree cutting. Pipelines are proposed along the roads, at some places there are trees, however, no tree cutting is envisaged for laying pipelines. Following measures need to be implemented during design validation and preconstruction phase to minimize and/or compensate for the loss of tree cover:

- (i) Except four (4) coconut trees at Kodi OHT site, and pruning of large tree to the minimum required extent at Halekoti OHT site, no trees shall be removed for the subproject
- (ii) Trees in the pipeline alignments shall be avoided during construction by locally altering the alignment
- (iii) Obtain tree cutting and pruning permission from Tree Officer; plant and maintain 10 trees for each tree that is removed

56. **Subproject Components in Coastal Zone.** Kodi extension area of Kundapura is located in the CRZ II. Per CRZ Notification, CRZ II is defined as “the area that has already been developed up to or the shoreline. For this purpose, 'Developed Area' is used to refer to the area within municipal limits or in other legally designated urban areas which has already been substantially built up, along with drainage and approach roads and other service infrastructure, such as water supply and sewerage mains”. Kodi area, with all its existing houses, is separated by a road (coast and beach areas). Proposed subproject components of clear water main to proposed Kodi OHT, OHT and some distribution lines to be laid in the Kodi area will fall under this zone. As the works proposed are small scale and without existing residential area, no notable impacts envisaged on coastal environment. However, during the construction phase, run-off from stockpiled materials and chemicals from fuels and lubricants during construction works can flow into sea and contaminate water quality. Project area receives high rainfall therefore it is important that runoff from the construction areas, which may contain silt and chemical traces do not enter the coast or any water bodies. Impact will be temporary, and but needs to be mitigated. Construction contractor will be required to:

- (i) All earthworks be conducted during the dry season to prevent the problem of soil/silt run-off during rains;
- (ii) Piling activities for OHT foundation work at Kodi shall be conducted carefully; there shall be no spillage of bentonite on the ground; bentonite slurry shall be properly collected in leak proof containers and re-circulated in the piling activity;

- excess bentonite slurry shall be dried properly in containers, and disposed in landfill safely
- (iii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
- (iv) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
- (v) Place storage areas for fuels and lubricants away from any drainage leading to water bodies. Storage structure should consider 110% capacity bund;
- (vi) Store fuel, construction chemicals etc., on an impervious floor, also avoid spillage by careful handling; provide spill collection sets for effective spill management; and
- (vii) Dispose any wastes generated by construction activities in landfill.

57. **Utilities.** . Pipeline alignment is carefully chosen to avoid the existing utilities like sewer and water lines, drains, electrical lines, etc.,. Wherever space is available, pipeline is aligned in the earthen shoulder where there are no utilities. In narrow roads, pipelines are aligned in the road section into the edge avoiding, where there are no utilities. However, disturbance to utilities and shifting cannot completely be avoided. Where required, Where required, during the installation stage of telephone lines, electric poles and wires, etc., will be shifted due to the operation of construction machineries:.. To mitigate the adverse impacts due to relocation of the utilities, contractor, in coordination with PIU, will:

- (i) At least two-weeks prior to start of work at any section, Identify utilities that will be required to be temporarily disturbed / shifted for the construction work;
- (ii) Liaise with the respective utility department, provide prior information to the affected public and restore the utilities as soon as the work is complete
- (iii) Provide contingency services where required (temporary diversion of drains, provision of water supply by tankers, etc.,)
- (iv) Coordinate with the respective department and ensure that electricity and telephone services are restored quickly
- (v) Reconstruct the damaged footpath and drains immediately after the completion of pipeline work in that particular section

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). Construction waste and debris will be reused for beneficial purposes or disposed in municipal landfill site. In case new sites are required for disposal, extreme care will be taken to avoid disposals near the forest, water bodies, swamps, or in areas which will inconvenience the community. Construction work camps will be located away (100 m) from residential areas. Material stockpiles shall be protected by bunds during the monsoon to arrest the silt laden runoff into drains. The subproject is likely to generate soil from excavations, which needs to be disposed safely. The following measures should be considered for disposal of surplus/waste soil:

- (i) The excavated soil should be removed from construction area at the earliest for beneficial reuse such as land raising / filling of excavated areas;
- (ii) Soil should be covered with tarpaulin sheets during the transportation; and

- (iii) 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.

59. **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, contractor will use the exiting quarry sites and sand mining areas already permitted by Mines and Geology Department.

60. For this subproject, aggregate will be procured from an existing licensed quarry crusher in Hunsekatte and the source for sand will be nearby river sand mining areas permitted 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.

61. **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 supply components. 2046 has been considered as the design year for all the system components. Accordingly, 2016 is 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 liters per capital per day (lpcd) for 100% population.

62. **Source Sustainability.** The water source is river Varahi. During field investigation, it is found that Varahi River is a reliable and sufficient source concerning the quantity of water during all seasons. No gauge is installed to measure the actual flow in the river. According to the Varahi Hydel Power Project, the flow out of the power plant is 8.5 cumecs. With a water demand of 7.60 MLD in 2026, which is equivalent to 0.11 cumecs, the river provides sufficient water to serve the town Kundapura. The same river is proposed for water supply to the upstream major town of Udupi under the central government funded AMRUT scheme. This scheme will withdraw 0.56 cumecs of water (41 MLD) from the river. From the Kundapura intake at Jambu, the river flows down for about 12 km -13 km and discharges into the Arabian Sea. The combined withdrawal for Kundapura and Udupi will be 0.676 cumecs, which is just about 8% of total water availability, leaving 92% water downstream. Therefore, Varahi River is considered more than enough for the projected water supply of 7.60 MLD and no major changes envisaged from water abstraction from river and remain same at current level, and abstraction from underground source will not be needed.

63. **River Water Quality.** There are no major pollution sources like industries in the upstream side of the intake. Most of the villages and towns, however, along the river discharge domestic wastewater into the river without any treatment, although there is no such disposal point in the proximity of intake. The raw water will be treated to drinking water standards and supplied to the consumers.

64. **Water Treatment Plant.** The WTP was constructed at Japthi Village about 2.2 km away from the Intake point to treat 7.6 MLD of raw water. WTP is surrounded by agricultural lands. It follows a conventional treatment process involving coagulation, flocculation, sedimentation, filtration process with the following units.

- (i) Cascade Aerator;
- (ii) Raw water channel with Parshall Flume with flow meter;
- (iii) Flash mixer;
- (iv) Clariflocculator;
- (v) three filter beds;

- (vi) Chemical House;
- (vii) Clear water storage sump;
- (viii) Laboratory;
- (ix) Gravity feed chlorinators;
- (x) Two Clear water reservoirs;
- (xi) Clear water pump house; and
- (xii) Transformer yard.

65. The water treatment plant in Kundapura Town treats raw water by conventional treatment methods, which includes coagulation by adding alum, flocculation, clarification, filtration and post chlorination. Site visits have been made to the water treatment plant to assess its present performance. The water inflow to the WTP is lower than in the design envisaged. Consequently, the plant is under loaded and produced just half of the design capacity. Therefore, flow meters should be installed to measure the actual inflow to the WTP. Environmental audit of the existing WTP has been conducted during the IEE preparation to assess the current environmental performance. In Karnataka, as per the current legal set-up, WTPs do not require consent or authorization (for both establishment and the operation) from the Karnataka State Pollution Control Board. This audit identified some concerns, which need to be addressed (Environmental Audit report is presented in Appendix 9). These are mainly related to backwash wastewater and sludge generated from the WTP, which are not managed properly and let into open drains. As per the design estimate, 476 m³ of backwash wastewater from three filter beds and 178 m³ of wastewater from clarifiers generated daily. At present, this is directly drained out to natural drains. As part of the KIUWMIP, it is proposed to develop wastewater collection, and recirculation system, and sludge management system. Sludge from clarifiers and backwash collection tank, will be conveyed to sludge ponds, and dried sludge will be sent to sanitary landfill for disposal⁴. This system avoids discharge of polluted water into natural environment, and it also optimizes utilization of raw water by recirculation. Necessary infrastructure is included in the subproject and will be implemented by the contractor. Existing chlorination system also is not properly working, and there are concerns related to safety of the chlorination system. Improvements to chlorination system is included in the present subproject, and measures suggested are given below.

66. There is invariably a safety risk when considerable quantities of chlorine are handled at the WTP. (Chlorine cylinders will be brought by trucks to the site, installed and operated to disinfect the water supplies). Since facilities are located in the urban area, precautions will, thus, be needed to ensure the safety of both workers and citizens. The average dose of chlorine for pre-chlorination will be about 4mg/l and that for post- chlorination will be about 3 mg/l. Chlorine cylinders (called tonners, with capacity about 900 kg, equivalent to one month's supply, which is the maximum allowed volume to be stored onsite) will be procured from nearest manufacturing unit and stored at the site.

67. To avoid any risk to workers and public, the chlorination facility at the WTP will be upgraded with all appropriate safety features and equipment to meet with any accidental eventuality, which may include:

- (i) Chlorine neutralization pit with a lime slurry feeder;
- (ii) Proper ventilation, lighting, entry and exit facilities;

⁴ Kundapura has a sanitary landfill for disposal of municipal solid waste. Developed according to Municipal Solid Waste Management Rules of Government of India, it is operated by Kundapura Town Municipal Council, which is also the implementing agency of this subproject.

- (iii) Facility for isolation in the event of major chlorine leakage;
- (iv) Personal protection and safety equipment for the operators in the chlorine plant;
- (v) Audible alarm facilities to alert chlorine gas leak;
- (vi) Provide training to the staff in safe handling and application of chlorine
- (vii) If the chlorine storage will be within 100 m of any sensitive receptor, the project will involve them in the emergency response planning.

Table 6: Corrective Action Plan for Environmental Compliance of Existing WTP

Concern	Action Required	Timeline	Responsible Agency and Funding Source
Poor backwash wastewater and sludge management – discharged untreated into natural drains	- Provision of backwash recirculation system – to avoid discharge and also to recover raw water -Provision of sludge collection, thickening, drying and reuse/disposal system	Corrective actions such as treatment of backwash water and sludge management system are included in the subproject	Kundapura TMC; KUWMIP funds
Poor handling of chlorination system and lack of safety measures	Improvements to chlorination.	Corrective actions are included in the subproject	Kundapura TMC KUWMIP-

68. **Social and Cultural Resources – Chance Finds.** Any work involving ground disturbance can uncover and damage archaeological and historical remains. Subproject area is not a known area of archaeological potential, and therefore the risk is low. Nevertheless, construction contractor needs to follow these measures in conducting any excavation work:

- (i) Create awareness among the workers and supervisors about the chance finds during excavation work;
- (ii) Stop work immediately if any finds are suspected to allow further investigation; and
- (iii) Inform archaeological agencies promptly if a find is suspected, and take any action they require to ensure its removal or protection in situ.

C. Construction Impacts

69. 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 (supplemented by manual digging in narrow roads) 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.

70. Pipelines work will be taken up in sections-wise. Excavation, pipe laying and refilling work will be conducted in small sections in sequence, and at any point of time not more than 30-40 m section will be open for work at any work site. There will be no open trenches at the end of each day of work. As shown in Figure 25, the maximum depth of excavation is 1.2 m, and maximum is 0.6 m.. 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 or 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. Following

Table 7 shows the details of construction activities involved in the subproject.

Table 7: Construction Activities for the Subproject

Component	Construction Method	Likely Waste Generated
Water Supply line	<p>A trench of maximum size 1.2 m deep and 0.6 m wide will be excavated along the identified roads and pipeline will be laid.</p> <p>Pipes will be placed in the trench and joined. A bed of sand of 100 mm thick will be prepared at the bottom where there is hard bottom surface (rock) and pipes will be placed on the sand bed. 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.</p> <p>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.</p> <p>At the start (tapping) point, the feeder main to be laid across a main traffic intersection (Shastri Circle on NH 66). Trenchless method (Pipe Jacking) will be adopted to lay the pipeline below the ground to avoid disturbance to traffic movement.</p> <p>Pipe laying method: All the pipelines – feeder main and distribution lines will be laid along the roads. Feeder main is partly laid in the busy city roads, but mostly in low density rural kind of setting, close to coast. Distribution lines are mostly laid in the city area. Some of the roads in the town are narrow about 3-4 m. Following method is adopted for pipe laying:</p> <ul style="list-style-type: none"> • Pipes will be laid in small sections daily (30 -100 m) at different locations with different teams • Where the trenching involves cutting open hard surface (road cutting), pipeline work will be about 30-40 m in a day. • Within these small sections, work will be conducted again in parts as opening up entire section and barricading will inconvenience the public • Excavation, pipe laying and refilling will be carried out in sequence; first, adequate length of trench excavated to lay one pipe (about 10 m considering working space and jointing), and pipe will be lowered in the trench and refilled, and simultaneously the trench excavation will continue for next pipe length; in this method, working section at any point of time will not be more than 20 m • Work area will be properly barricaded with hard barricades; all construction activities - movement of construction equipment like excavators, rollers, and placing of excavated soil, pipes, construction 	<p>22780 m³ of soil will be excavated; more than 98% of excavated soil will be utilized for refill; remaining soil (380 m³) need to be disposed off</p> <p>This excess soil shall be used for leveling or other construction activities or transported to existing landfill site to use it as waste cover</p>

Component	Construction Method	Likely Waste Generated
	<p>material etc., will be confined to the barricaded area; excess soil after refilling will be transported to disposal site at the end of each day's work</p> <ul style="list-style-type: none"> • Refilled material will be watered and consolidated immediately and barricades removed, and continued for section • In this method disturbance to nearest houses/shops will be limited to 2 to 6 hours at any particular work section • As the work is conducted in small patches, disruption of access to houses and shops, even though temporary, will be very minimal • Given shall depth of trench (max 1.2 m), no groundwater accumulation in trenches anticipated • Sheet piling will be used in sandy areas / mixed sandy areas irrespective of trench depth 	
Water reservoirs (OHTs)	<p>Excavation, compaction and consolidation of earth, bar bending, concreting, staging and finishing work etc.</p> <p>Pile foundation will be constructed for OHT at Kodi located on the coast.</p>	Excess soil shall be used for filling if required or stored/ dumped in approved debris disposal site.

m³ = cubic meter, m = meter, mm = millimeter, OHT = overhead tank.

71. 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 Kundapura town, 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.

72. 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.

73. While trenching at densely populated areas like market place or layouts, or roads with heavy traffic, 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 area identified at Kundapura are Neharu Nagara, Darbe, Bolwar, Nellikatte, Parlodka, Kemmai, Krishnanagra, Bannur. Except these Bustand road, Kemmai road, darbe road, Court road, Vivekananda Nagara road, Uppinangadi Road and Bypass road. Given the maximum trench width of 0.6 m for laying pipelines, no road will be completely closed, but there will be disturbance / inconvenience during the work, but this too will be minimal as the construction will be taken up in small sections as described earlier.

74. Prior to the start of work, contractor should prepare a site-specific Construction Management Plan, which should be submitted every month before works start. The Construction Management Plan will include the method statement for construction works, Utility Management and Contingency Plan, Traffic Management Plan, Work camp and Labor Camp details, Safety measures taken for the workers and the public, etc.

75. 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:

- (i) Work description;
- (ii) No. of workers (skilled and unskilled);
- (iii) Details of Plant, equipment and machinery, vehicles;
- (iv) Work duration (total, and activity-wise, for example for pipe laying, from excavation to road resurfacing/testing);
- (v) Personal protection equipment (helmet, gloves, boots, etc.) details for each type of work;
- (vi) Details of materials at each site (type and quantity);
- (vii) 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.);
- (viii) Construction waste/debris generated (details and quantity);
- (ix) Detail the sequence of work process (step-by-step) including specific details of each work;
- (x) Contractor's supervision and management arrangements for the work
- (xi) Emergency: Designate (i) responsible person on site, and (ii) first aider
- (xii) Typical site layout plan including pipe trenching, placement of material, excavated earth, barricading etc.;
- (xiii) 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.

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

- (i) Provide barricading/security personnel at the site to prevent entry/trespassing of pedestrian/vehicles into the work zone;
- (i) Location of temporary stockpiles and provision of bunds;
- (ii) Separation of stockpiles areas with workers/vehicle movement paths to avoid disturbing the stockpiled soil;
- (iii) Wetting of soil to arrest dust generation by sprinkling water;
- (iv) 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 Program Implementation Unit (PIU).

77. **Sources of Materials.** Moderate quantities of construction material (~2500 m³) sand and aggregate, will be required for this subproject. The construction contractor will be required to:

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

78. **Air Quality.** It is most certain that work will be conducted during the dry season, so there is potential for creating dust from the excavation of dry soil, backfilling, transportation to disposal, and from the import and storage of sand/gravel for bedding. Emissions from construction vehicles, equipment, and machinery used for excavation and construction will also

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

- (i) Consult with PIU on the designated areas for stockpiling of clay, soils, gravel, and other construction materials;
- (ii) Damp down exposed soil and any stockpiled on site by spraying with water when necessary during dry weather;
- (iii) Bring materials (aggregates, sand, etc. gravel) as and when required;
- (iv) Use tarpaulins to cover sand and other loose material when transported by vehicles;
- (v) Stockpile sand and other loose material only in barricaded area and protect/cover by tarpaulins to avoid dust generation
- (vi) Clean wheels and undercarriage of vehicles prior to leaving construction site
- (vii) 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.

79. **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/concrete breakers/pile drivers will be used to break open the road surface. Pneumatic drills typically generate an equivalent noise of 82-98 decibels (dB), 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 a day at each location) thus impact is minimal and short-term. The construction contractor will be required to:

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

80. **Surface Water Quality.** Kundapura receives high annual average rainfall of 4297 mm, of which over 80% is received during monsoons. The southwest monsoon winds bring rains from June to September while the northeast monsoon winds deliver further rainfall from October to December. In any unavoidable case of excavation during monsoon, 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 Town. As Kundapura is a coastal town, surrounded by rivers, any contamination will be detrimental to coastal waters. These potential impacts are temporary and short-term duration only and to ensure these are mitigated, construction contractor will be required to:

- (i) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
- (ii) Laying of pipelines during dry season and closing of all trenches before rainy season and avoid any chances of collecting the water in the trenches or pumping;
- (iii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, dispose in municipal landfill (Sample Spoils Management Plan in Appendix 10);
- (iv) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
- (v) Provide temporary bunds for stockpiles and materials;
- (vi) Place storage areas for fuels and lubricants away from any drainage leading to water bodies. Storage structure should consider 110% capacity bund; and
- (vii) Dispose any wastes generated by construction activities in landfill or reuse in beneficial purposes;

81. **Groundwater.** Subproject activities do not interfere with groundwater regime, will not abstract from groundwater, nor will the activities affect groundwater quality. Another physical impact that is often associated with excavation is the effect on drainage and the local water table if groundwater and surface water collect in the voids. To ensure that water will not pond in pits and voids near project location, the construction contractor will be required to conduct excavation works on non-monsoon season to the maximum extent possible.

82. **Landscape and Aesthetics.** The construction work is likely to generate moderate considerable quantities of waste soil (380 m³). The pipe laying work will generate surplus soil; as small diameter pipes are proposed it will generate only about 2% as surplus as most of the soil will be used for refilling after the pipe is laid in trench. Work will also generate concrete and bitumen debris from road cutting. 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:

- (i) Manage surplus soil, debris and solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- (ii) Coordinate with PIU / Kundapura TMC for beneficial uses of road debris and surplus soils in on-going construction works or for temporary storage for future use or disposal in landfill
- (iii) In unavoidable case of disposal, debris shall be disposed at landfill site or site approved by PIU / Kundapura; waste shall not be disposed in the forest areas and in or near water bodies/ rivers / coast;
- (iv) Prepare and implement Waste/Spoil Management Plan;
- (v) Surplus soil and debris from work site shall be removed / cleared at the end of each day of work; there shall be no stock piling of debris / surplus soil at the site
- (vi) Recover used oil and lubricants and reuse or remove from the sites;
- (vii) Remove all wreckage, rubbish, or temporary structures which are no longer required; and

- (viii) Request PIU/ PMDCSC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.

83. **Accessibility.** Transport infrastructure will be affected by the pipe laying work. However, the proposed pipeline diameter is small (max 250 mm diameter), and almost 70% of pipelines are 110 mm or below. As described in detail in Table 5, only about 800 m length of total 4,800 m of feeder main is on the main arterial road (Kundapura main road, Figure 27), which carries considerable traffic. Rider lines (distribution lines) of 75 mm diameter are proposed along Kundapura main roads (there are two parallel roads, both of which area called Kundapura main road) on two sides of both roads, from Shastri Circle to Parijatha Circle. These are the main arterial roads of the town, busy with activities and almost all commercial activities are located along this road. As described earlier, this road is very wide with adequate shoulder space to lay pipeline along the carriageway. About 100 m of pipeline to be laid along NH 66, where adequate shoulder space available. Pipeline will also be laid along state highway 52 (SH 52), adequate shoulder space is available. The pipeline crossing of NH 66 at Shastri Circle will be laid by trenchless method, therefore no disturbance to NH 66 and Kundapura main road at Shastri Circle is not anticipated. Trenchless work may however disturb the traffic on NH service road for a short distance (Figure 28). Other roads are mostly in residential areas, width varies widely from 3 – 9m. Following are the narrow roads in the project areas (< 4 m wide): Shri chakreswari temple Cross road, Jattigeshwara Temple road, Kallegere Shree Devi Hospital road, Vittalwadi Road, Maddu Gudde, Fish market cross road and Ring Road Karvi-Kere. These are mostly in residential areas and carry less traffic. The width required for laying pipelines is maximum 0.6 m, and pipeline is to be laid into edge of the road. Also, the pipelines will be laid in small section. Therefore no major impacts on traffic anticipated. No full road closures anticipated, however, in narrow roads there will be disturbance and inconvenience to traffic. . Potential impact is negative but short term, reversible, and can be mitigated. The construction contractor will be required to:

- (i) Plan pipeline work in consultation with the traffic police; prepare a Traffic Management Plan – a template is provided for reference at Appendix 11.;
- (ii) Strictly follow the pipe laying method presented in Table 7 so that trench excavation, pipe laying, and refilling including compacting, at a stretch is completed in a minimum possible time;
- (iii) Provide for immediate consolidation of backfilling material to desired compaction – this will allow immediate road restoration and therefore will minimize disturbance to the traffic movement;
- (iv) Schedule transport and hauling activities during non-peak hours;
- (v) No road shall be completely closed for traffic; in unavoidable circumstances of road closure (eg, NH service road closure at Shastri Circle for trenchless work), provide alternative route, and ensure that public is informed about such traffic diversions;
- (vi) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
- (vii) Maintain safe pedestrian access at all times to the houses along the work site;
- (viii) Hard barricades should be mandatorily provided for work sites in residential and commercial areas, along with caution board.
- (ix) 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;

- (x) Keep the site free from all unnecessary obstructions;
- (xi) Drive vehicles in a considerate manner
- (xii) In narrow roads listed above, Inform the affected local population on week in advance, and again a day before the work

Figure 27: View of Kundapura Main Road and Pipeline Alignment on Road Shoulder

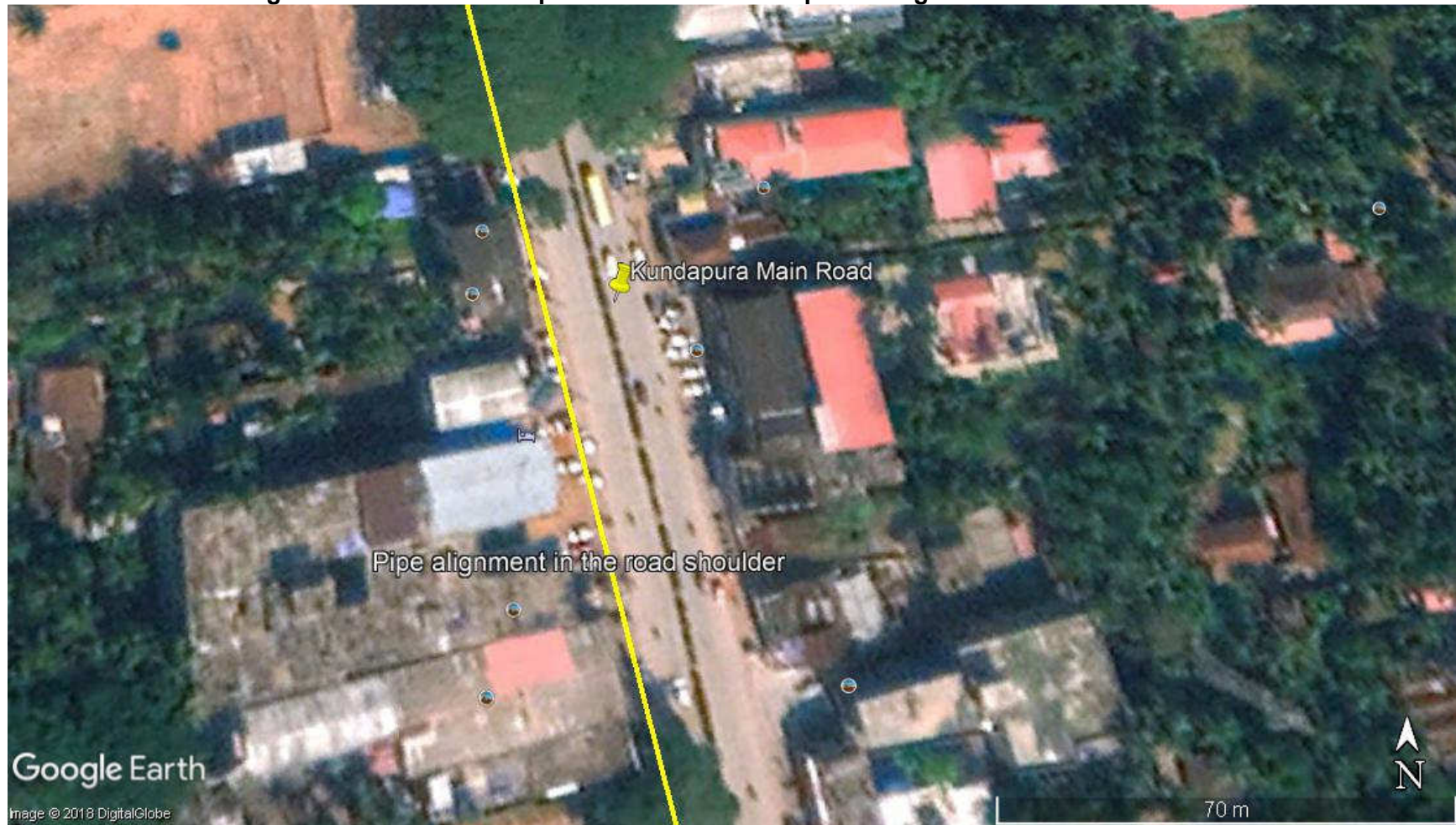
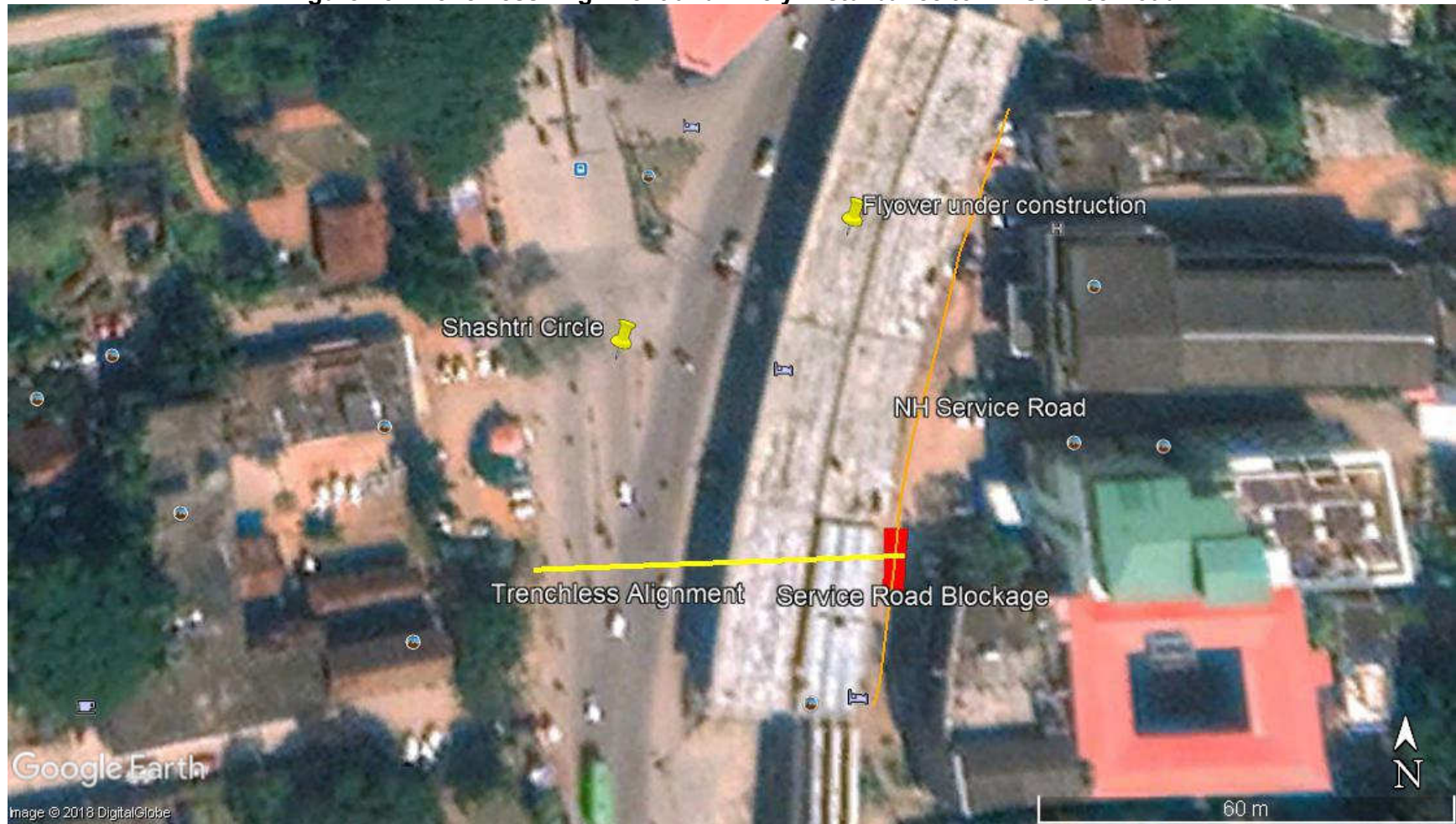


Figure 28: Trenchless Alignment and Likely Disturbance to NH Service Road



84. **Impacts on social sensitive areas:** Since works will be conducted in an urban area, where there are sensitive areas like schools, hospitals and religious centers, trench excavation and pipe laying activities can create nuisance and health hazard to children and people with ailments. There are several churches, temples, educational institutes, hospitals in the town (Anjaneya Temple, Holy Rosery Church, government hospital, Chinmayi hospital, Kundeshwara temple, Sri Nagajattigeshwara temple, Adishakti temple, Venkataramana school etc.). These are abutting the roads, pipeline alignment will disturb the access and may also inconvenience due to noise, dust and from safety risks during the works. Proposed mitigation measures aim to minimize the impact in all areas in general; however, special attention is necessary for these locations. The following measures shall be implemented within a 50 m radius around the sensitive locations (schools, hospitals, and religious centers):

- (i) No material should be stocked in this area; material shall be brought to the site as and when required;
- (ii) Conduct work manually with small group of workers and less noise; minimize use of equipment and vehicles;
- (iii) Strictly follow the pipe laying method presented in Table 7 so that trench excavation, pipe laying, and refilling including compacting, at a stretch is completed in a minimum possible time;
- (iv) No work should be conducted near the religious places during religious congregations;
- (v) Material transport to the site should be arranged considering school timings; material should be in place before school starts;
- (vi) 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; and
- (vii) Implement all measures suggested elsewhere in this report – dust and noise control, public safety, traffic management, strictly at the sites.

85. **Socioeconomic – Income.** All of the project components will be located in government land and existing ROW. Excavation of trenches and pipe laying work will obstruct access to residences/commercial buildings adjacent to the pipeline. Disruption of access to commercial establishments may affect livelihood. Main commercial areas are located along two parallel main roads of Kundapura, and here pipeline is aligned along the road shoulder. This will disturb the access to shops. However, given the section-wise construction of pipeline, immediate closure of trenches, at any point of time there will not be significant impact. 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:

- (i) Strictly follow the pipe laying method presented in Table 7 so that trench excavation, pipe laying, and refilling including compacting, at a stretch is completed in a minimum possible time;
- (ii) Leave space for access between mounds of excavated soil;
- (iii) Provide wooden planks/footbridges for pedestrians and metal sheets for vehicles to allow access across trenches to premises where required;
- (iv) Consult affected businesspeople to inform them in advance when work will occur
- (v) Address livelihood issues, if any; implement the resettlement plan to address these issues;

- (vi) 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
- (vii) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints;

86. **Socioeconomic Employment.** Manpower will be required during the construction period (24 months). 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 employ local labor force to the maximum extent, if manpower is available.

87. **Occupational Health and Safety.** Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Subproject area is located in a coastal belt comprising sandy soil and high water table area. Although the depth of excavation is limited to 1.2 m, there is a risk of collapse due to loose sandy soil especially in Kodi area along the coastal beach. Potential impacts are negative and long-term but reversible by mitigation measures. The construction contractor will be required to:

- (i) Comply with all national, state and local core labor laws (See Appendix 2 of this IEE);
- (ii) Develop and implement site-specific health and safety (H&S) plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use Personal Protective Equipment; (c) H&S Training⁵ for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;
- (iii) All trenches in sandy and mixed sandy soils irrespective of depth shall be protected with safety shoring / strutting to avoid safety risks to workers, public and nearby buildings/structures
- (iv) Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;
- (v) Provide medical insurance coverage for workers;
- (vi) Secure all installations from unauthorized intrusion and accident risks;
- (vii) Provide supplies of potable drinking water;
- (viii) Provide clean eating areas where workers are not exposed to hazardous or noxious substances
- (ix) 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;
- (x) 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;

⁵ 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.

- (xi) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
- (xii) Ensure moving equipment is outfitted with audible back-up alarms;
- (xiii) 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;
- (xiv) Disallow worker exposure to noise level greater than 85 dB for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively; and
- (xv) Overall, the contractor should comply with International Finance Corporation (IFC) Environmental, Health and Safety (EHS) Guidelines on occupational health and safety. (this can be downloaded from <http://www1.ifc.org/wps/wcm/connect/9aef2880488559a983acd36a6515bb18/2%2Boccupational%2Bhealth%2Band%2Bsafety.pdf?MOD=AJPERES>).

88. **Community Health and Safety.** Hazards posed to the public, specifically in high-pedestrian areas may include traffic accidents and vehicle collision with pedestrians. In most of the cases location of project sites are along the road ways, hence safety risk to community is to be considered. The pipe line work may require trenches along the roads including in narrow streets; unprotected trench excavation may endanger the stability of nearby buildings/structures. However considering the maximum trench size of 1.2 m deep and 0.6 m wide, the risk is minimal. Potential impact is negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

- (i) Provide protective shoring / strutting for all excavations in sandy and mixed sandy soils (>1m);
- (ii) One week prior to start of work at any section, a joint inspection shall be conducted along with PIU and Kundapura TMC to identify risk areas and buildings at risk (due to excavation, vibration and noise) and take necessary precautions for safe conduct of work
- (iii) Plan material and waste routes to avoid times of peak-pedestrian activities;
- (iv) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure;
- (v) Provide road signs and flag persons to warn of dangerous conditions, for all work sites along the roads; and
- (vi) Overall, the contractor should comply with IFC EHS Guidelines Community Health and Safety (this can be downloaded from <http://www1.ifc.org/wps/wcm/connect/dd673400488559ae83c4d36a6515bb18/3%2Bcommunity%2Bhealth%2Band%2Bsafety.pdf?MOD=AJPERES>).

89. **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. 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_workers_accommodation).

- (i) Consult with PIU before locating workers camps/sheds, and construction plants; as far as possible located at least 200 m from residential areas;
- (ii) Minimize removal of vegetation and disallow cutting of trees;
- (iii) Labor camps shall include accommodation for workers/laborers along with other basic amenities such as kitchen, potable water supply, sanitation (toilets, bathrooms, washing areas and water supply for such needs), first aid room as well as garbage collection and disposal facility.
- (iv) The roof height of the worker's and labor camp shall not be less than 3 m from floor level to the lowest part of the roof.
- (v) The camps shall be floored with concrete, shall be kept clean, and with proper cross ventilation, and the space provided shall be on the basis of one sq.mt per head or as per the relevant regulation, whichever is higher.
- (vi) Fire and electrical safety pre-cautions shall be adhered to.
- (vii) Cooking, sanitation and washing areas shall be provided separately.
- (viii) The Contractor shall maintain necessary living accommodation and ancillary facilities (including provision of clean fuel to prevent damage to forests and to prevent fuel wood cutting and burning by labor) in functional and hygienic manner.
- (ix) The site must be graded and rendered free from depressions such that water does not get stagnant anywhere.
- (x) The entire boundary of the site should be fenced all around with barbed wire so as to prevent the trespassing of humans and animals.
- (xi) Provide water and sanitation facilities; water, meeting Indian drinking water standards shall be provided, in adequate quantities (supply of 60- 80 lcpd); all water storage structures must be cleaned regularly and covered properly to avoid any contamination;
- (xii) 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;
- (xiii) Train employees in the storage and handling of materials which can potentially cause soil contamination;
- (xiv) Recover used oil and lubricants and reuse or remove from the site;
- (xv) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- (xvi) Remove all wreckage, rubbish, or temporary structures which are no longer required;
- (xvii) Report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work; and
- (xviii) The work camp details should be included in the Construction Management Plan.

90. **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:

- (i) Create awareness among the workers and supervisors about the chance finds during excavation work;
- (ii) Stop work immediately if any finds are suspected to allow further investigation
- (iii) Inform archaeological agencies promptly if a find is suspected, and take any action they require to ensure its removal or protection in situ;

- (iv) Adjacent to important religious sites, undertake excavation and construction work in such a way that no structural damage is caused to the building.

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

- (i) Contractor in consultation with PIU and TMC shall identify beneficial uses of surplus soil and debris in other construction work or ground leveling activities where required
- (ii) Waste shall not be disposed in drainage lines, river courses, water bodies, ponds, forest areas, agricultural lands etc., no residential areas shall be located within 100 m downwind side of the sites, the site is minimum 250 m away from sensitive locations like settlements, ponds/lakes or other water bodies.
- (iii) Construction waste shall be disposed only in sites approved by PIU and TMC – either in landfill or any site that is suitable for debris disposal identified based on the above criteria

D. Operational and Maintenance Impacts

92. O&M of the water supply system will be carried out by the Kundapura TMC. The system have a design life of 30 years, during which shall not require major repairs or refurbishments and should operate with little maintenance beyond routine actions required to keep the equipment in working order. The stability and integrity of the system will be monitored periodically to detect any problems and allow remedial action if required. Any repairs will be small-scale involving manual, temporary, and short-term works involving regular checking and recording of performance for signs of deterioration, servicing and replacement of parts.

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

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

95. 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.

96. Increased water supply will increase the sewage generation, which needs to be safely collected, treated and disposed. A comprehensive sewerage system to be developed

97. The citizens of the Kundapura 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.

E. Cumulative Impacts

98. Cumulative impacts are those that result from the successive, incremental, and/or combined effects of a project or activity when added to other existing, planned, and/or

reasonably anticipated future ones. The subproject aims to improve municipal water supply in Kundapura, by rehabilitating the existing intake and water treatment facilities, and providing new OHTs and distribution lines. Kundapura's water comes from river Varahi, which is also proposed as an alternative source of water for the upstream town of Udupi, in a government funded bulk water project that is being implemented in parallel with the distribution system subproject under the same tranche and project. Varahi also serves as a source for irrigation water supply. Cumulative water withdrawals may affect the source sustainability and downstream uses and ecosystem needs. However, an analysis on the water availability, and cumulative withdrawals indicated that the impact will not be significant.

99. Kundapura is the last notable water withdrawal point on River Varahi before it joins the Arabian Sea, after flowing for about 12-13 km from the intake point. On the upstream side, Udupi intake (i.e. proposed new intake) is at about 10 km. An irrigation weir and Varahi Hydal Power Project (VHPP) is located on the upstream side of Udupi intake proposed intake. VHPP discharges 1,100 cubic feet per second (cusec) of water into river course throughout year, of which 800 cusec is for irrigation use and remaining 300 cusec is available for drinking and river flow purposes. The combined withdrawal of Kundapura and Udupi will be 23.9 cusec of the total available 300 cusec, which is just about 8 % of the total available flow, leaving a remaining 92 % flow or 74 cusec available for downstream uses. This, therefore, shows that there are no significant impacts related to source sustainability or downstream impacts.

100. During the construction work, dust pollution is anticipated from the subproject activities. This, combined with the other usual construction activities in urban areas, may increase the particulate matter concentration in ambient air. Dust control measures suggested in the EMP aim to minimize the dust generation from the subproject construction activities. At Shastri Circle, where the pipeline construction by trenchless method will be carried out, a road flyover bridge is under construction. Pipeline work scheduling and construction approach will be coordinated with the bridge construction agency so that cumulative incontinence to traffic is minimized. No significant impacts are, therefore, anticipated.

VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Project Stakeholders

101. 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:

- (i) Residents, shopkeepers and businesspeople near the work sites;
- (ii) Public representatives and prominent citizens of the town;
- (iii) Kundapura TMC;
- (iv) KUIDFC, Government of Karnataka.

102. Secondary stakeholders are:

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

B. Consultation and Disclosure

103. The subproject has been designed in close consultation with public representatives of Kundapura TMC, and accordingly the TMC passed a resolution for preparation of subproject (Appendix 12). Public consultation meetings were conducted during the project preparation and design stages. Various forms of public consultations (consultation through adhoc discussions on site) have been used to discuss the project and involve the community in planning the project and mitigation measures.

104. A public consultation workshop was conducted on October 18, 2016 in Kundapura to discuss the proposed project and likely environmental issues and mitigation measures. various stakeholders – public representatives, officials from various agencies were participated in the workshop. The consultation meeting details including photographs are appended at Appendix 13.

105. Following consultation meetings are also conducted: (i) with elected representatives of TMC consultation held on 6 March 2015 and passed a resolution indicating the need of project, (ii) General Body Meeting with all elected members/Councilor meeting held on November 3, 2015, (iii) Member of Legislative Assembly (MLA) held consultation meeting on June 13, 2016, (iv) Site visit to all sites and consultation with nearby residents. The details of the stakeholder's consultations are presented in Table 8 below.

Table 8: Stakeholder Consultations

	Date	Meeting Location	Meeting Headed by	Attendees of the Meeting	Remarks
1	27 February 2016	Kundapura Town Municipal Council (TMC) Meeting hall	President, TMC Kundapura	Chief Officer, TMC, Kundapura, Assistant Executive Engineer (AEE), TMC, Kundapura, Council members, Jayaprakash T, GKW Praveen Ivan Rego, GKW, Shivaram, GKW	Inception report Approval
2	10 July 2015	Kundapura TMC Meeting hall	President, TMC Kundapura	Chief Officer, TMC, Kundapura, AEE, TMC, Kundapura, Council members, Jayaprakash T, GKW Praveen Ivan Rego, GKW, Shivaram, GKW	Preliminary Design Report Approval
3	30 May 2016	Kundapura TMC Meeting hall	President, TMC Kundapura	Chief Officer, TMC, Kundapura, AEE, TMC, Kundapura, Council members, Jayaprakash T, GKW Praveen Ivan Rego, GKW, Shivaram, GKW	Detailed Project Report Approval
4	18 October 2016	Surrounding residents of proposed overhead tank (OHT) site Halekote, Kundapura	Municipal Quarters Halekote, Kundapura	Mrs. Lidwin W/o Mithun, Mrs. Shantha W/o Nagaraj, Mrs. NaliniKundar W/o of Late Shankar Kundar, Mrs. Gowri W/o Shyama Mendon Mrs. Sumathi W/o Mahabala P. Chandan, Mrs. Jayasheela Nayak Bhargava Nilaya Halekote Kundapura, Mr. Babu K Bangera Door No 523 A-2 Chikensal Road Halekote Kundapura, Mr. Purushothama	Project component: 24 X 7 water supply for Kundapura town

	Date	Meeting Location	Meeting Headed by	Attendees of the Meeting	Remarks
				S/o Late Manjayya Sherigar Door No 523/D Chikensal Road Kundapura	

C. Future Consultation and Disclosure

106. Executing agency and implementing agency shall extend and expand the consultation and disclosure process significantly during implementation of the Investment Program.

107. **Consultation During Construction.** Prior to start of construction, PIU will conduct meaningful consultations⁶ and information dissemination sessions at various places and solicit the help of the local community, leaders/prominent for the project work. Focus group meetings will be conducted to discuss and plan construction work (mainly pipeline work) with local communities to reduce disturbance and other impacts and also regarding the project GRM. Project information and construction schedule will be provided to the public via mass media (newspapers, television, websites etc.). A constant communication will be established with the affected communities to redress the environmental issues likely to surface during construction phase. Contractor will provide prior public information (in Kannada and English) about the construction work in the area, once 7 days prior to the start of work and again a day before the start of work via pamphlets. At the work sites, public information boards will also be provided to disseminate project related information.

- (i) Public meetings with affected communities (if any) to discuss and plan work program and allow issues to be raised and addressed once construction has started; and
- (ii) 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;

108. **Project Disclosure.** Draft IEE has already been disclosed. Executive summary of this final IEE will be again be translated in Kannada and made available at the offices of PMU, Regional Program Management Unit (RPMU) PIU, and Kundapura TMC and also displayed on their notice boards. Hard copies of the IEE will be accessible to citizens as a means to disclose the document and at the same time creating wider public awareness. Electronic version of the IEE in English and Executive Summary in Kannada will be placed in the official website of the KUIDFC after approval of the IEE by ADB. Stakeholders will also be made aware of grievance register and redress mechanism.

109. Public information campaigns to explain the project details to a wider population will be conducted. Public disclosure meetings will be conducted at key project stages to inform the public of progress in the project's implementation. Prior to start of construction, the PIU will issue Notification on the start date of implementation in local newspapers A board showing the details of the project will be displayed at the construction sites for the information of public.

⁶ Meaningful consultation will: (i) be carried out on an ongoing basis throughout the project cycle; (ii) involve timely disclosure of relevant information. Affected peoples and stakeholders will have access to relevant project information prior to any decision-making that will affect them; (iii) be conducted free of intimidation or coercion; and (iv) be gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups.

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

- (i) Public information campaigns (via newspaper, TV and radio) to explain the project to the wider town population and prepare them for disruption they may experience once the construction program is underway;
- (ii) 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
- (iii) 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.

111. Based on ADB requirements, draft IEE has already been posted on ADB website. Further, the following will be again posted on ADB website: (i) this IEE, upon finalization and approval of ADB; (ii) a new or updated IEE, if prepared, reflecting significant changes in the Project during implementation; (iii) corrective action plan prepared during Project implementation to address unanticipated environmental impacts and to rectify non-compliance to EMP provisions; and (iv) environmental monitoring reports (EMR format is given in Appendix 14). Documents will also be available on the websites of KUIDFC and Kundapura TMC.

VII. GRIEVANCE REDRESS MECHANISM

112. The GRM for the subproject has been established in accordance with an official Memorandum issued upon the order of Joint Managing Director KUIDFC Official Memorandum dated 28th June 2017. It has been established to receive, evaluate and address the concerns, complaints and grievances of the affected persons in relation to the project's social and environmental performances. The GRM aims to provide time bound action and transparent mechanisms to resolve social and environment concerns.

113. A project GRM will cover the project's towns for all kinds of grievances and will be regarded as an accessible and trusted platform for receiving and addressing project related complaints and grievances. The multi-tier GRM will have realistic time schedules and identify persons responsible to address grievances and deal directly with displaced persons/complainants to resolve their issues.

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

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

A. Grievance Redressal Process

116. 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 urban local body (ULB) responsible for addressing resettlement/social issues. Resident engineer and the ULB 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 PMDCSC's site office in full visibility of public. Grievances of immediate nature should be resolved at site/ within ULB/PIU level within 15 days of registration of grievances.

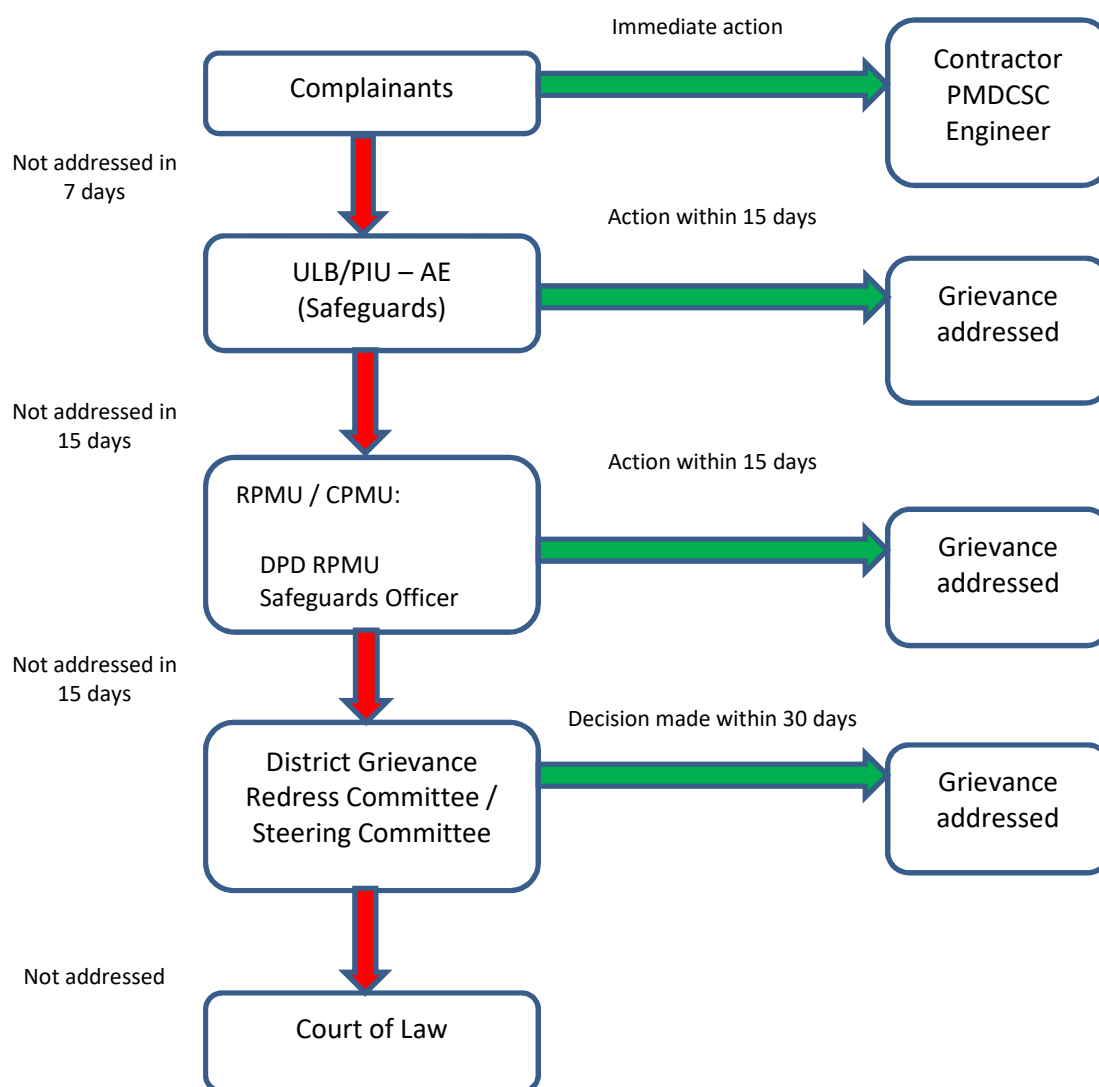
117. All the Grievances that cannot be resolved at ULB/PIU within 15 days will be forwarded to the grievances redress committee (GRC) headed by Deputy Project Director, RPMU at Subdivision level who will review and resolve within 15 working days of grievance being registered with assistance of the concerned PIU/ULB personnel if required. The grievances of critical nature and those cannot be resolved at GRC level should be referred to District Level Implementation Committee (DLIC) set up at district level headed by Deputy Commissioner who will review the grievances and to be settled within 30 days. All documents related to grievances, follow up action taken to resolve along with explanatory note on nature, seriousness and time taken for grievance redress shall be prepared by RPMU Safeguards Officer and circulated to DLIC members at least a week prior to scheduled meeting. The decision taken at the DLIC level will be communicated to the complainant by Safeguards Officer, RPMU through ULB/PIU

118. For any issues that remain unresolved by the GRC it is referred to DLIC at the District Level, and if the decisions taken at such meetings are not acceptable, the complainants /displaced persons can approach the Court of Law as per Government of Karnataka legal procedure.

B. Grievance Redress Committee Composition and Selection of Members

119. The GRC for the project will be headed by (a) Special Land Acquisition Officer/Assistant Commissioner of the concerned sub-Division as Chairman of the sub Division with members as follows: (i) ULB Commissioners/Chief Officer of the concerned ULB towns, (ii) Deputy Project Director as member Secretary and Convener, (iii) PMDCSC Engineer, (iv) Affected Community member/NGO, and (v) Safeguards Officer RPMU KIUWMIP Mangalore member and will shoulder responsibility of keeping records of grievances/ complaints in details. Safeguards Officer will be responsible for coordinating with all GRC members and the displaced persons for grievance redressal. Grievances of critical nature and those cannot be resolved at Divisional level should be referred to DLIC set up at District level they will determine the merit of each grievance and attempt to resolve the same within a month from the date of lodging of complaints. The decision of DLIC is final and cannot be contested in any other forum except in the Courts of Law.

120. The affected person can also 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.

Figure 29: Grievance Redress Process

AE = Assistant Engineer, DPD = Deputy Project Director, PIU = Program Implementation Unit, PMDCSC = Project Management Design and Construction Supervision Consultant, RPMU = Regional Program Management Unit, ULB = urban local body.

121. **Recordkeeping.** Records of all grievances received, including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions and the date these were effected and final outcome will be kept by PIU (with the support of PMDCSC) and submitted to PMU.

122. **Information Dissemination Methods of the Grievance Redress Mechanism.** The PIU, assisted by PMDCSC/Public Communication, Awareness, Resettlement and Rehabilitation Consultant (PCARRC) will be responsible for information dissemination to affected persons and general public in the project area on grievance redress mechanism. Public awareness campaign will be conducted to ensure that awareness on the project and its grievance redress procedures is generated. The campaign will ensure that the poor, vulnerable and others are made aware of grievance redress procedures and entitlements per agreed entitlement matrix including. whom

to contact and when, where/ how to register grievance, various stages of grievance redress process, time likely to be taken for redress of minor and major grievances, etc. Grievances received and responses provided will be documented and reported back to the affected persons. The number of grievances recorded and resolved and the outcomes will be displayed/disclosed in the PIU, offices, ULB notice boards and on the web, as well as reported in the semi-annual environmental and social monitoring reports to be submitted to ADB.

123. **Periodic Review and Documentation of Lessons Learned.** The PMU will periodically review the functioning of the GRM and record information on the effectiveness of the mechanism, especially on the PIU's ability to prevent and address grievances.

124. **Costs.** All costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by the respective PIU. Cost estimates for grievance redress are included in resettlement cost estimates.

125. **Country Legal Procedure.** An aggrieved person shall have access to the country's legal system at any stage, and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM.

126. **ADB's Accountability Mechanism.** In the event that the established GRM is not in a position to resolve the issue, the affected person can also use the ADB Accountability Mechanism through directly contacting (in writing) the Complaint Receiving Officer (CRO) at ADB headquarters or the ADB India Resident Mission. The complaint can be submitted in any of the official languages of ADB's developing member countries. Before submitting a complaint to the Accountability Mechanism, it is recommended that affected people make a good faith effort to resolve their problems by working with the concerned ADB operations department (in this case, the resident mission). Only after doing that, and if they are still dissatisfied, they could approach the Accountability Mechanism. The ADB Accountability Mechanism information will be included in the project-relevant information to be distributed to the affected communities, as part of the project GRM.

VIII. ENVIRONMENTAL MANAGEMENT PLAN

A. Environmental Management Plan

127. 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.

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

129. A copy of the SEMP/updated EMP must be kept on work sites at all times. The EMP is included in the bid documents and will be further reviewed and updated during implementation.

The EMP is 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.

130. 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.

131. Table 9 to 11 show 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. Table 12 shows the Environmental Monitoring Plan to be implemented during project implementation and operation.

Table 9: Environmental Management Plan for Anticipated Impacts – Pre- Construction

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Submission of updated environmental management plan (EMP)/site environmental plan (SEP); EMP implementation and reporting	Unsatisfactory compliance to EMP	(i) Appoint Safeguards (Environmental, Health and Safety or EHS) Engineer to ensure EMP implementation; (ii) Submission of updated EMP/site-specific environmental management plan (SEMP); and (iii) Timely submission monthly of monitoring reports including documentary evidence on EMP implementation such as photographs	Contractor	(i) mobilization of EHS engineer; (ii) submission of SEMP prior to start of works; and (iii) submission of monthly reports	Contractor cost
Utilities	Telephone lines, electric poles and wires, water lines within proposed project area	At least one month prior to start of work provide information (including alignment drawings) to all utility agencies (electricity and telephone department, and PMC) about the pipeline alignments and work to be conducted.	PIU and PMDCSC	Review and check the information provided to utility agencies	No cost required. Mitigation measures are part of term of reference (TOR) of PMU, design engineers, and supervising consultants.
Trees on project sites	Tree cutting	(i) Except four (4) coconut trees at Kodi OHT site, and pruning of large tree to the minimum required extent at Halekoti OHT site, no trees shall be removed for the subproject (ii) Trees is the pipeline alignments shall be avoided during construction by locally altering the alignment (iii) Obtain tree cutting and pruning permission from Tree Officer; plant and maintain 10 trees for each tree that is removed	Contractor in collaboration with ULB/PIU	(i) tree cutting/pruning permission; and (ii) Compensatory tree plantation as part of the project.	Contract provisional sums for compensatory tree plantation
Social and	Ground disturbance	(i) Create awareness among the	Contractor and Project	Chance Finds	No cost required.

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Cultural Resources	can uncover and damage archaeological and historical remains	workers and supervisors about the chance finds during excavation work; (ii) Stop work immediately if any finds are suspected to allow further investigation; and (iii) Inform archaeological agencies promptly if a find is suspected, and take any action they require to ensure its removal or protection in situ.	Management, Design and Construction Supervision Consultant (PMD CSC)	Procedure	
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Disruption to traffic flow and sensitive receptors	(i) Prioritize areas within or nearest possible vacant space in the project location; (ii) If it is deemed necessary to locate elsewhere, consider sites that will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems; (iii) Do not consider residential areas; (iv) Take extreme care in selecting sites to avoid direct disposal to water body which will inconvenience the community; and (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; (a) no residential areas shall be located within 50 m downwind side of the site; and (c) site is minimum 250 m away from sensitive locations like settlements, ponds/lakes or	PIU to determine locations prior to beginning of construction works.	(i) List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas. (ii) Written consent of landowner/s (not lessee/s) for reuse of excess spoils to agricultural land	No cost required. Mitigation measures are part of term of reference (TOR) of PMU, design engineers, and supervising consultants.

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		other water bodies.			
Sources of Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution.	(i) Contractor should obtain material from existing mines approved/licensed by Mines and Geology Department/ Revenue Department only; (ii) Verify suitability of all material sources and obtain approval of implementing agency; (iii) No new quarry sites shall be developed for the subproject purpose; and (iv) Submit a monthly statement of construction material procured indicating material type, source and quantity.	Contractor	(i) List of approved quarry sites and sources of materials; all clearance / permit documents to be verified .	No cost required.
Structural and seismic stability of storage reservoirs (OHTs or Ground Level Service Reservoirs) 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.	PIU and PMDCSC	Incorporated in final design and communicated to contractors.	No cost required. Mitigation measures are part of TOR of PMU, design engineers, and supervising consultants.
Consents, permits, clearances, NOCs, etc.	Failure to obtain necessary consents, permits, NOCs, etc. can result to design revisions and/or stoppage of works	(i) Obtain all necessary consents, permits, clearance, NOCs, etc. prior to start of civil works; (ii) Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc.; and	ULB/PIU / Contractor	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

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
					supervising consultants.
Method statement	Use of approved construction practices to minimize construction impacts	<p>Method Statement should be in a Table format with appended site layout map and cover the following:</p> <ul style="list-style-type: none"> (i) Work description; (ii) Number of workers (skilled and unskilled); (iii) Details of plant, equipment and machinery, vehicles; (iv) Work duration (total, and activity-wise, for example for pipe laying, from excavation to road resurfacing/testing); (v) Personal protection equipment (helmet, gloves, boots, etc.) details for each type of work; (vi) Details of materials at each site (type and quantity); (vii) 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.); (viii) Construction waste/debris generated (details and quantity); (ix) Detail the sequence of work process (step-by-step) including specific details of each work; (x) Contractor's supervision and management arrangements for the work; (xi) Emergency: Designate (i) responsible person on site, and 	Contractor to prepare method statement for review and approval by PMDCSC / PIU prior to start of work.	Review of method statement and implementation of work	No cost required.

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		(ii) first aider; (xii) Typical site layout plan including pipe trenching, placement of material, excavated earth, barricading etc.; and (xiii) 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.			

Table 10: Environmental Management Plan for Anticipated Impacts – Construction

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Environmental Management Plan (EMP) Implementation Training	Impacts on the environment, workers, and community due to improper implementation of EMP	(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 (OHS), core labor laws, applicable environmental laws, etc.; and (ii) appointment of Environmental, Health and Safety (EHS) Engineer by contractor prior to start of work.	Construction Contractor/ project implementation unit (PIU)/ Project Management Design and Construction Supervision Consultant (PMDSC)	(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 Program Management Unit (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, sulphur oxides, particulate matter, nitrous oxides, and hydrocarbons.	(i) Consult with PMU/PMDSC on the designated areas for stockpiling of clay, soils, gravel, and other construction materials; (ii) Damp down exposed soil and any stockpiled on site by spraying with water when necessary during dry weather; (iii) Use tarpaulins to cover sand and other loose material when transported by trucks; and (iv) Stockpile sand and other loose material only in barricaded area and protect/cover by tarpaulins to avoid dust generation (v) Clean wheels and undercarriage of vehicles prior to leaving construction site; and (vi) 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	(i) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets; (ii) Laying of pipelines during	Construction Contractor	(i) Areas for stockpiles, storage of fuels and lubricants and waste materials; (ii) Number of silt traps	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
	during installation of pipelines can contaminate nearby surface water quality.	dry season and closing of all trenches before rainy season and avoid any chances of collecting the water in the trenches or pumping; (iii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, dispose in municipal landfill (Sample Spoils Management Plan in Appendix 10); (iv) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; (v) Provide temporary bunds for stockpiles and materials; (vi) Place storage areas for fuels and lubricants away from any drainage leading to water bodies. Storage structure should consider 110% capacity bund; and (vii) Dispose any wastes generated by construction activities in landfill or reuse in beneficial purposes		installed along trenches leading to water bodies; (iii) Records of surface water quality inspection; (iv) Effectiveness of water management measures; (v) No visible degradation to nearby drainages, nallahs or water bodies due to civil works	
	Contamination of coastal water due to works in coastal zone	In addition to the above measures following measures given below for piling works: <ul style="list-style-type: none"> Piling activities for OHT foundation work at Kodi shall be conducted carefully; there shall no spillage of bentonite on the ground; bentonite slurry shall be properly collected in leak proof containers and re-circulated in the piling activity; 	Construction Contractor	(i) Areas for stockpiles, storage of fuels and lubricants and waste materials; (ii) Number of silt traps installed along trenches leading to water bodies; (iii) Records of surface water quality inspection; (iv) Effectiveness of	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
		excess bentonite slurry shall be dried properly in containers, and disposed in landfill safely		water management measures; and (v) No visible degradation to nearby drainages, nallahs or water bodies 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 (road cutting and piling activity) 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 (dB) 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; and (iii) Equivalent day and night time noise levels (Appendix 3)	Cost for implementation of mitigation measures responsibility of contractor.
Landscape and aesthetics	Impacts due to excess excavated earth, excess construction and demolition materials and solid waste such as removed concrete, wood, packaging materials,	(i) Manage surplus soil, debris and solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; (ii) Coordinate with PIU / Kundapura TMC for beneficial uses of road debris and surplus soils in on-going construction	Construction Contractor	(i) Complaints from sensitive receptors; (ii) Worksite clear of hazardous wastes such as oil/fuel; and (iii) Worksite clear of any excess excavated earth, excess construction materials,	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
	empty containers, spoils, oils, lubricants, and other similar items.	works or for temporary storage for future use or disposal in landfill (iii) In unavoidable case of disposal, debris shall be disposed at landfill site or site approved by PIU / Kundapura; waste shall not be disposed in the forest areas and in or near water bodies/ rivers / coast (iv) Prepare and implement spoils management plan; (v) Surplus soil and debris from work site shall be removed / cleared at the end of each day of work; there shall be no stock piling of debris / surplus soil at the site (iv) Recover used oil and lubricants and reuse or remove from the sites; (vi) Remove all wreckage, rubbish, or temporary structures which are no longer required; and (vii) Request PIU/PMDCSC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.		and solid waste such as removed concrete, wood, packaging materials, empty containers	
Utilities - existing Infrastructure and Facilities	Disruption of service and damage to existing infrastructure at specified project location	(i) At least two-weeks prior to start of work at any section, Identify utilities that will be required to be temporarily disturbed / shifted for the construction work; (ii) Liaise with the respective utility department, provide prior information to the affected public and restore the utilities as soon as the work is complete (iii) Provide contingency services where required (temporary diversion of drains, provision of	Construction Contractor and PIU	Section-wise list of utilities to be shifted / disturbed to be submitted to PIU two-weeks prior to start of work at that section along with a plan to shift and contingency steps to be taken	Part of project cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		water supply by tankers, etc.,) (iv) Coordinate with the respective department and ensure that electricity and telephone services are restored quickly (v) Reconstruct the damaged footpath and drains immediately after the completion of pipeline work in that particular section		Record to confirm that contingency services are provided and all damaged utilities are restored after the work	
Ecological Resources – Terrestrial	Loss of vegetation and tree cover	(i) Except four (4) coconut trees at Kodi OHT site, and pruning of large tree to the minimum required extent at Halekoti OHT site, no trees shall be removed for the subproject (ii) Trees is the pipeline alignments shall be avoided during construction by locally altering the alignment (iii) Obtain tree cutting and pruning permission from Tree Officer; plant and maintain 10 trees for each tree that is removed	Construction Contractor	PMU/PMDSC to report in writing the number of trees cut and planted.	Cost for implementation of mitigation measures responsibility of contractor.
Accessibility	Traffic problems and conflicts near project locations and haul road	(i) Plan pipeline work in consultation with the traffic police; prepare a Traffic Management Plan – a template is provided for reference at Appendix 11.; (ii) Strictly follow the pipe laying method presented in Table 7 so that trench excavation, pipe laying, and refilling including compacting, at a stretch is completed in a minimum possible time; (iii) Provide for immediate consolidation of backfilling material to desired compaction – this will allow immediate road restoration and therefore will minimize	Construction Contractor	(i) Traffic route during construction works including number of permanent signages, barricades and flagmen on worksite (Appendix 11); (ii) Complaints from sensitive receptors; and (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
		<p>disturbance to the traffic movement;</p> <p>(iv) Schedule transport and hauling activities during non-peak hours;</p> <p>(v) No road shall be completely closed for traffic; in unavoidable circumstances of road closure (eg, NH service road closure at Shastri Circle for trenchless work), provide alternative route, and ensure that public is informed about such traffic diversions;</p> <p>(vi) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;</p> <p>(vii) Maintain safe pedestrian access at all times to the houses along the work site;</p> <p>(viii) Hard barricades should be mandatorily provided for work sites in residential and commercial areas, along with caution board.</p> <p>(ix) 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;</p> <p>(x) Keep the site free from all unnecessary obstructions;</p> <p>(xi) Drive vehicles in a</p>			

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		considerate manner In narrow roads listed above, Inform the affected local population on week in advance, and again a day before the work			
Socio-Economic – Income.	Impede the access of residents and customers to nearby shops	(i) Strictly follow the pipe laying method presented in Table 7 so that trench excavation, pipe laying, and refilling including compacting, at a stretch is completed in a minimum possible time; (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; and (iii) Number of walkways, signages, and metal sheets placed at project location.	Cost for implementation of mitigation measures responsibility of contractor.
Socio cultural resources	Disturbance to socio cultural resources (religious, educational, health care etc.), access disruptions etc.,	(i) No material should be stocked close to these areas; material shall be brought to the site as and when required; (ii) Conduct work manually with small group of workers and less noise; minimize use of equipment and vehicles; (iii) Strictly follow the pipe laying method presented in Table 7 so that trench excavation, pipe laying,	Construction Contractor	(i) Visual site observations (i) Public complaints	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		and refilling including compacting, at a stretch is completed in a minimum possible time; (iv) No work should be conducted near the religious places during religious congregations; (v) Material transport to the site should be arranged considering school timings; material should be in place before school starts; (vi) 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; and (vii) Implement all measures suggested elsewhere in this report – dust and noise control, public safety, traffic management, strictly at the sites.			
Socio-Economic - Employment	Generation of contractual employment and increase in local revenue	(i) Employ local labor force to the maximum extent, if manpower is available; and (iii) Comply with labor laws	Construction Contractor	(i) Employment records; (ii) Records of sources of materials; and (iii) Compliance to core labor laws (See Appendix 2 of this IEE)	Cost for implementation of mitigation measures responsibility of contractor.
Occupational Health and Safety	Occupational hazards which can arise during work	(i) Comply with all national, state and local core labor laws (See Appendix 2 of this IEE); (ii) Develop and implement site-specific health and safety (H&S) plan which will include measures such as: (a) excluding	Construction Contractor	(i) Site-specific OHS Plan; (ii) Equipped first-aid stations; (iii) Medical insurance coverage for workers; (iv) Number of	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
		<p>public from the site; (b) ensuring all workers are provided with and use Personal Protective Equipment; (c) H&S Training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;</p> <p>(iii) All trenches in sandy and mixed sandy soils irrespective of depth shall be protected with safety shoring / strutting to avoid safety risks to workers, public and nearby buildings/structures</p> <p>(iv) Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;</p> <p>(v) Provide medical insurance coverage for workers;</p> <p>(vi) Secure all installations from unauthorized intrusion and accident risks;</p> <p>(vii) Provide supplies of potable drinking water;</p> <p>(viii) Provide clean eating areas where workers are not exposed to hazardous or noxious substances</p> <p>(ix) 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;</p> <p>(x) Provide visitor orientation if visitors to the site can gain</p>		<p>accidents;</p> <p>(v) Supplies of potable drinking water;</p> <p>(vi) Clean eating areas where workers are not exposed to hazardous or noxious substances;</p> <p>(vii) record of H&S orientation trainings</p> <p>(viii) personal protective equipment;</p> <p>(ix) % of moving equipment outfitted with audible back-up alarms;</p> <p>(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.</p> <p>(xi) Compliance to core labor laws (Appendix 2)</p>	

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		<p>access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted;</p> <p>(xi) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;</p> <p>(xii) Ensure moving equipment is outfitted with audible back-up alarms;</p> <p>(xiii) 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;</p> <p>(xiv) Disallow worker exposure to noise level greater than 85 dB for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively; and</p> <p>(xv) Overall, the contractor should comply with International Finance Corporation (IFC) Environmental, Health and Safety (EHS) Guidelines on occupational health and safety. (this can be downloaded from http://www1.ifc.org/wps/wcm/connect/9aef2880488559a983acd36a6515bb18/2%2Boccupational%2Bh</p>			

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		health%2Band%2Bsafety.pdf?MOD=AJPERES).			
Community Health and Safety.	Traffic accidents and vehicle collision with pedestrians during material and waste transportation	<p>(i) Provide protective shorting / strutting hard barricading for all deep excavations in sandy and mixed sandy that may require especially for pipe lines soils (>1m);</p> <p>(ii) One week prior to start of work at any section, a joint inspection shall be conducted along with PIU and Kundapura TMC to identify risk areas and buildings at risk (due to excavation, vibration and noise) and take necessary precautions for safe conduct of work</p> <p>(i) identify buildings at risk prior to start of excavation work and take necessary precautions for safe conduct of work;</p> <p>(ii)(iii) Plan material and waste routes to avoid times of peak-pedestrian activities;</p> <p>(iii) Liaise with Kundapura TMC in identifying risk areas on route cards/maps;</p> <p>(iv) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure;</p> <p>(v) Provide road signs and flag persons to warn of dangerous conditions, for all work sites along the roads; and</p> <p>(vi) Overall, the contractor should comply with IFC EHS Guidelines Community Health and Safety (this</p>	Construction Contractor	<p>(i) Traffic Management Plan; and</p> <p>(ii) Complaints from sensitive receptors</p>	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
		can be downloaded from http://www1.ifc.org/wps/wcm/connect/dd673400488559ae83c4d36a6515bb18/3%2Bcommunity%2Bhealth%2Band%2Bsafety.pdf?MOD=AJPERES).			
Work Camps and worksites	<p>Temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants</p> <p>Unsanitary and poor living conditions for workers</p>	<p>(i) The contractor should operate the temporary worker camps in compliance with IFC EHS Guidelines specific to workers accommodation (this can be downloaded from http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_gpn_workers_accommodation), including the following:</p> <p>(ii) Consult with PIU before locating workers camps/sheds, and construction plants; as far as possible located within reasonable distance of work site;</p> <p>(ii)• Minimize removal of vegetation and disallow cutting of trees;</p> <p>(iii) Labor camps shall include accommodation for workers/laborers along with other basic amenities such as kitchen, potable water supply, sanitation (toilets, bathrooms, washing areas and water supply for such needs), first aid room as well as garbage collection and disposal facility.</p> <p>(iv)• The roof height of the worker's and labor camp shall not be less than 3 m from floor level to the lowest part of the roof.</p> <p>(v) The camps shall be floored</p>	Construction Contractor	<p>(i) Complaints from sensitive receptors;</p> <p>(ii) Drinking water and sanitation facilities for employees</p>	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
		<p>with concrete, shall be kept clean, and with proper cross ventilation, and the space provided shall be on the basis of one sq.mt per head or as per the relevant regulation, whichever is higher.</p> <p>(vi) Fire and electrical safety precautions shall be adhered to.</p> <p>(vii) Cooking, sanitation and washing areas shall be provided separately.</p> <p>(viii) The Contractor shall maintain necessary living accommodation and ancillary facilities (including provision of clean fuel to prevent damage to forests and to prevent fuel wood cutting and burning by labor) in functional and hygienic manner.</p> <p>(ix) The site must be graded and rendered free from depressions such that water does not get stagnant anywhere.</p> <p>(x) The entire boundary of the site should be fenced all around with barbed wire so as to prevent the trespassing of humans and animals.</p> <p>(xi) 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;</p> <p>(xii) Provide separate facilities for men and women; sanitary facilities shall be properly build and well</p>			

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		<p>maintained; toilet and bath facilities should be provided on basis of 1 per 15 or less persons;</p> <p>(xiii) Train employees in the storage and handling of materials which can potentially cause soil contamination;</p> <p>(xiv) Recover used oil and lubricants and reuse or remove from the site;</p> <p>(xv) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;</p> <p>(xvi) Remove all wreckage, rubbish, or temporary structures which are no longer required; and</p> <p>(xvii) Report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.</p>			
Social and Cultural Resources	Risk of archaeological chance finds	<p>(i) Create awareness among the workers and supervisors about the chance finds during excavation work;</p> <p>(ii) Stop work immediately if any finds are suspected to allow further investigation;</p> <p>(iii) Inform archaeological agencies promptly if a find is suspected, and take any action they require to ensure its removal or protection in site; and</p> <p>(iv) Adjacent to important religious sites, undertake excavation and construction work in such a way that no structural damage is caused to the building.</p>	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
Submission of EMP implementation report	Unsatisfactory compliance to EMP	(i) Appointment of Environment, Health and Safety (EHS) Engineer to ensure EMP implementation; and (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 top soiled and regrassed using the guidelines set out in the revegetation specification that forms part of this document; (vii) The contractor must arrange the cancellation of all temporary services; and (viii) Request PMU/PMDSC to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.	Construction Contractor	PMU/PMDSC 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 operation and maintenance (O&M) are removed; and (iv) worksite clean-up is satisfactory.	Cost for implementation of mitigation measures responsibility of contractor.

Table 11: Environmental Management Plan for Anticipated Impacts – Operation

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Operation and maintenance (O&M) of 24 x 7 Water supply system and water treatment plant (WTP)	Poor quality of supply water due to improper maintenance	Urban local body (ULB) shall ensure that all water supply pipelines are maintained well, and water is treated to the required Drinking Water Standards	Town Municipal Council (TMC), Kundapura	TMC, Kundapura	TMC cost
Water Quality Monitoring	Non-availability of standard water for drinking	Treated water shall be tested for drinking water quality standards – parameters on regular basis and residual chlorine, E-coli to be tested at consumer end point.	TMC, Kundapura	TMC, Kundapura	TMC cost
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	TMC, Kundapura	TMC, Kundapura	TMC 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 health and safety plan to protect workers and public. Contractor may request police to divert traffic if necessary.	O&M Contractor/ Kundapura TMC	Kundapura TMC	TMC cost
Asset management	Reduction in NRW Increased	Preparation of O&M Manual	TMC, Kundapura	TMC, Kundapura	TMC cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
	efficiency of the system				
Emergency Response Plan	Non-availability of Emergency Response Plan affect water supply system	<p>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 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</p> <p>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.</p>	TMC, Kundapura	TMC, Kundapura	TMC cost
Health and Safety during O&M period	Impact on human health and safety issues	<p>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 suitable for contact with</p>	TMC, Kundapura	TMC, Kundapura	TMC cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		<p>potable water supplies.</p> <p>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.</p> <p>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).</p> <p>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.</p> <p>Employers should provide adequate toilet and washing facilities to maintain personal hygiene.</p> <p>Wastes from portable or temporary arrangements should be disposed of without risk to water supplies or the environment.</p> <p>Cleaning and Disinfection Procedures:</p> <p>Before putting into service new, repaired, rehabilitated or modified water main carrying potable water, the main must first be cleaned, disinfected, flushed and sampled to ensure that it is free from contamination.</p> <p>Contractors and his employees 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 should be encouraged to report such symptoms without prejudice to their employment prospects.</p>			

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		<p>Employees should be provided with 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.</p> <p>Handling Chlorine gas cylinders during O&M period:</p> <p>Technical precautions:</p> <p>Ventilate chlorine rooms adequately.</p> <p>Use only suitable and tested chlorine gas equipment.</p> <p>Use only approved gas warning equipment and water spraying equipment (external operation).</p> <p>Ensure that there are short escape routes into the open. (Escape doors must open outwards.)</p> <p>Renew the connection seal every time the chlorine cylinders are exchanged.</p> <p>Handling Chlorine cylinders:</p> <p>Proper training shall be given to the staff handling Chlorine gas cylinders and be repeated at least once a year. Only trained and designated staff shall handle gas cylinders containing chlorine.</p> <p>Chlorine cylinders shall be stored with the valve cap attached securely together, with a suitable seal and the protecting cap on. Filled and empty gas cylinders should be stored separately.</p> <p>To prevent heating of the chlorine cylinders, they should be kept out of direct sunlight.</p> <p>Valves on chlorine gas cylinders should be operated by hand without use of force. Valves of filled or empty chlorine cylinders should always be closed securely with the correct cap.</p> <p>It is advised to store chlorine gas cylinders in an adequately ventilated room and ensure short escape routes into the open air.</p> <p>Operating instructions Material safety Data Sheet (MSDS) shall be displayed in accordance with the regulations on hazardous substances.</p> <p>When exchanging chlorine cylinders and</p>			

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		<p>performing vacuum and pressure tests, suitable breathing mask with filter like full face mask shall be used along with suitable protective gloves and shoes.</p> <p>Procedure in the case of Emergency: Proceed according to Emergency plan and inform the concerned authority immediately. If leakage of chlorine gas cannot be controlled using the water spray equipment, call the fire brigade immediately to attend. If the chlorine concentration is above the maximum workplace concentration level (0.5 ppm), use suitable compressed air breathing apparatus and a protective chemical suit.</p> <p>First Aid: Persons who have inhaled chlorine gas shall be moved to a site with fresh air and they require immediate medical attention. If the injured persons are breathless, artificial respiration is necessary. Otherwise, they should be made to inhale nebulized dexamethasone. If chlorine comes into contact with eyes or skin, it should be rinsed off immediately with plenty of water and consult doctor. Contaminated clothing should be removed immediately.</p>			
Grievance redressal during O&M	Non-attending of grievances affect water supply system	<p>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 in a timely manner by the contractor.</p> <p>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.</p> <p>Concerned engineer from ULB shall do frequent vigilant checks at the areas from where maximum complaints have been received.</p>	TMC, Kundapura	TMC, Kundapura	-

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Increase of sewage	Increased quantity of sewage leads to open area/drain and creates health problems	Develop a comprehensive sewerage system	TMC, Kundapura	Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC)/ Government of Karnataka	TMC cost

Table 12 : Environmental Monitoring Plan

Sample	Site/s	Responsibility	Parameter to Monitor	Frequency	Who	Cost (₹)
Construction Phase						
Ambient air quality and noise	4 points (Shastri Circle, Parijatha Circle, WTP site, OHT site at Kodi)	Contractor	SPM, RSPM, SO _x , NO _x Day and night time noise (dB) Monitoring method as prescribed by CPCB	Once before start of construction Quarterly (yearly 4-times) during construction period of 24 months – 9 times	Contractor	₹5000 per sample – sum ₹180,000 for 36 samples
Noise Level	4 points (Shastri Circle, Parijatha Circle, WTP site, OHT site at Kodi)	Contractor	Noise level	Once before start of construction Quarterly (yearly 4-times) during construction period of 24 months – 9 times	Contractor	₹2500 per sample ₹90,000 for 36 samples
Operation Stage						
Source (raw) water quality	Intake in River	Contractor/ O&M Operator	Water quality parameters (all including pesticides, heavy metals)	Once prior to start of operation and monthly during operation	Contractor	12 measurements per year x 12000 = ₹144,000
Treated water quality	At the WTP outlet	Contractor/ O&M Operator	All Drinking water parameters	Monthly once during operation	Contractor	Operating costs (water quality will be tested at the internal laboratory to be established in the project at WTP)
Health and safety during O&M period	All water treatment plants	Contractor / O&M operator	Incidents and near misses during construction and operation against performance targets of zero incident.	Monthly	Contractor	

CPCB = Central Pollution Control Board, dB = decibel, NO_x = nitrogen oxide, O&M = operation and maintenance, RSPM = respirable suspended particulate matter, SO_x = sulphur oxide, SPM = suspended particulate matter., WTP = water treatment plant.

B. Institutional Arrangements

132. **Executing Agency.** KUIDFC is the executing agency responsible for overall technical supervision and execution of all subprojects funded under the Investment Program. Implementation activities is overseen by Program Management Unit (PMU) established in its head office at Bangalore exclusively for KIUWMIP. PMU is supported by Regional PMU (RPMU) established in Mangalore headed by Deputy Project Director, to support and monitor implementation in PIUs of Tranche 2 program towns. PMU and RPMU are staffed with technical, administrative and financial officials, including safeguards specialists, to manage and monitor program implementation.

133. **Implementing Agency.** The implementing agencies are the respective ULBs, in this case Town Municipal Council (TMC) of Kundapura. Program Implementation Units (PIUs) are set up in each program ULB for implementation of day-to-day activities in the field.

134. Other than the above institutional setup, District Level Implementation Committee (DLIC) will be set up in each district to monitor implementation of subprojects and institutional reforms. The DLIC shall consist of Deputy Commissioner of District, Deputy Project Director (DPD) RPMU, Municipal Commissioners' /Chief Officers of ULB and PMDCSC.

135. **Safeguards Implementation.** A Safeguards Compliance and Monitoring Unit (SCMU), established in the PMU directly under the KIUWMIP Task Manager (Project Director), will continue to have the overall responsibility of ensuring compliance with ADB SPS. SCMU is staffed with a Safeguards Compliance and Monitoring Officer (SCMO) with overall responsibility for environmental and social safeguards, and two safeguards specialists—Assistant Executive Engineer (AEE—Environment), and Social Development Officer (SDO), responsible respectively for environment and social safeguards. The SCMU will ensure that all subprojects comply with environmental safeguards. In each regional office in Mangalore and Davangere, a Safeguards Officer will assist in and coordinate safeguard tasks. For enhancing the monitoring role of environmental safeguards, KUIDFC will consider assigning the environmental officers at the regional officers in implementation stage. In each PIU, an Assistant Engineer (safeguards) will coordinate the safeguard tasks at PIU/town level. For Tranche 2, PIUs are established at Kundapura, Mangalore, Puttur and Udupi. A Project Management, Design and Construction Supervision Consultant (PMDSC) will assist PMU and PIUs in the implementation of the entire investment program including compliance with the EARF and resettlement framework. PMDCSC is stationed in Mangalore with the field teams in each of the PIUs. PMDCSC team includes an Environmental Specialist and a Social Development Specialist to prepare, implement and monitor all safeguard activities and ensure safeguards compliance. At the civil works stage, Contractor staff will include Safeguards / Environment, Health and Safety (EHS) engineer to supervise and report on EMP implementation.

136. The responsibility fulfilling environmental requirements of Government of India and Government of Karnataka and conducting required level of environmental assessment as per ADB guidelines lies with the PIUs/implementing agency, i.e. Kundapura TMC. Consultant Team will assist the CMC in this regard.

137. The mitigation measures identified through IEEs and EMP will be incorporated into the Investment Program implementation cycle. Mitigation measures, which are to be implemented by the Contractor, shall form part of the Contract Documents. The other mitigation measures will be implemented by the implementing agency/PIU/PMU as specified in the IEE. During the construction phase, PIU with the support of consultant team will monitor the implementation of

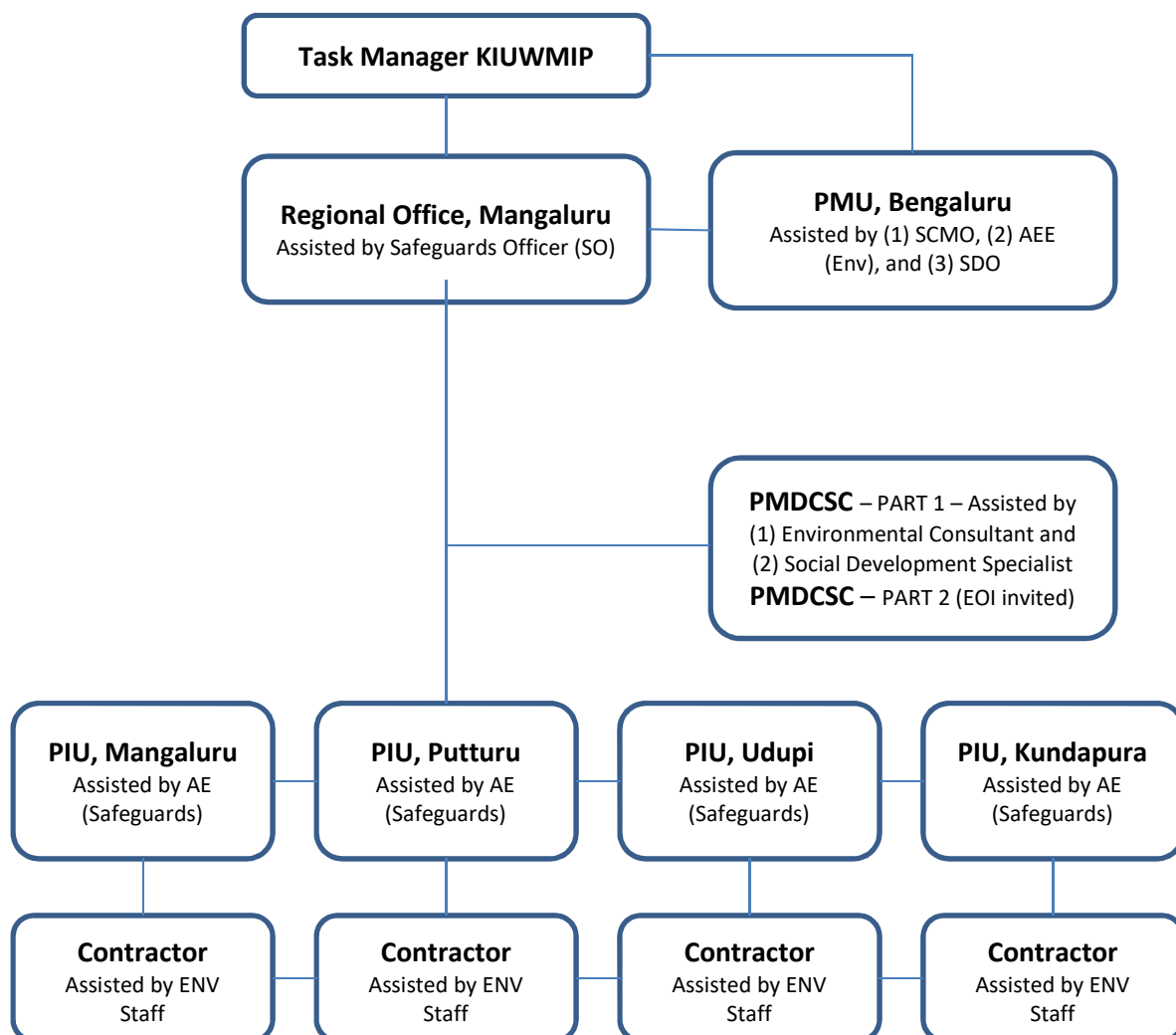
the EMP and report to the PMU. Implementation of EMP and other environmental related measures and the results of environmental monitoring conducted during implementation will be reported to ADB through semi-annual Environmental Monitoring Reports. These will also be made available on executing agency (KUIDFC) website for wider public access.

138. **Consultant Support.** A consultant team (Project Management, Design and Construction Supervision Consultant, PMDCSC), based in Mangalore and with field teams in tranche 2 programs towns will assist PIUs, RPMU and PMU in day-to-day implementation of the investment program. PMDCSC will be involved in all activities including in project planning, preparation, design of subproject and cost estimates, co-ordination, procurement, technical guidance, construction supervision, contract management, safeguards implementation and monitoring, capacity development and training etc., PMDCSC includes an Environmental Specialist consultant to implement the subprojects in compliance with EARF, and will be responsible for all safeguards tasks – preparation, implementation, monitoring and reporting. In each program town, a field team of PMDCSC will be mobilized and will include an Environmental Engineer for day-to-day implementation and monitoring of EMP implementation, and also to assist Environmental Specialist of PMDCSC.

139. **Contractor.** The contractor shall appoint one Safeguards (Environmental, Health and Safety) Engineer who will be responsible on a day-to-day basis for i) ensuring implementation of EMP ii) Coordinating the PMDCSC and environment specialists (all levels) iii) community liaison, consultation with interested/affected parties and grievance redressal and iv) reporting.

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

141. Figure 30 and Table 13 give a summary of the institutional responsibility of environmental safeguards at all stages of the project.

Figure 30: Environmental Safeguard Implementation Arrangements

AE = Assistant Engineer, AEE = Assistant Executive Engineer, ENV = Environment, EOI = expression of interest, KIUWMIP = Karnataka Integrated Urban Water Management Investment Program, PIU = Program Implementation Unit, PMDCSC = Project Management Design and Construction Supervision Consultant, SCMO = safeguard and community mobilization officer, SDO = Social Development Officer.

Table 13: Institutional Roles and Responsibilities

Responsible Agency	Responsibility		
	Pre-Construction Stage	Construction Stage	Post-Construction
Task Manager	(i) Review rapid environmental assessment (REA) checklists and assign categorization based on ADB Safeguard Policy Statement (SPS); (ii) Review and approve Initial Environmental Examination (IEE); (iii) Submit IEE to ADB for approval and disclosure in ADB website; (iv) Ensure approved IEEs are disclosed in Karnataka Urban Infrastructure Development and Finance Corporation (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;	(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; and (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)	(vi) Organize an orientation workshop for program management unit (PMU), urban local bodies (ULBs)/Town Municipal Councils (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) Occupational health and safety (OHS), (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	(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; and	Compliance monitoring (Appendix 14) 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
	<p>taking immediate actions to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation;</p> <p>(ix) Ensure compliance with all government rules and regulations regarding site and environmental clearances as well as any other environmental requirements;</p> <p>(x) Assist PMU, project implementation units (PIUs), and project nongovernmental organizations (NGOs) to document and develop good practice construction guidelines to assist the contractors in implementing the provisions of IEE; and</p> <p>(xi) Assist in the review of the contractors' implementation plans to ensure compliance with the IEE.</p>	<p>(ix) Coordinate with the General Manager, environmental Experts, ULBs/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.</p>	
Safeguards Officer	<p>(i) Coordinate public consultation and information disclosure;</p> <p>(ii) Liaise with local offices of regulatory agencies in obtaining clearances/approvals;</p> <p>(iii) Assist PMU for clearances obtained at state level;</p> <p>(iv) Review and approve contractors' updated EMPs;</p> <p>(v) Take necessary action for obtaining rights of way;</p> <p>(vi) Inform affected persons on: (a) project cutoff date; (b) public notice for schedule of land acquisition / occupation; (c) entitlement matrix; (d) compensation packages against different categories of loss and tentative schedule of land clearing / acquisition for starts of civil works activities; and</p> <p>(vii) Coordinate valuation of assets such</p>	<p>(i) Oversee day-to-day implementation of EMP by contractors, including compliance with all government rules and regulations;</p> <p>(ii) Ensure continuous public consultation and awareness;</p> <p>(iii) Coordinate grievance redress process and ensure timely actions by all parties; and</p> <p>(iv) Review monthly contractors' EMP monitoring reports.</p>	<p>(i) Review and forward quarterly monitoring reports to PMU;</p> <p>(ii) Inform PMU of unanticipated impacts and formulate corrective action plan;</p> <p>(iii) Recommend issuance of work - construction work completion certification of the contractor upon verification of satisfactory post-construction clean-up;</p> <p>(iv) Take corrective actions when necessary to ensure no adverse impacts; and</p> <p>(v) Submit monthly social and environmental monitoring reports to PMU.</p>

Responsible Agency	Responsibility		
	Pre-Construction Stage	Construction Stage	Post-Construction
	as land, trees of various species, etc.		
Kundapura TMC	(i) Conduct initial environmental assessment for proposed project using REA checklists and submit to PMU; (ii) Prepare 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 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.; and (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; and (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; and (ii) Issuance of clearance for contractor's post-construction activities as specified in the EMP.
Consultant Environment Specialist at Kundapura TMC level Project Management, Design and Construction Supervision Consultant (PMDSCS)	(i) Assist ULBs/TMCs in preparation of REA checklists and IEEs; (ii) Assist ULBs/TMCs in obtaining all necessary clearances, permits, consents, NOCs, etc. Ensure provisions and conditions are incorporated in the IEE and detailed design documents; (iii) Assist in ensuring IEE is included in bid documents and contract agreements. Assist in determining adequacy of cost for EMP implementation; (iv) Assist in addressing any concern related to IEE and EMP; and (v) Assist in summarizing IEE and translating to language understood by local people.	(i) Monitor EMP implementation; (ii) Recommend corrective action measures for non-compliance by contractors; (iii) Assist in the review of monitoring reports submitted by contractors; (iv) Assist in the preparation of monthly reports; and (vi) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs.	(i) Assist in the inspection and verification of contractor's post-construction activities.
Contractors	(i) Ensure EMP implementation cost is included in the methodology;	(i) Implement EMP; (ii) Implement corrective actions if	(i) Ensure EMP post-construction requirements are satisfactorily

Responsible Agency	Responsibility		
	Pre-Construction Stage	Construction Stage	Post-Construction
	(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; and (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.	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 PMDCSC are timely informed of any foreseeable activities related to EMP implementation; and (vi) Address any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs	complied; and (ii) Request certification from ULBs/TMCs.

C. Training Needs

142. The following Table 14 presents the outline of capacity building program to ensure EMP implementation. The estimated cost is ₹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 Environmental Management Plan Implementation

Description	Target Participants	Estimate (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, occupational health and safety (OHS), etc. - Incorporation of Environmental Management Plan (EMP) into the project design and contracts - Monitoring, reporting and corrective action planning	All staff and consultants involved in the project	10,000	Project Management Unit (PMU) cost
2. EMP implementation (3 days) - Roles and responsibilities - OHS 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) - Site-specific EMP - Traffic management plan - Spoils management plan - Waste management plan - Chance find protocol - Operation and maintenance (O&M) plans - Post-construction plan	All staff and consultants involved in the project All contractors prior to award of contract or during mobilization stage.	25,000 25,000	PMU cost Contractors cost as compliance to contract provisions on EMP implementation (refer to EMP tables)
4. Experiences and best practices sharing - Experiences on EMP implementation	All staff and consultants involved in the project All contractors All nongovernmental	25,000	PMU Cost

Description	Target Participants	Estimate (Lump Sum) (₹)	Cost and Source of Funds
- Issues and challenges - Best practices followed	organizations (NGOs)		
5. Contractors Orientation to Workers on EMP implementation (OHS, core labor laws, spoils management, etc.)	All workers (including manual laborers) of the contractor prior to dispatch to worksite	10,000	Contractors cost as compliance to contract provisions on EMP implementation (refer to EMP tables)
Total cost for Capacity Building Program on EMP Implementation		120,000	

PMU Fund	₹85,000
Contractor Cost	₹35,000
Total cost for Capacity Building Program	₹120,000

D. Monitoring and Reporting

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

144. During construction, results from internal monitoring by the contractor will be reflected in their weekly EMP implementation reports (Appendix 14, Sample Environmental Site Inspection Report) to the Resident Engineer. These weekly reports will be retained in PMDCSC for reference. Resident Engineer will review and advise contractor for corrective actions if necessary. Monthly report summarizing compliance and corrective measures taken will be prepared by Resident Engineer to be reviewed and endorsed by PIU and consolidated monthly report will be submitted to PMU.

145. Based on monthly reports and measurements, PMU will draft, review, and submit to ADB, 6-monthly (semi-annual) EMR (Appendix 14). Once concurrence from the ADB is received the report will be disclosed in the KUIDFC /ULB website.

146. 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.

147. ADB's monitoring and supervision activities are carried out on an on-going basis until a Project Completion Report (PCR) is issued. ADB issues a PCR within 1-2 years after the project is physically completed and in operation.

E. Environmental Management Plan Implementation Cost

148. Most of the mitigation measures require the contractors to adopt good site practice, which should be part of their normal procedures already, so there are unlikely to be major costs associated with compliance. 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 Kundapura PIU/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 accidents.

Table 15: Cost Estimates to Implement the Environmental Management Plan

No.	Particulars	Stages	Unit	Number	Rate	Cost (₹)	Costs Covered By
A	Implementation Staff						
1	Environment, Health and Safety (EHS) Engineer	Construction	Per month	24	30,000	720,000	Civil works contract
B.	Monitoring Measures						
1	Air quality monitoring	Construction	Per location	4x9=36	5,000	180,000	Civil works contract
2	Noise levels monitoring	Construction	Per location	4x9=36	2,500	90,000	Civil works contract
	Sub Total					270,000	
C	Capacity Building						
1	Introduction and sensitization to environment issues	Pre-construction	lump sum			10,000	Program Management Unit (PMU)
2	Environmental Management Plan (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
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)					120,000	
D	Civil Works						
1	Construction of shelters for workers.	Construction	Lump sum			400,000	Civil works contract
2	Providing Water Supply Facility for the workers	Construction	Lump sum			100,000	Civil works contract
3	Providing Sanitation Facility for the workers	Construction	Lump sum			100,000	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 1.5m and 3.5m, horizontal support by MS flat (65 x 65 x 6 mm) along the sides and at	Construction	Per unit	70	15,000	1,050,000	Civil works contract

No.	Particulars	Stages	Unit	Number	Rate	Cost (₹)	Costs Covered By
	the center, supported by 50mm MS hollow pipes of 4m height at the ends and at the center.						
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	12	3000	36,000	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 iron.	Construction	Per unit	6	2500	15000	Civil works contract
	Sub Total (D)					1,701,000	
	Total (A+B+C+D)					2,811,000	

The air and noise quality monitoring will be done near to sensitive receptors like hospitals, educational institutions and major junctions.

PMU Fund	-	₹85,000
Contractor Cost	-	₹2,726,000
Total	-	₹2,811,000

IX. CONCLUSION AND RECOMMENDATIONS

149. The process described in this document has assessed the environmental impacts of all elements of the Kundapura 24x7 water supply system subproject. All potential impacts were identified in relation to pre-construction, construction, and operation phases. Planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible.

150. The subproject components are located in Kundapura urban area. Rehabilitation works proposed in Jackwell and WTP are located outside the town. No private land required for this subproject. There are no environmentally-sensitive areas such as protected areas, wetlands, mangroves, or estuaries in the subproject locations.

151. Water source is existing, and therefore no proposal to augment supply from existing source or create a new source. The total water demand will be within the design capacity of the existing intake. Therefore, no impacts related to source are anticipated. Varahi river water source to Kundapura is a reliable and sufficient source concerning the quantity of water during all seasons. Kundapura is the last notable water withdrawal point on River Varahi before it joins the Arabian Sea, after flowing for about 12 km to 13 km from the intake point. On the upstream side, Udupi intake (i.e. proposed new intake) is at about 10 km. An irrigation weir and VHPP is located on the upstream side of Udupi intake proposed intake. VHPP discharges 1,100 cubic feet per second (cusec) of water into river course throughout year, of which 800 cusec is for irrigation use and remaining 300 cusec is available for drinking and river flow purposes. The combined withdrawal of Kundapura and Udupi will be 23.9 cusec of the total available 300 cusec, which is just about 8% of the total available flow, leaving a remaining available 92% flow or 74 cusec for downstream use. There are no significant impacts related to source sustainability or downstream impacts.

152. New subproject component sites (for OHTs) are selected on government owned lands, and the pipelines are proposed along the existing public roads. Subproject therefore involves no private land acquisition. Kundapura is a coastal town, located along the the western coast of India. Town is surrounded by the Arabian Sea in the west. Municipal areas located close to the sea coast fall under the CRZ-II, and any works in this zone requires prior permission (no objection certificate) for construction; this is already obtained. Given the small scale of works, no impacts on coastal waters envisaged; appropriate measures to contain silt runoff from work areas included in the EMP. Kodi OHT site is selected in land covered with coconut plantation, and four trees will be required to cut for the OHT construction. The OHT site at Halekote is vacant, but there is a big old tree (Rain tree, *Albizia saman* or *Samanea saman*) next to the selected site, and it required to be pruned of branches to accommodate OHT with 15 m staging height. Measures suggested include permission from the tree officer for tree cutting, and guidance in tree pruning so that tree will not be damaged and compensatory afforestation. Works related to WTP and Jack Well are minor and will be conducted within the existing facilities. The new components included in the WTP for recirculation of backwash/waste water and sludge management system will be constructed within the vacant land available in the WTP facility. There are no trees. With the recirculation there will be zero wastewater generation from WTP, and sludge accumulated and dried will be disposed in the existing sanitary landfill of Kundapura TMC.

153. 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, appropriate construction process is suggested for working section-wise and trenchless method at a major traffic junction etc., and based on 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.

154. Environmental monitoring protocols will ensure that mitigation measures are complied with during construction and operation and that environmental integrity is protected. Observations on- and off-site, document checks, and interviews with workers and beneficiaries, and any requirements for remedial action will be reported to PMU. Surveys will also be utilized to monitor the expected improvements in the quality of domestic water and the health of the population. There will also be regular and periodic monitoring surveys for quality of water (at intake, reservoirs and at consumer end).

155. 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.

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

157. The citizens of the Kundapura 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.

158. The Kundapura Town 24x7 Water Supply System subproject is unlikely to cause significant adverse impacts. The potential impacts that are associated with design, construction, and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures.

159. 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.

160. Environmental Clearance requirement per Government of India Environmental Impact Assessment Notification is not applicable to this subproject. No objection certificates required from Karnataka Coastal Zone Management Authority for works located in CRZ II have already obtained. This IEE is prepared based on detailed engineering design and needs to be updated in future, if there are any changes in project components, design, locations or construction processes during the implementation.

RAPID ENVIRONMENTAL ASSESSMENT CHECKLIST

Kundapura 24 x 7 Water Supply Subproject

SCREENING QUESTIONS	Yes	No	REMARKS
Project Siting Is the project area			
Densely populated?	X		Subproject activities extend to the entire Town including the densely populated areas at Kundapura are Halekote, Maddugudde, Chikkensal, Vaderhobli, Karvikere There are no major negative impacts envisaged, because water supply 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 working in small sections, 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		Kundapura 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 for Kundapura Town Water Supply Scheme requires two lands, and both lands are government land
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.

SCREENING QUESTIONS	Yes	No	REMARKS
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 needs to be developed in the town
Inadequate disposal of sludge from water treatment plants?		x	In existing WTP, there is no scope for expansion for sludge drying bed. Only minor rehabilitation works are proposed in the existing WTP - Post Chlorination proposed. Hence there is no chemical contents in the backwash water. Further in the existing system earthen pond will be used to settle the solid materials and supernatant will lead to river by gravity through natural drain. ULB shall ensure that the sludge is removed from water treatment plants regularly.
Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?		x	
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	In the existing WTP the Chlorination system is not working properly. Hence the new (one working +one standby chlorinators are proposed), safety care provisioned
Dislocation or involuntary resettlement of people	X		There may be temporary disturbance to business and squatters/vendors during construction. A resettlement plan shall mitigate/compensate these impacts.
disproportionate impacts on the poor, women and children, Indigenous Peoples or other Vulnerable groups?		x	Not applicable
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.

SCREENING QUESTIONS		Yes	No	REMARKS
Increased road traffic due to interference of construction activities?	Proper traffic management and planning will be ensured during construction	X		Proper traffic management and planning will be ensured during construction.
Continuing soil erosion/silt runoff from construction operations?		X		Construction activities (pipe laying, etc.) on hill slopes may increase the chance of land slide and soil erosion. Careful stacking of excavated materials will be ensured to avoid slippage and erosion. Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
Delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?			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	high density poly ethylene (HDPE) pipes will be used for distribution system and are noncorrosive 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		The town has no drainage network system. Individual leach pit system is used for the drainage. Under the state fund the Karnataka urban water supply and sewerage board has taken up the execution of sewerage network of adequate capacity and sewage treatment system.
increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant		X		Sewerage system of adequate capacity needs to be developed in the town
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.
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.

SCREENING QUESTIONS	Yes	No	REMARKS
Community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning.		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

ENVIRONMENTAL AND LABOUR RELATED LEGISLATIONS IN INDIA

1. Environmental Related Legislations

1. The Water (Prevention and Control of Pollution) Act, 1974, amended 1988
2. The Water (Prevention and Control of Pollution) Rules, 1975
3. The Water (Prevention and Control of Pollution) Cess Rules, 1971
4. The Air (Prevention and Control of Pollution) Act 1981, amended 1987
5. The Air (Prevention and Control of Pollution) Rules, 1982
6. The Environment (Protection) Act, 1986, amended in 1991 and including the following Rules/Notification issued under this Act
7. The Environment (Protection) Rules, 1986, including amendments
8. The Solid Wastes Management Rules, 2016
9. The Hazardous Wastes (Management and Handling) Rules, 1989
10. The Bio-Medical Waste (Management and Handling) Rules, 1998
11. Noise Pollution (Regulation and Control) Rules, 2000,
12. Wild Life (Protection) Amendment Act, 2002
13. Environmental Impact Assessment Notification, 2006
14. Environmental Standards of Central Pollution Control Board (CPCB)
15. The Indian Wildlife (Protection) Act, 1972, amended 1993
16. The Wildlife (Protection) Rules, 1995
17. The Indian Forest Act, 1927
18. Forest (Conservation) Act, 1980, amended 1988
19. Forest (Conservation) Rules, 1981 amended 1992 and 2003
20. Guidelines for Diversion of Forest Lands for Non-Forest Purpose under the Forest (Conservation) Act, 1980
21. Ancient Monuments and Archaeological Sites and Remains Act 1958
22. Ancient Monuments and Archaeological Sites and Remains Rules 1959
23. Government of India Notification of 1992 under the above-stated Rules
24. Coastal Regulation Zone (CRZ) Notification from MoEF.

2. Salient Features of Major Labour Laws in India

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 Labor (Regulation and Abolition) Act, 1970 - The Act provides for certain welfare measures to be provided by the Contractor to contract labor and in case the Contractor fails to provide, the same are required to be provided by the Principal Employer by Law. The principal employer is required to take Certificate of Registration and the Contractor is required to take a License from the designated Officer. The Act is applicable to the establishments or Contractor of principal employer if they employ 20 or more contract labor.
- (vi) Minimum Wages Act, 1948 - The employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, 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 ₹3,500/- per month or less. The bonus to be paid to employees getting ₹2,500/- per month or above up to ₹3,500/- per month shall be worked out by taking wages as ₹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.

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

APPLICABLE AMBIENT AIR QUALITY AND NOISE STANDARDS

Table 3a.1: Applicable Ambient Air Quality Standards

Parameter	Location ^a	Applicable Standards Per ADB SPS ^e (µg/m ³)
PM ₁₀	Industrial Residential, Rural and Other Areas	20 (Annual) ^c 50 (24-hr) ^c
	Sensitive Area	20 (Annual) ^c 50 (24-hr) ^c
PM ₂₅	Industrial Residential, Rural and Other Areas	10 (Annual) ^c 25 (24-hr) ^c
	Sensitive Area	10 (Annual) ^c 25 (24-hr) ^c
SO ₂	Industrial Residential, Rural and Other Areas	50 (Annual) ^b 20 (24-hr) ^c 500 (10-min) ^c
	Sensitive Area	20 (Annual) ^b 20 (24-hr) ^c 500 (10-min) ^c
NO ₂	Industrial Residential, Rural and Other Areas	40 (Annual) ^b 80 (24-hr) ^b 200 (1-hr) ^c
	Sensitive Area	30 (Annual) ^b 80 (24-hr) ^b 200 (1-hr) ^c
CO	Industrial Residential, Rural and Other Areas	2,000 (8-hr) ^b 4,000 (1-hr) ^b 100,000 (15-min) ^d
	Sensitive Area	2,000 (8-hr) ^b 4,000 (1-hr) ^b 100,000 (15-min) ^d
Ozone (O ₃)	Industrial Residential, Rural and Other Areas	100 (8-hr) ^b 180 (1-hr) ^b
	Sensitive Area	100 (8-hr) ^b 180 (1-hr) ^b
Lead (Pb)	Industrial, Residential, Rural and Other Areas	0.5 (Annual) ^b 1.0 (24-hr) ^b
	Sensitive Area	0.5 (Annual) ^b 1.0 (24-hr) ^b
Ammonia (NH ₃)	Industrial Residential, Rural and Other Areas	100 (Annual) ^b 400 (24-hr) ^b
	Sensitive Area	100 (Annual) ^b 400 (24-hr) ^b
Benzene (C ₆ H ₆)	Industrial Residential, Rural and Other Areas	5 (Annual) ^b
	Sensitive Area	5 (Annual) ^b
Benzo(o)pyrene (BaP) particulate phase only	Industrial Residential, Rural and Other Areas	0.001 (Annual) ^b
	Sensitive Area	0.001 (Annual) ^b
Arsenic (As)	Industrial Residential, Rural and Other Areas	0.006 (Annual) ^b
	Sensitive Area	0.006 (Annual) ^b
Nickel (Ni)	Industrial Residential, Rural and Other Areas	0.02 (Annual) ^b
	Sensitive Area	0.02 (Annual) ^b

^a Sensitive area refers to such areas notified by the India Central Government.

^b Notification by Ministry of Environment and Forests, Government of India Environment (Protection) Seventh Amendment Rules, 2009

^c WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide. *Global update 2005*. WHO. 2006

^d Air Quality Guidelines for Europe Second Edition. WHO 2000.

^e Per ADB SPS, the government shall achieve whichever of the ambient air quality standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

Table 3a.2: Applicable Ambient Noise Level Standards

Receptor/ Source	Applicable Standards Per ADB SPS ^c (dBA)	
	Day time	Night time
Industrial area	70 ^b	70 ^b
Commercial area	65 ^a	55 ^a
Residential Area	55 ^a	45 ^a
Silent Zone	50 ^a	40 ^a

^a Noise Pollution (Regulation and Control) Rules, 2002 as amended up to 2010.

^b Guidelines for Community Noise. WHO. 1999

^c Per ADB SPS, the government shall achieve whichever of the ambient air quality standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

APPLICABLE STANDARDS FOR DISCHARGE OF ENVIRONMENTAL POLLUTANTS (EFFLUENT)

Pollutants	Units	Applicable Standard per ADB SPS ^{a, b, c}
pH	pH	6 – 9 ^b
BOD	mg/l	20 ^a
COD	mg/l	125 ^b
Total nitrogen	mg/l	10 ^b
Total phosphorus	mg/l	2 ^b
Oil and grease	mg/l	10 ^b
Total suspended solids	mg/l	<50 ^a
Total coliform bacteria	MPN b / 100 ml	400a ^b

^a Environment (Protection) Amendment Rules, 2017

^b Health-based guideline values

^c Per ADB SPS, the government shall achieve whichever of the ambient air quality standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

APPLICABLE DRINKING WATER STANDARDS

Group	Parameter Parameter	Unit	Applicable Standards Per ADB SPS ^{a, c, d}
Physical	Turbidity	NTU	1 (5) ^a
	pH		6.5 – 8.5 ^a
	Color	Hazen units	5 (15) ^a
	Taste and Odor		Agreeable ^a
	TDS	mg/l	500 (2,000) ^a
	Iron	mg/l	0.3 ^a
	Manganese	mg/l	0.1 (0.3) ^a
	Arsenic	mg/l	0.01 ^a
	Cadmium	mg/l	0.003 ^a
	Chromium	mg/l	0.05 ^a
	Cyanide	mg/l	0.05 ^a
	Fluoride	mg/l	1 (1.5) ^a
	Lead	mg/l	0.01 ^a
	Ammonia	mg/l	0.5 ^a
Chemical	Chloride	mg/l	250 (1,000) ^a
	Sulphate	mg/l	200 (400) ^a
	Nitrate	mg/l	45 ^a
	Copper	mg/l	0.05 (1.5) ^a
	Total Hardness	mg/l	200 (600) ^a
	Calcium	mg/l	75 (200) ^a
	Zinc	mg/l	5 (15) ^a
	Mercury	mg/l	0.001 ^a
	Aluminum	mg/l	0.1 (0.3) ^a
	Residual Chlorine	mg/l	0.2 ^a
Micro Germs	E-coli	MPN/100ml	Must not be detectable in any 100 ml sample ^a
	Total Coliform	MPN/100ml	

^a Bureau of India Standard 10200: 2012.

^b Health-based guideline values.

^c Per ADB SPS, the government shall achieve whichever of the ambient air quality standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

^d Figures in parenthesis are maximum limits allowed in the absence of alternate source.

ಪ್ರಸ್ತಾವನೆ: ಕರಾವಳಿ-ನಿಯಂತ್ರಣ ವಲಯ ನಿರ್ದೇಶನಾ ಮಟ್ಟ ಕೆಲಸ ಸಕ್ರಿಯ ಪ್ರಸ್ತಾವನೆಯನ್ನು ದಿನಾಂಕ: 07.04.2017 ರಂದು ಪಡೆದ ಚಿಲ್ಲಾ ಕರಾವಳಿ ವಲಯ ನಿರ್ದೇಶನಾ ಸಮಿತಿ ಸಭೆಯಲ್ಲಿ ಚರ್ಚಿಸಿ, ಕರಾವಳಿ ನಿಯಂತ್ರಣ ವಲಯ ಪರಿಷ್ಕರಣಾ 2018 ಪಟ್ಟಿ ಸಿ.ಬಿ. ರೀಡ್-4 A (iii) (3) ನ ಪ್ರಕಾರ ಸಮೀಕ್ಷಿಸಬಹುದಾದ ಆಧಾರಗಳನ್ನು ಹೊಂದಿರುವ ಸರ್ವೆ ಪ್ರಸ್ತಾವನೆಯನ್ನು ಕರಾವಳಿ ನಿಯಂತ್ರಣ ವಲಯ ನಿರ್ದೇಶನಾ ಮಟ್ಟ ನಿರ್ದೇಶನಾ KSCZMA ನಿಂದ ಸಿದ್ಧಪಡಿಸಲಾಯಿತು.

ಸಮಿತಿ: ಸರ್ವಾಧಿಕಾರಿ, ಆರೋಗ್ಯ (3)ರ ಮಧ್ಯದ ಸಮಿತಿ ಪ್ರಸ್ತಾವನೆಯನ್ನು ಕರಾವಳಿ ನಿರ್ದೇಶನಾ ವಲಯ ನಿರ್ದೇಶನಾ ಮಟ್ಟದ ನಿರ್ದೇಶನಾ ರಾಜ್ಯ ಕರಾವಳಿ ವಲಯ ನಿರ್ದೇಶನಾ ಪ್ರಾಧಿಕಾರಕ್ಕೆ ಸಲ್ಲಿಸುವುದು.

ಸಮಿತಿ ಪ್ರಸ್ತಾವನೆಯನ್ನು ದಿನಾಂಕ: 17.4.2017ರಂದು ಸಮಿತಿ 12ನೇ ಸಭಾಸಭೆ ರಾಜ್ಯ ಸರ್ಕಾರ ವಲಯ ನಿರ್ದೇಶನಾ ಪ್ರಾಧಿಕಾರ ಸಭೆಯಲ್ಲಿ ಚರ್ಚಿಸಲಾಯಿತು.

ಪ್ರಾಧಿಕಾರ: ಸಿ. ಬಿ. ರೀಡ್-4 A (iii) (3)ರ ಪ್ರಕಾರ 2018 ಕರಾವಳಿ ಕರಾವಳಿ-ನಿಯಂತ್ರಣ ವಲಯ ನಿರ್ದೇಶನಾ ಮಟ್ಟದ ಪ್ರಸ್ತಾವನೆ ಮುಂದುವರಿದು, ಕರಾವಳಿ ನಿರ್ದೇಶನಾ ಕರಾವಳಿ ವಲಯ ನಿರ್ದೇಶನಾ ಪ್ರಾಧಿಕಾರದ ಅನುಮೋದನೆ ನೀಡಲು ನಿರ್ದೇಶನಾ ಸಮಿತಿಗೆ ಸಲ್ಲಿಸಲಾಯಿತು.

ಪ್ರಾಧಿಕಾರ ಸಮಿತಿ ನಿರ್ದೇಶನಾ: "ADB ಸಿಬಿ. ರೀಡ್-4 A (iii) (3)ರ ಪ್ರಕಾರ 2018 ಕರಾವಳಿ ಕರಾವಳಿ-ನಿಯಂತ್ರಣ ವಲಯ ನಿರ್ದೇಶನಾ ಮಟ್ಟದ ಪ್ರಸ್ತಾವನೆ (Over Head Tank) ಅನುಮೋದಿಸಲಾಯಿತು. ಸಿ.ಬಿ. ರೀಡ್-4 A (iii) (3)ರ ಪ್ರಕಾರ 2018 ಕರಾವಳಿ ಕರಾವಳಿ-ನಿಯಂತ್ರಣ ವಲಯ ನಿರ್ದೇಶನಾ ಮಟ್ಟದ ಪ್ರಸ್ತಾವನೆ (GRZ Clearance) ಒಂದು ಈ ಕರಾವಳಿ-ನಿಯಂತ್ರಣ ವಲಯ ನಿರ್ದೇಶನಾ ಮಟ್ಟದ ಪ್ರಸ್ತಾವನೆ ನೀಡಲಾಯಿತು.

- 1) ದಿನಾಂಕ: 07.04.2017ರಂದು ಪಡೆದ ಚಿಲ್ಲಾ ಕರಾವಳಿ ವಲಯ ನಿರ್ದೇಶನಾ ಸಮಿತಿ ಸಭೆಯಲ್ಲಿ ಚರ್ಚಿಸಿ, ಕರಾವಳಿ ನಿಯಂತ್ರಣ ವಲಯ ಪರಿಷ್ಕರಣಾ 2018 ಪಟ್ಟಿ ಸಿ.ಬಿ. ರೀಡ್-4 A (iii) (3) ನ ಪ್ರಕಾರ ಸಮೀಕ್ಷಿಸಬಹುದಾದ ಆಧಾರಗಳನ್ನು ಹೊಂದಿರುವ ಸರ್ವೆ ಪ್ರಸ್ತಾವನೆಯನ್ನು ಕರಾವಳಿ ನಿಯಂತ್ರಣ ವಲಯ ನಿರ್ದೇಶನಾ ಮಟ್ಟದ ನಿರ್ದೇಶನಾ ರಾಜ್ಯ ಕರಾವಳಿ ವಲಯ ನಿರ್ದೇಶನಾ ಪ್ರಾಧಿಕಾರಕ್ಕೆ ಸಲ್ಲಿಸುವುದು.
- 2) ದಿನಾಂಕ: 17.4.2017ರಂದು ಪಡೆದ ಚಿಲ್ಲಾ ಕರಾವಳಿ ವಲಯ ನಿರ್ದೇಶನಾ ಸಮಿತಿ ಸಭೆಯಲ್ಲಿ ಚರ್ಚಿಸಿ, ಕರಾವಳಿ ನಿಯಂತ್ರಣ ವಲಯ ಪರಿಷ್ಕರಣಾ 2018 ಪಟ್ಟಿ ಸಿ.ಬಿ. ರೀಡ್-4 A (iii) (3) ನ ಪ್ರಕಾರ ಸಮೀಕ್ಷಿಸಬಹುದಾದ ಆಧಾರಗಳನ್ನು ಹೊಂದಿರುವ ಸರ್ವೆ ಪ್ರಸ್ತಾವನೆಯನ್ನು ಕರಾವಳಿ ನಿಯಂತ್ರಣ ವಲಯ ನಿರ್ದೇಶನಾ ಮಟ್ಟದ ನಿರ್ದೇಶನಾ ರಾಜ್ಯ ಕರಾವಳಿ ವಲಯ ನಿರ್ದೇಶನಾ ಪ್ರಾಧಿಕಾರಕ್ಕೆ ಸಲ್ಲಿಸುವುದು.
- 3) ದಿನಾಂಕ: 17.4.2017ರಂದು ಪಡೆದ ಚಿಲ್ಲಾ ಕರಾವಳಿ ವಲಯ ನಿರ್ದೇಶನಾ ಸಮಿತಿ ಸಭೆಯಲ್ಲಿ ಚರ್ಚಿಸಿ, ಕರಾವಳಿ ನಿಯಂತ್ರಣ ವಲಯ ಪರಿಷ್ಕರಣಾ 2018 ಪಟ್ಟಿ ಸಿ.ಬಿ. ರೀಡ್-4 A (iii) (3) ನ ಪ್ರಕಾರ ಸಮೀಕ್ಷಿಸಬಹುದಾದ ಆಧಾರಗಳನ್ನು ಹೊಂದಿರುವ ಸರ್ವೆ ಪ್ರಸ್ತಾವನೆಯನ್ನು ಕರಾವಳಿ ನಿಯಂತ್ರಣ ವಲಯ ನಿರ್ದೇಶನಾ ಮಟ್ಟದ ನಿರ್ದೇಶನಾ ರಾಜ್ಯ ಕರಾವಳಿ ವಲಯ ನಿರ್ದೇಶನಾ ಪ್ರಾಧಿಕಾರಕ್ಕೆ ಸಲ್ಲಿಸುವುದು.
- 4) ದಿನಾಂಕ: 17.4.2017ರಂದು ಪಡೆದ ಚಿಲ್ಲಾ ಕರಾವಳಿ ವಲಯ ನಿರ್ದೇಶನಾ ಸಮಿತಿ ಸಭೆಯಲ್ಲಿ ಚರ್ಚಿಸಿ, ಕರಾವಳಿ ನಿಯಂತ್ರಣ ವಲಯ ಪರಿಷ್ಕರಣಾ 2018 ಪಟ್ಟಿ ಸಿ.ಬಿ. ರೀಡ್-4 A (iii) (3) ನ ಪ್ರಕಾರ ಸಮೀಕ್ಷಿಸಬಹುದಾದ ಆಧಾರಗಳನ್ನು ಹೊಂದಿರುವ ಸರ್ವೆ ಪ್ರಸ್ತಾವನೆಯನ್ನು ಕರಾವಳಿ ನಿಯಂತ್ರಣ ವಲಯ ನಿರ್ದೇಶನಾ ಮಟ್ಟದ ನಿರ್ದೇಶನಾ ರಾಜ್ಯ ಕರಾವಳಿ ವಲಯ ನಿರ್ದೇಶನಾ ಪ್ರಾಧಿಕಾರಕ್ಕೆ ಸಲ್ಲಿಸುವುದು.

ಸದರಿ ಪ್ರಾಜ್ಞಾನವನ್ನು ದಿನಾಂಕ: 15.02.2014ರಂದು ನಡೆದ 1ನೇ ಸಭೆಯಲ್ಲಿ ಸಹಿ, ಕುರಿತು
ವಲಯ ನಿರ್ವಹಣಾ ಪ್ರಾಧಿಕಾರ ಸಭೆಯಲ್ಲಿ ಚರ್ಚೆ ನಡೆಯಿತು.

ಪ್ರಾಧಿಕಾರಕ್ಕೆ ಈ ಮುಗ್ಗಿ ಜಾರ್ಜ್, ಎ.ಆರ್.ಎಸ್. ಅಧೀನದಲ್ಲಿ, 2014ರ ಜನವರಿ
ಅನುಮತಿಸಲ್ಪಟ್ಟಿರುವ ಮುಖಪುಟವಾಗುವಂತೆ ಪ್ರಾಜ್ಞಾನ ವೈಶಿಷ್ಟ್ಯ, ಅನುಮತಿಸಿ ಕುರಿತು
ಪ್ರಾಜ್ಞಾನದ ಅನುಮೋದನೆ ನೀಡಲು ತೀರ್ಮಾನಿಸಲಾಗಿದೆ.

ಪ್ರಾಧಿಕಾರದ ಸದರಿ ನಿರ್ಣಯದಂತೆ, "ADB ನಡುವೆ KULWAMP-Train-2 ಯೋಜನೆಯಲ್ಲಿ
ಕುರಿತು 24X7 ನಿರಂತರವಾಗಿ ಯೋಜನೆಯಲ್ಲಿ ವೈಶಿಷ್ಟ್ಯ ಅನುಮತಿಸಿ" ಕುರಿತು
ನಿಯಂತ್ರಣ ವಲಯ ನಿರ್ವಹಣಾ ಪತ್ರ (CRZ Clearance) ಮತ್ತು ಈ ಕುರಿತು
ಪ್ರಾಜ್ಞಾನವನ್ನು ನೀಡಲಾಗಿದೆ.

- 1) ಯೋಜನಾ ಪ್ರದರ್ಶನದ ಸಭೆಯ ಅನಂತರ ಸಂಪೂರ್ಣವಾಗಿ 1062 ಸೆಪ್ಟೆಂಬರ್ 2014
ದಿನಾಂಕದಿಂದ 1061ನೇ ಜನವರಿ 2014 ರವರೆಗೆ ಸಂಪೂರ್ಣವಾಗಿ ಸಹಿ ಸಂಪೂರ್ಣವಾಗಿ.
- 2) ವೈಶಿಷ್ಟ್ಯ ಅನುಮತಿಸುವ ಸಂಪೂರ್ಣವಾಗಿ ಅಲ್ಲಿಗೆ ಸಂಪೂರ್ಣವಾಗಿ ಸಹಿ ಸಂಪೂರ್ಣವಾಗಿ.
- 3) ವೈಶಿಷ್ಟ್ಯ ಅನುಮತಿಸುವ ಸಂಪೂರ್ಣವಾಗಿ ಅಲ್ಲಿಗೆ ಸಂಪೂರ್ಣವಾಗಿ ಸಹಿ ಸಂಪೂರ್ಣವಾಗಿ.
- 4) ವೈಶಿಷ್ಟ್ಯ ಅನುಮತಿಸುವ ಸಂಪೂರ್ಣವಾಗಿ ಅಲ್ಲಿಗೆ ಸಂಪೂರ್ಣವಾಗಿ ಸಹಿ ಸಂಪೂರ್ಣವಾಗಿ.
- 5) ವೈಶಿಷ್ಟ್ಯ ಅನುಮತಿಸುವ ಸಂಪೂರ್ಣವಾಗಿ ಅಲ್ಲಿಗೆ ಸಂಪೂರ್ಣವಾಗಿ ಸಹಿ ಸಂಪೂರ್ಣವಾಗಿ.

ಪ್ರಾಜ್ಞಾನ ಕುರಿತು ನಿಯಂತ್ರಣ ವಲಯ ನಿರ್ವಹಣಾ ಪತ್ರ (CRZ Clearance) ಮತ್ತು ಕುರಿತು
ನಿಯಂತ್ರಣ ವಲಯದ ಅಧೀನದಲ್ಲಿ 2014ರ ಅನಂತರದ ಸಂಪೂರ್ಣವಾಗಿ.

ಕುರಿತು ಸಂಪೂರ್ಣವಾಗಿ.

(ನಿರ್ದೇಶಕರು)

ನಿರ್ದೇಶಕರು (ಅಂತರರಾಷ್ಟ್ರೀಯ) ಮತ್ತು
ನಿರ್ದೇಶಕರು.

ಕುರಿತು ಸಂಪೂರ್ಣವಾಗಿ ಸಂಪೂರ್ಣವಾಗಿ ಸಂಪೂರ್ಣವಾಗಿ
ಅಲ್ಲಿಗೆ ಸಂಪೂರ್ಣವಾಗಿ ಸಂಪೂರ್ಣವಾಗಿ.

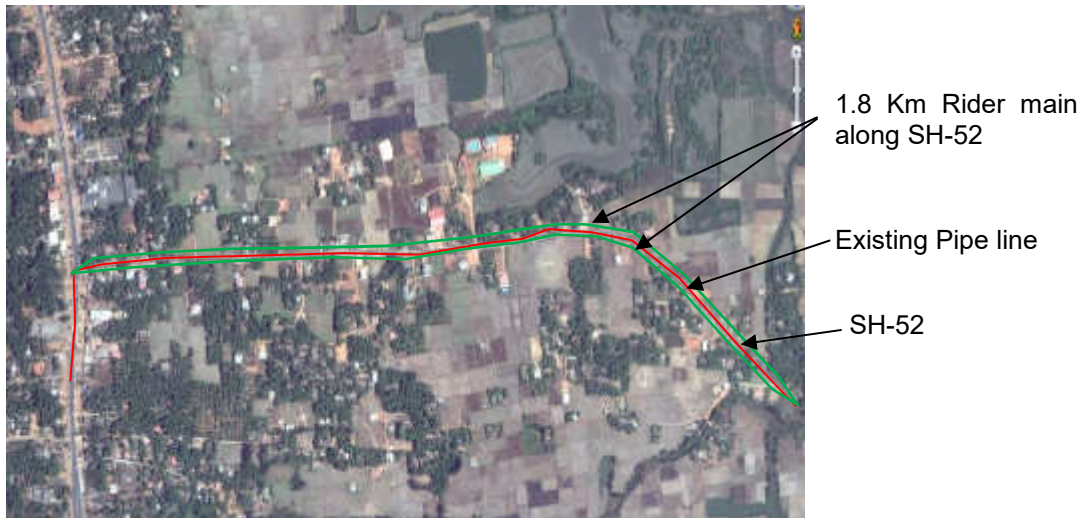
LIST OF CLEARANCES REQUIRED

No	Permission	Water Supply	Responsibility
1	Karnataka State Pollution Control Board (KSPCB)	NA	NA
2	National Highways / Public Works Department (PWD)	National Highway (NH66) running through the entire Kundapura Town limit. No National Highway crossing but a stretch of 0.11 km for laying clear water main is proposed along the service lane of NH-66 which needs permission from National Highway Authority of India Laying rider main of length 1.8 km for Zone-1 along SH-52 permission will be required from State PWD.	Urban local body (ULB)/ Program Implementation Unit (PIU)
3	Railway	NA	NA
4	Utilities (HESCOM, BSNL)	Clearance Required, if crossing	ULB/PIU
5	Labour License	License Required.	Contractor
6	Forest	NA	NA
7	Karnataka Coastal Zone Management Authority (KCZMA)	No objection Certificate already obtained	ULB/PIU

National Highway Clearance Requirement



State Highway Clearance Requirement



ENVIRONMENTAL AUDIT OF THE EXISTING WATER TREATMENT PLANT IN KUNDAPUR

I. Introduction

The objectives of this environmental audit are to (i) assess the compliance of the existing water treatment plant (WTP) to be rehabilitated/augmented during the implementation of KIUWMIP with environmental legislation; (ii) improve environmental performance through monitoring the effectiveness of the management system; and (iii) increase the Kundapur TMC's knowledge of itself and its activities, thus increasing its ability to continually improve and minimize future potential liabilities.

The environmental audit was carried out for the existing WTP. The methodology adopted for this audit was to initially review existing plans and technical information and list various activities being carried out in the WTP. Due diligence was carried out to physically check whether environmental performance, health and safety, etc. were in compliance with national and state prescribed standards and guidelines. Team visited the WTP and observed operations. Meetings and discussions with key personnel were held in the various stages of the audit. Various documentations regarding the operational aspects were also checked.

II. Description of Existing Water Treatment Plant at Kundapur

Location	Kundapur Town Latitude:13°57'N Longitude:74°7'E
Start of operation (year)	2005-2006
Owned by	TMC, Kundapur
Contact person and designation	Mr. Manjunatha Shetty Environmental Engineer +919743559156
Capacity	7.6 million liters per day (MLD)
Water supply source	River Varahi, (intake well is 11.5 km from Kundapur)
Water treatment process	Technology: The treatment process is conventional, and has following units: Cascade Aerator, Raw Water Channel with Parshall Flume or continuous flow measurement, Coagulant & Flocculent chemical make up tanks, Flash Mixing tank, Clariflocculator including a flocculation zone in the center, three sand filters, Chlorination system and Clear water Sump & pump house.
	Materials: All civil structures are made of reinforced cement concrete, and mechanical units like the of HYSD steel. Process: the water from raw water pumping main enters into the inlet, and the first unit is cascade aerator. After aeration water passes through Parshall flume, where flow is measured. Coagulant and flocculent chemicals (alum and Lime) are added to the water, and mixed in the flash mixer tank, and then flows into Clariflocculator and Clarified water flows into sand filters (3 numbers) for filtration and the filtered water is disinfected with chlorine and allowed to flow into clear water tank from where water pumped into service reservoirs for distribution.

Backwash water and sludge management	<p>-filter backwash water is let into open drains as there is no recycling of backwash into inlet</p> <p>- the settled sludge from the bottom of the clarifier tank is periodically flushed into the drains.</p> <p>-the untreated backwash and sludge flushing ultimately reaches and disposed off into drain.</p>
Chlorination system	<p>Chlorine dosage system is not properly working; there are no safety precautions in place.</p> <p>Chlorine cylinders (100 kg tonners) are used which is placed at one side of the room. The dosage system is not properly functional; no safety systems like leak detection or emergency alarm or lime slurry pit available in the facility. Operators are not aware of safety measures or actions to be performed during any emergency.</p>
Compliance with environmental related legislations	Not applicable – in Karnataka, WTPs do not require consent of State Pollution Control Board for establishment and/or operation

SAMPLE OUTLINE SPOILS (CONSTRUCTION WASTE) MANAGEMENT PLAN

- The Spoil Management Plan should be site specific and be part of the monthly Construction Management Plan.
- The contractor, in consultation with the PIU, has to find out appropriate 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.

TRAFFIC MANAGEMENT PLAN

A. Principles for Traffic Management Plan Around the Water Pipes Construction Sites

One of the prime objectives of this Traffic Management Plan (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 Traffic Management Plan

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.

Make traffic safety and temporary traffic control an integral and high-priority element of every project from planning through design, construction, and maintenance.

Inhibit traffic movement as little as possible.

Provide clear and positive guidance to drivers, bicyclists, and pedestrians as they approach and travel through the temporary traffic control zone.

Inspect traffic control elements routinely, both day and night, and make modifications when necessary.

Pay increased attention to roadside safety in the vicinity of temporary traffic control zones.

Train all persons that select, place, and maintain temporary traffic control devices.

Keep the public well informed.

Make appropriate accommodation for abutting property owners, residents, businesses, emergency services, railroads, commercial vehicles, and transit operations.

Figure A2 to Figure A12 illustrates the operating policy for TMP for the construction of water pipes and the sewers along various types of roads.

C. Analyze the Impact Due to Street Closure

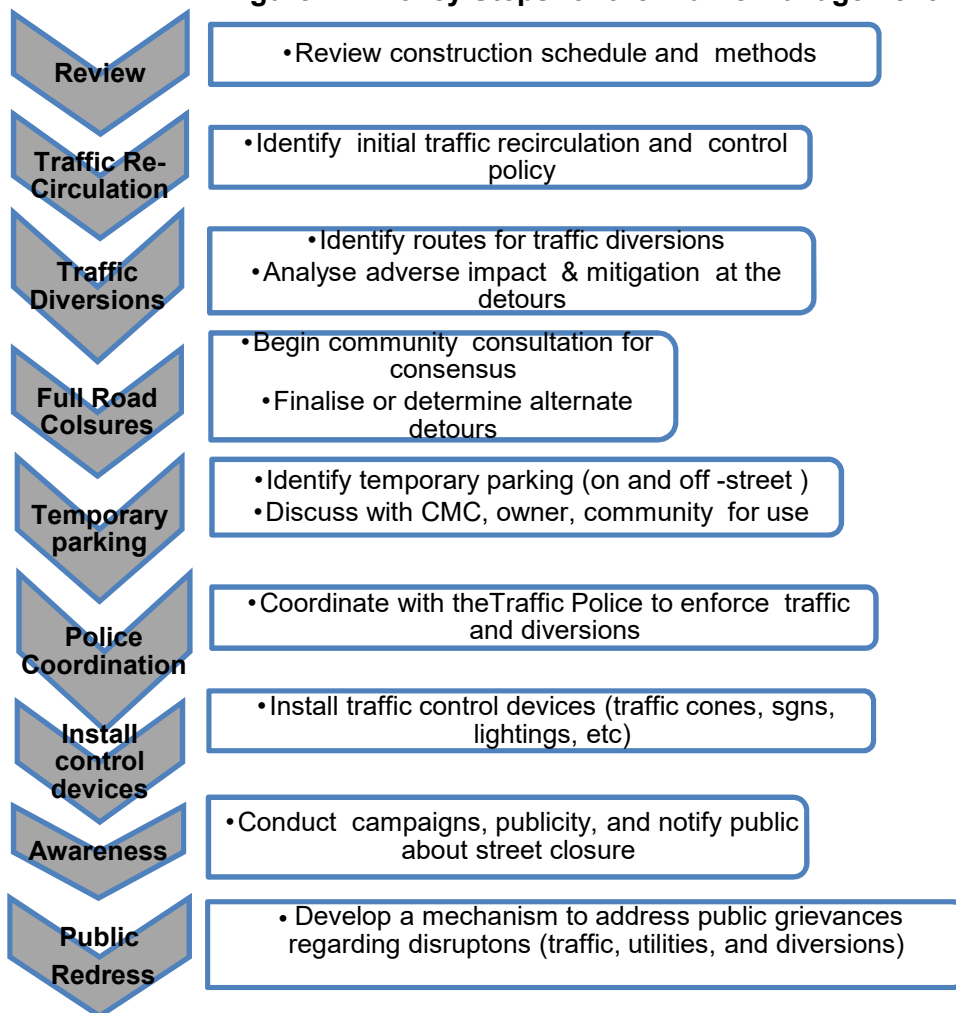
Apart from the capacity analysis, a final decision to close a particular street and divert the traffic should involve the following steps:

- (i) Approval from the Kundapura Town 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.

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

Figure A1: Policy Steps for the Traffic Management Plan



D. Public Awareness and Notifications

As per discussions in the previous sections, there will be travel delays during the constructions, as is the case with most construction projects, although 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.

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 Town level meeting with the elected representatives.

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

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

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

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

- (i) Explain why the brochure was prepared, along with a brief description of the 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

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

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

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 Town areas are wide but in old Town 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”).

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

- (i) Work on shoulder or parking lane;
- (ii) Shoulder or parking lane closed on divided road;
- (iii) Work in Travel lane;
- (iv) Lane closure on road with low volume;
- (v) Lane closure on a two-line road with low volume (with yield sign);
- (vi) Lane closure on a two-line road with low volume (one flagger operation);
- (vii) Lane closure on a two-lane road (two flagger operation);
- (viii) Lane closure on a four-lane undivided Road;
- (ix) Lane closure on divided roadway;
- (x) Half road closure on multi-lane roadway;
- (xi) Street closure with detour.

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.

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.

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

Figure A2 and A3: Work on Shoulder or Parking Lane and Shoulder or Parking Lane closed on Divided Road

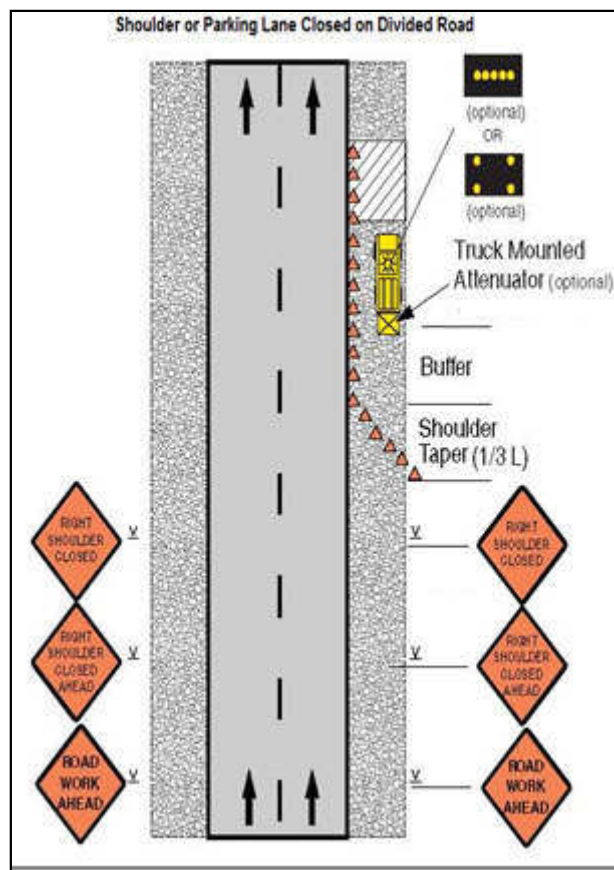
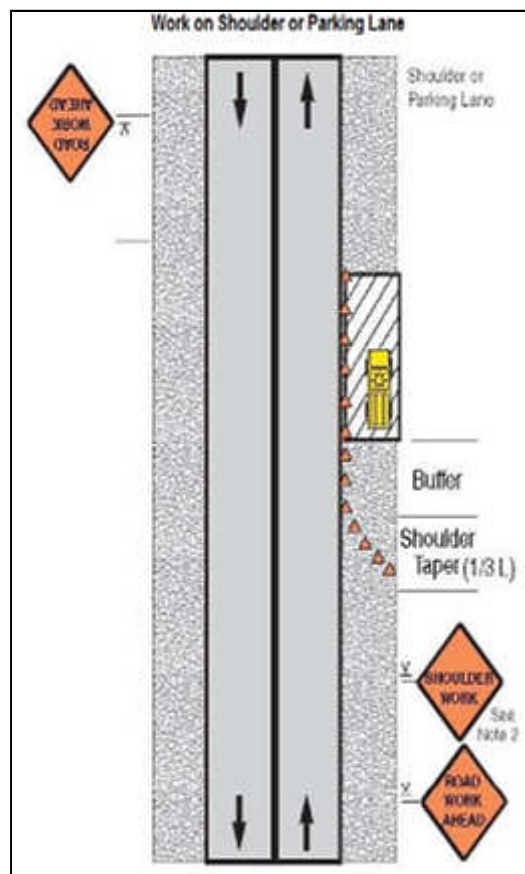


Figure A4 and A5: Work in Travel lane and Lane closure on road with low volume

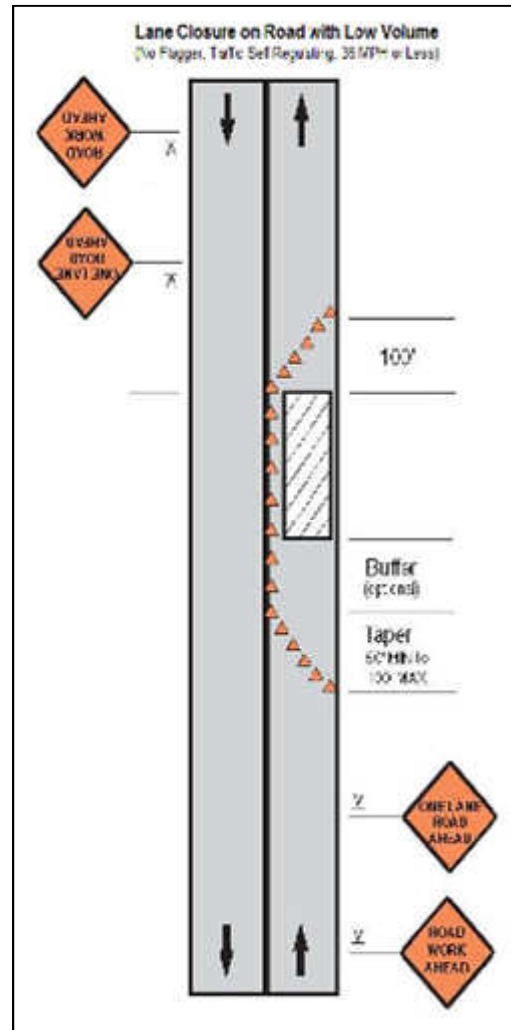
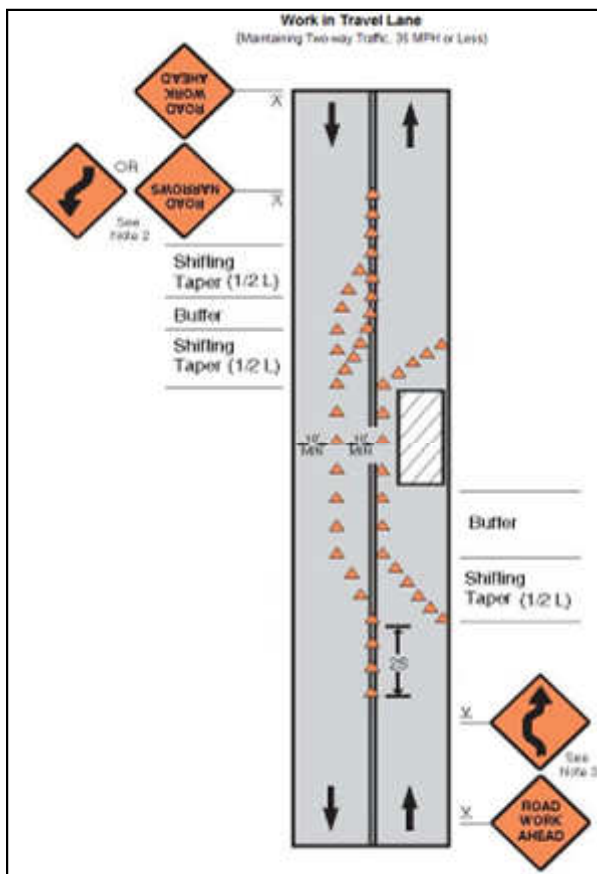


Figure A6 and A7: Lane Closure on a Two-Line Road with Low Volume (with Yield Sign) and Lane Closure on a Two-Line Road with Low Volume (One Flagger Operation)

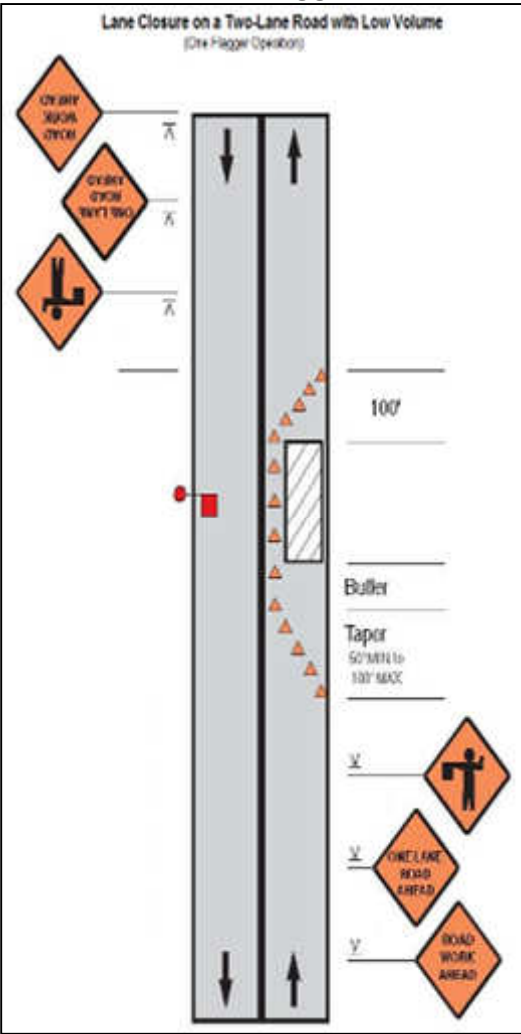
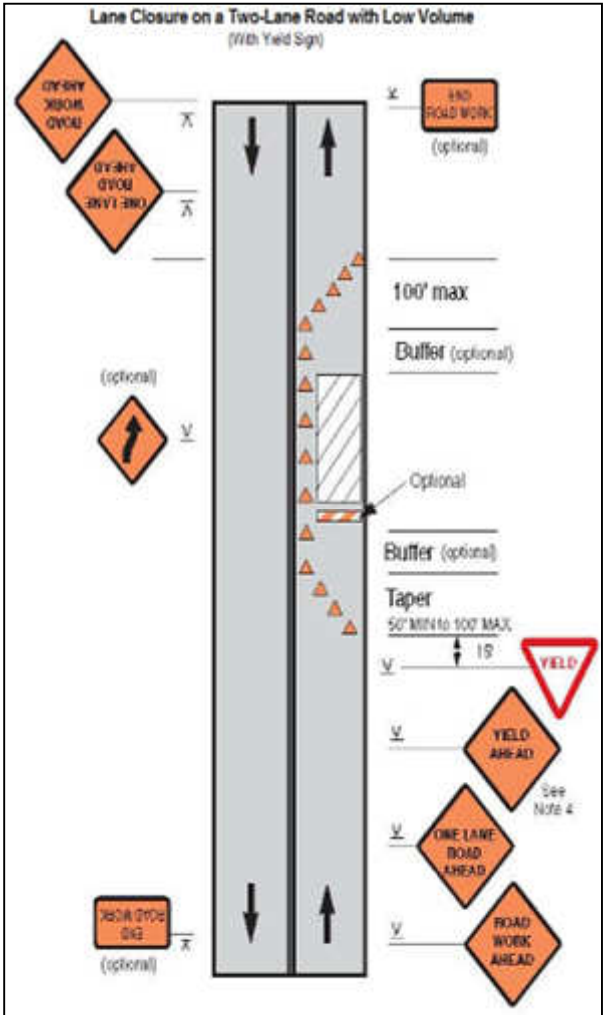


Figure A8 and A9: Lane Closure on a Two Lane Road (Two Flagger Operation) and Lane Closure on a Four Lane Undivided Road

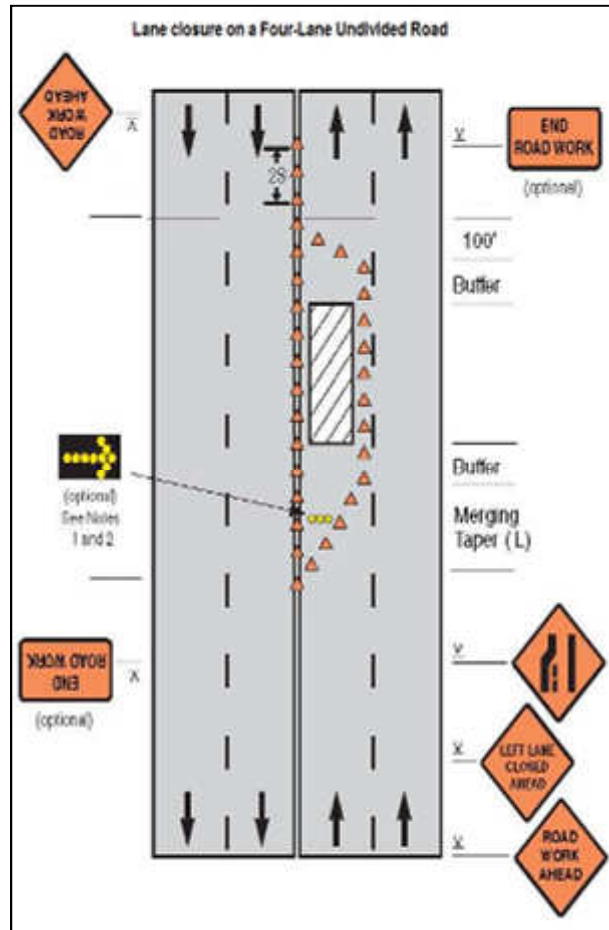
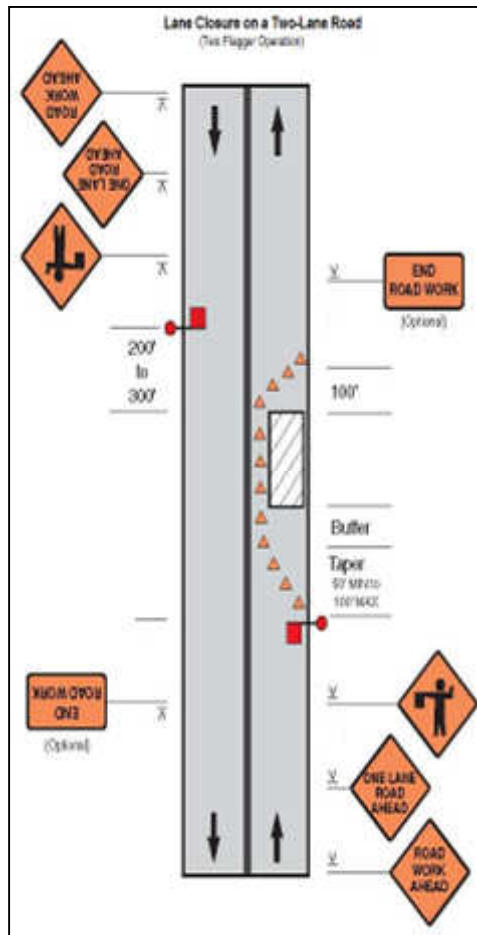


Figure A10 and A11: Lane Closure on Divided Roadway and Half Road Closure on Multi-Lane Roadway

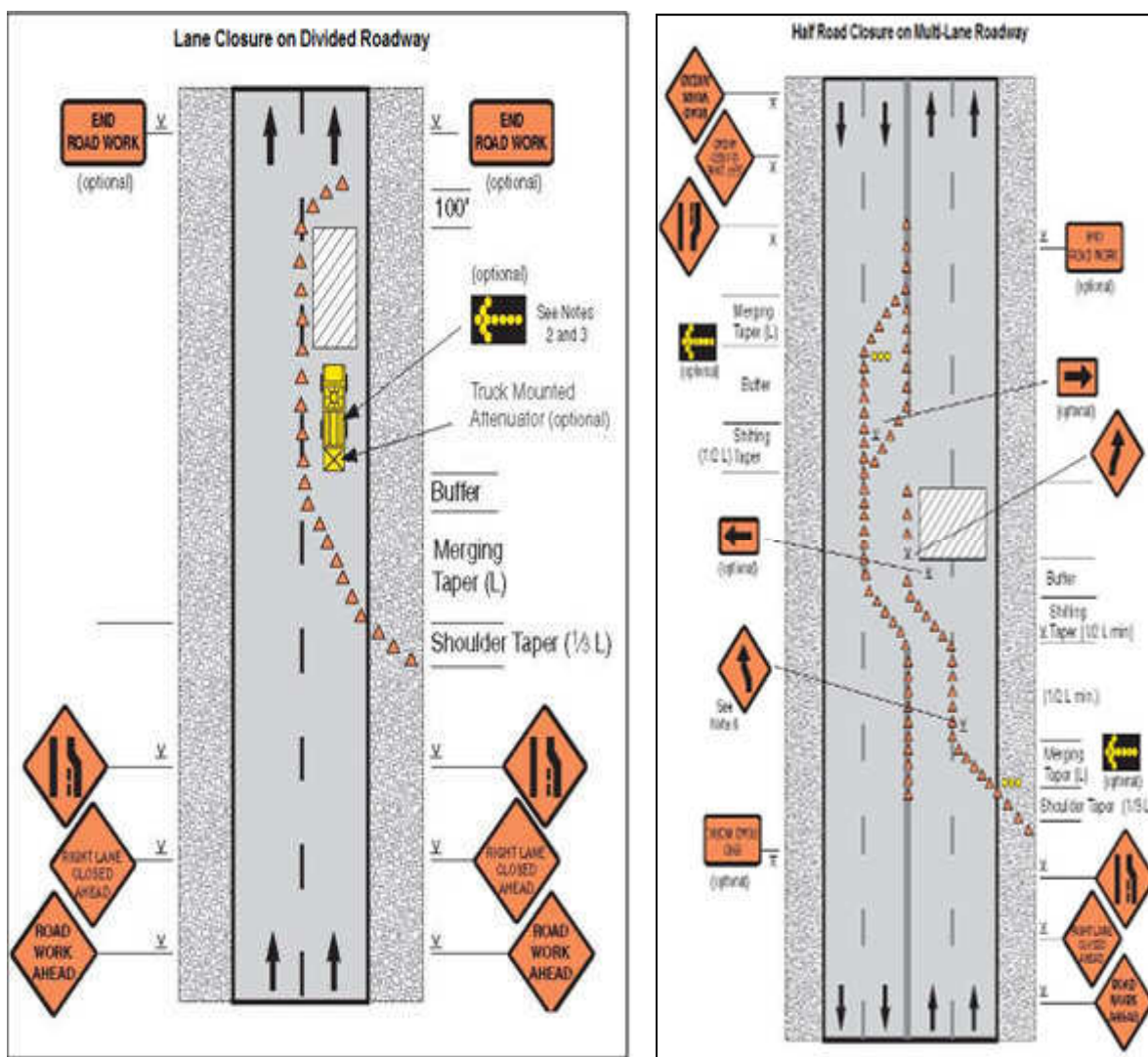
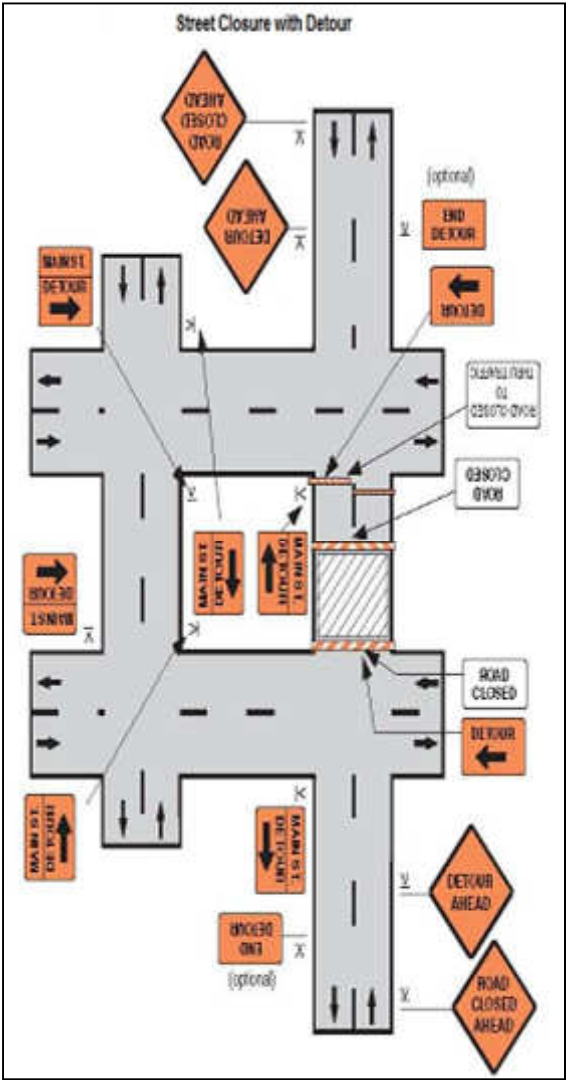
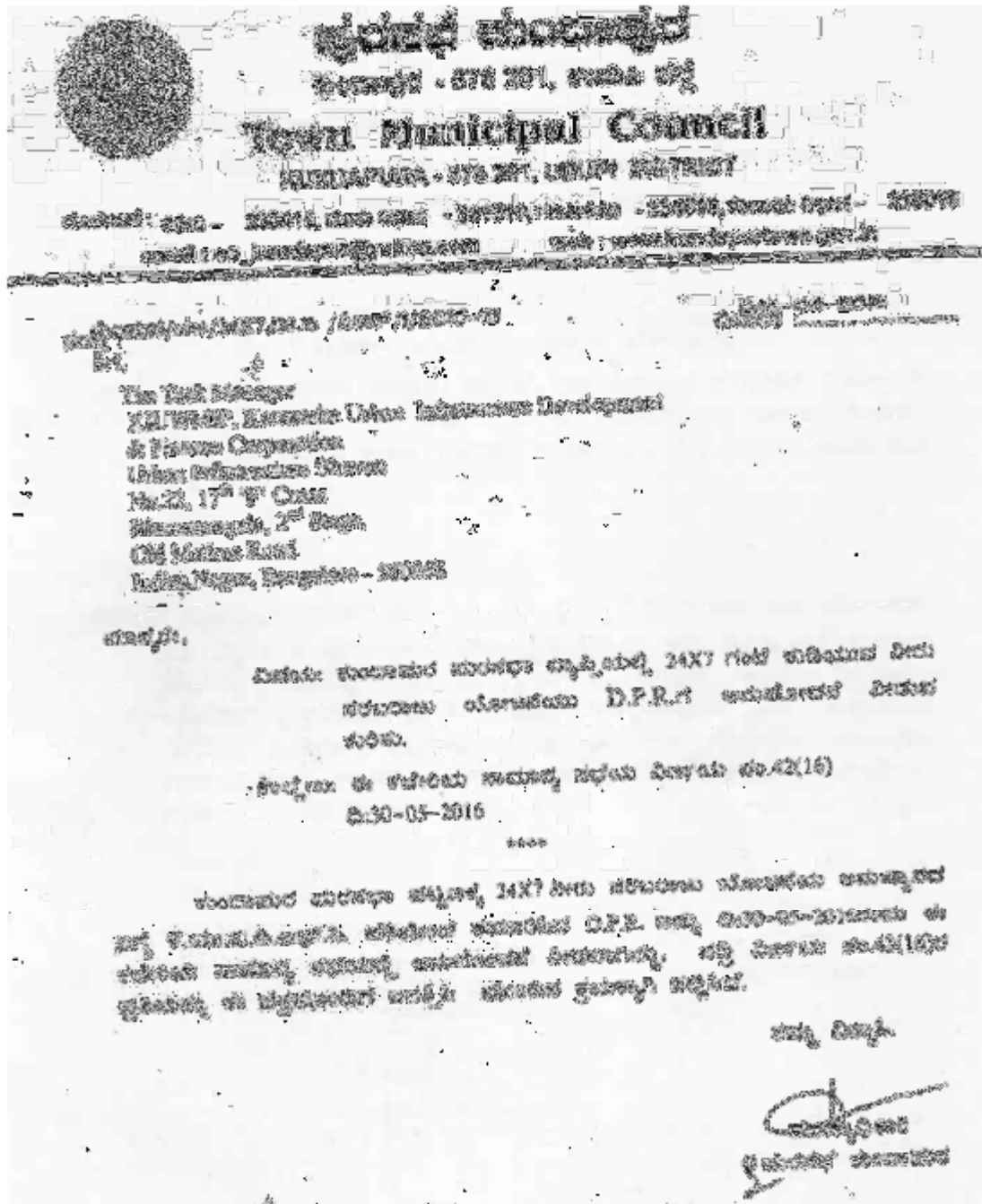


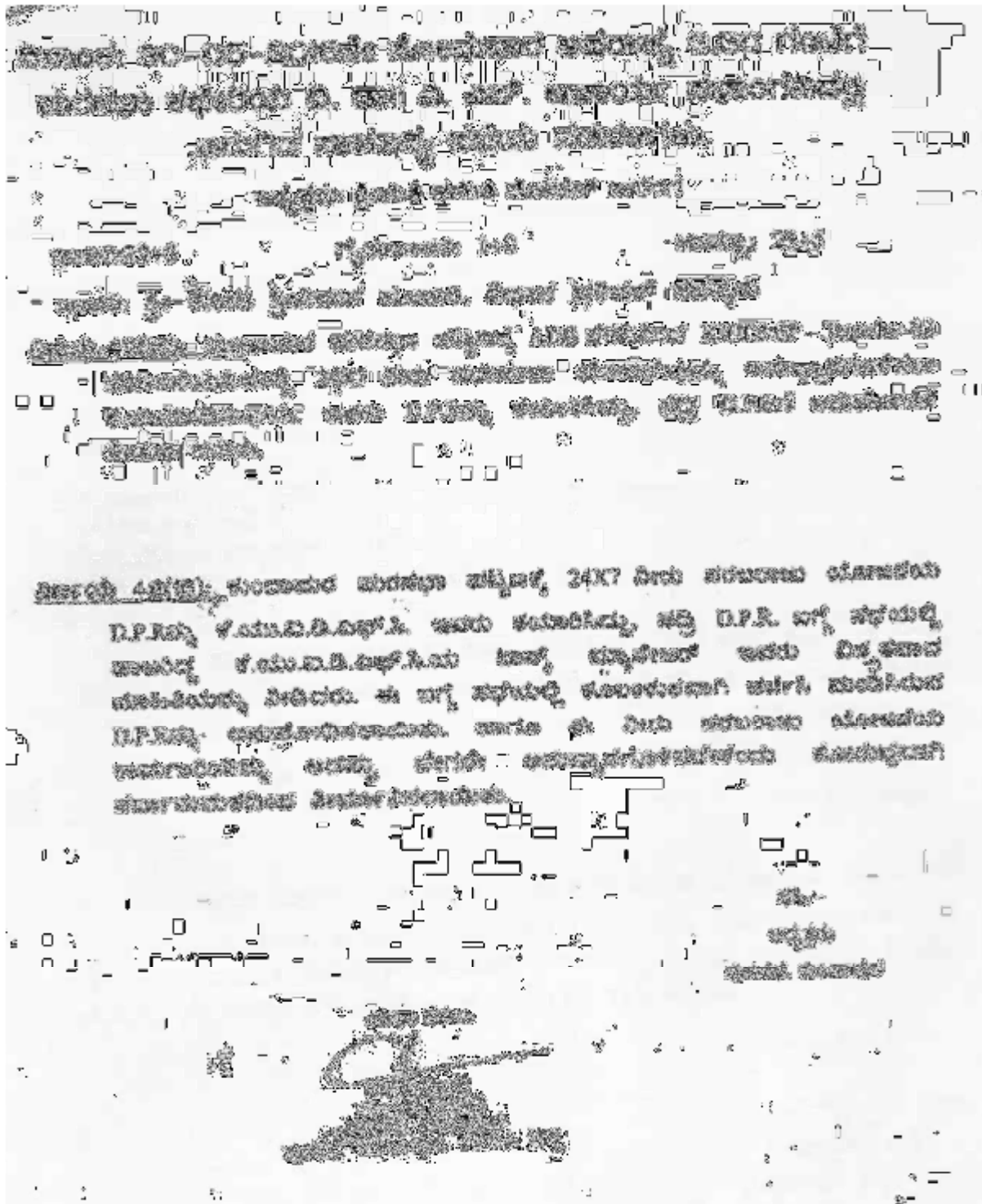
Figure A12: Street Closure with Detour



URBAN LOCAL BODY'S (KUNDAPURA TOWN MUNICIPAL COUNCIL) RESOLUTION FOR THE PROJECT

Following is the letter sent by TMC Kundapura to KUIDFC Task Manager of KIUWMIP about the resolution passed by the general body of the TMC approving the DPR prepared by KUIDFC for 24x7 water supply in Kundapura under KUIWMIP, tranche 2. TMC resolution is attached to this (refer next page). According to this resolution, the general body meeting was conducted on 30-May-2018 discussed the DPR in detail, and approved.





STAKEHOLDER CONSULTATION IN KUNDAPURA

Date: 18.10.2016

Project component: 24 X 7 water supply for Kundapura town

Water supply sub project: Laying of water supply distribution network and construction of overhead tanks

During Census in the month of October 2016, door to door visit has been done to create awareness and discussed with the residents about project component and also water supply sub project.

Place: Surrounding residents of proposed OHT site Halekote, Kundapura

	Name and Address of the Person Contacted	Contact No.	Present Condition of Water Supply	What Improvement is Required in the Present Condition	Contacted Person is the Beneficiary of the Proposed Project Yes/ No	Proposed Project Cause any Social Issue? Yes/ No	Suggestions for the Proposed Project
1	Mrs. Lidwin W/o Mithun Municipal quarters HalekoteKundapura Udupi District	9591443263	Daily 6 AM to 12 PM	24 X 7 water supply	Yes	No	Project need to be completed at the earliest
2	Mrs. Shantha W/o Nagaraj Municipal quarters HalekoteKundapura	9902842395	Daily 6 AM to 12 PM	24 X 7 water supply	Yes	No	Project need to be completed at the earliest
3	Mrs. NaliniKundar W/o of Late Shankar Kundar Door No 2D, Near Govt. Higher Primary School HalekoteKundapura	9035031687	Daily 6 AM to 12PM	24 X 7 water supply	Yes	No	Project need to be completed at the earliest
4	Mrs. Gowri W/o Shyama Mendon Door No.523/A HalekoteKundapura	9480667997	Daily 6 AM to 12 PM	24 X 7 water supply	Yes	No	Project need to be completed at the earliest
5	Mrs. Sumathi W/o Mahabala P. Chandan Door No 523/B HalekoteKundapura	7676372951	Daily 6 AM to 12 PM	24 X 7 water supply	Yes	No	Project need to be completed at the earliest
6	Mrs. JayasheelaNayakBhargava NilayaHalekote Kundapura	9480560823	Daily 6 AM to 12 PM	24 X 7 water supply	Yes	No	Project need to be completed at the earliest
7	Mr. Babu K Bangera Door No 523 A-2 Chikensal Road Halekote Kundapura	9901654839	Daily 6 AM to 12 PM	24 X 7 water supply	Yes	No	Project need to be completed at the earliest
8	Mr. Purushothama S/o Late ManjayyaSherigar Door No 523/D Chikensal Road Kundapura	9741488352	Daily 6 AM to 12 PM	24 X 7 water supply	Yes	No	Project need to be completed at the earliest

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1	John's Book Store/medals	single
2	Dr. Walter Smith	multiple
3	James Smith Co. Inc.	single
4	Dr. E. Johnson	single
5	Dr. E. Johnson	single
6	Dr. Walter Smith	single
7	Dr. Walter Smith	single
8	Dr. Walter Smith	single
9	John's Book Store/John Smith	single
10	Dr. John Smith	single
11	Dr. John Smith	single
12	Dr. John Smith	single
13	Dr. John Smith	single
14	Dr. John Smith	single
15	Dr. John Smith	single
16	John's Book Store/John Smith	single
17	Dr. John Smith	single
18	John's Book Store/John Smith	single
19	Dr. John Smith	single
20	John's Book Store	single
21	John's Book Store	single
22	John's Book Store	single
23	John's Book Store	single
Additional items		
1	Dr. Johnson	single
2	Dr. John Smith	single
3	Dr. Johnson	single
4	John's Book Store	multiple
5	Dr. Johnson	single
Additional items		
1	John's Book Store	single
2	Dr. E. Johnson	single
3	Dr. E. Johnson	single
4	Dr. E. Johnson	single

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Photographs of Public Consultation



Proposed site for construction of OHT and existing OHT in the same site in Halekote, Kundapura

Consultation with the local residents by the ULB Chief Officer I/c and staff, Executive Engineer-KIUWMIP, Social Development Officer and other GKW Consultants in Halekote, Kundapura





Proposed OHT Site (Vacant Government Land) in Kodi Kundapura

Public consultation at Kodi

Consultation with the local residents by the ULB Chief Officer I/c, Executive Engineer-KIUWMIP, Social Development Officer and other GKW Consultant in Kodi, Kundapura



ULB Chief Officer I/c (Wearing Saree) and Next to Her is Ward Councilor Mrs.Jyothi and Her Residence is Nearby the Proposed OHT Construction Site.

Public Consultation near Proposed OHT Site at Kodi

Place: Surrounding residents of proposed OHT site Kodi, Kundapura

	Name and Address of the Person Contacted	Contact No.	Present Condition of Water Supply	What Improvement is Required in the Present Condition	Contacted Person is the Beneficiary of the Proposed Project Yes/ No	Proposed Project Cause Any Social Issue? Yes/ No	Suggestions for the Proposed Project
1	H Y Mohammed S/o Yusufsaheb Door No 17/7 M. Kodi, Kundapura	8453440509	No water supply from the TMC	24 X 7 water supply	Yes	No	Project need to be completed at the earliest
2	Mrs. Noorjan W/o Babusab Door No 13/7 M. KodiKundapura	9632845945	No water supply from the TMC	24 X 7 water supply	Yes	No	Project need to be completed at the earliest
3	Mrs. Tahira W/o Zubir Door No 17/B M. KodiKundapura	9844985956	No water supply from the TMC	24 X 7 water supply	Yes	No	Project need to be completed at the earliest
4	Mr. DevarayaKini S/o Late MadhavaKini Door No 20, 'Sri. Madhava' M. Kodi, Kundapura	9611534637	No water supply from the TMC	24 X 7 water supply	Yes	No	Project need to be completed at the earliest
5	Mrs. Jyothi Ganesh Mogaveer W/o Ganesh Mogaveer Ward Councillor Door No 57 M. KodiKundapura	9739486466	No water supply from the TMC	24 X 7 water supply	Yes	No	Project need to be completed at the earliest
6	Mr. GovindaNaik S/o SadaiahNaik Door No 10/7 M. KodiKundapura	9663072040	No water supply from the TMC	24 X 7 water supply	Yes	No	Project need to be completed at the earliest

MONITORING AND REPORTING FORMATS

SEMI-ANNUAL ENVIRONMENTAL MONITORING REPORT TEMPLATE

I. INTRODUCTION

- Overall project description and objectives
- Environmental category as per ADB Safeguard Policy Statement, 2009
- Environmental category of each subproject as per national laws and regulations
- Project Safeguards Team

Name	Designation/Office	Email Address	Contact Number
1. PMU			
2. PIUs			
3. Consultants			

- Overall project and sub-project progress and status
- Description of subprojects (package-wise) and status of implementation (preliminary, detailed design, on-going construction, completed, and/or O&M stage)

Package Number	Components/List of Works	Status of Implementation (Preliminary Design/Detailed Design/On-going Construction/Completed/O&M) ^a	Contract Status (specify if under bidding or contract awarded)	If On-going Construction	
				%Physical Progress	Expected Completion Date

^a If on-going construction, include % physical progress and expected date of completion.

II. COMPLIANCE STATUS WITH NATIONAL/STATE/LOCAL STATUTORY ENVIRONMENTAL REQUIREMENTS¹

¹ All statutory clearance/s, no-objection certificates, permit/s, etc. should be obtained prior to award of contract/s. Attach as appendix all clearance obtained during the reporting period. If already reported, specify in the "remarks" column.

Package No.	Subproject Name	Statutory Environmental Requirements ^a	Status of Compliance ^b	Validity if obtained	Action Required	Specific Conditions that will require environmental monitoring as per Environment Clearance, Consent/Permit to Establish ^c

^a Specify (environmental clearance? Permit/consent to establish? Forest clearance? Etc.)

^b Specify if obtained, submitted and awaiting approval, application not yet submitted

^c Example: Environmental Clearance requires ambient air quality monitoring, Forest Clearance/Tree-cutting Permit requires 2 trees for every tree, etc.

III. COMPLIANCE STATUS WITH ENVIRONMENTAL LOAN COVENANTS

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

IV. COMPLIANCE STATUS WITH THE ENVIRONMENTAL MANAGEMENT PLAN (REFER TO EMP TABLES IN APPROVED IEE/S)

- Confirm if IEE/s require contractors to submit site-specific EMP/construction EMPs. If not, describe the methodology of monitoring each package under implementation.

Package-Wise Implementation Status

Package Number	Components	Design Status (Preliminary Design Stage/Detailed Design Completed)	Final IEE based on Detailed Design				Site-specific EMP (or Construction EMP) approved by Project Director? (Yes/No)	Remarks
			Not yet due (detailed design not yet completed)	Submitted to ADB (Provide Date of Submission)	Disclosed on project website (Provide Link)	Final IEE provided to Contractor/s (Yes/No)		

- Identify the role/s of Safeguards Team including schedule of on-site verification of reports submitted by consultants and contractors.
- For each package, provide name/s and contact details of contractor/s' nodal person/s for environmental safeguards.

- Include as appendix all supporting documents including signed monthly environmental site inspection reports prepared by consultants and/or contractors.
- With reference to approved EMP/site-specific EMP/construction EMP, complete the table below
- Provide the monitoring results as per the parameters outlined in the approved EMP (or site-specific EMP/construction EMP when applicable).
- In addition to the table on EMP implementation, the main text of the report should discuss in details the following items:
 - (i) **Grievance Redress Mechanism.** Provide information on establishment of grievance redress mechanism and capacity of grievance redress committee to address project-related issues/complaints. Include as appendix Notification of the GRM (town-wise if applicable).
 - (ii) Complaints Received during the Reporting Period. Provide information on number, nature, and resolution of complaints received during reporting period. Attach records as per GRM in the approved IEE. Identify safeguards team member/s involved in the GRM process. Attach minutes of meetings (ensure English translation is provided).
 - a. Confirm if any dust was noted to escape the site boundaries and identify dust suppression techniques followed for site/s.
 - b. Identify muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads.
 - c. Identify type of erosion and sediment control measures installed on site/s, condition of erosion and sediment control measures including if these were intact following heavy rain;
 - d. Identify designated areas for concrete works, chemical storage, construction materials, and refueling. Attach photographs of each area.
 - e. Confirm spill kits on site and site procedure for handling emergencies.
 - f. Identify any chemical stored on site and provide information on storage condition. Attach photograph.
 - g. Describe management of stockpiles (construction materials, excavated soils, spoils, etc.). Provide photographs.
 - h. Describe management of solid and liquid wastes on-site (quantity generated, transport, storage and disposal). Provide photographs.
 - i. Provide information on barricades, signages, and on-site boards. Provide photographs.
 - j. Provide information on
 - k. Checking if there are any activities being under taken out of working hours and how that is being managed.

Summary of Environmental Monitoring Activities (for the Reporting Period)^a

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						

^a Attach Laboratory Results and Sampling Map/Locations.

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

V. APPROACH AND METHODOLOGY FOR ENVIRONMENTAL MONITORING OF THE PROJECT

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

VI. 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

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM10 µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³

Water Quality Results

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

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

Noise Quality Results

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

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

VII. SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

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

IX. APPENDIXES

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

SAMPLE ENVIRONMENTAL SITE INSPECTION REPORT

Project Name
Contract Number

NAME: _____ DATE: _____
TITLE: _____ DMA: _____
LOCATION: _____ GROUP: _____

WEATHER CONDITION:

INITIAL SITE CONDITION: _____

CONCLUDING SITE CONDITION:

Satisfactory _____ Unsatisfactory _____ Incident _____ Resolved _____ Unresolved _____

INCIDENT:
Nature of incident:

Intervention Steps:

Incident Issues

Resolution

Project Activity Stage	Survey	
	Design	
	Implementation	
	Pre-Commissioning	
	Guarantee Period	

Inspection

Emissions	Waste Minimization		
Air Quality	Reuse and Recycling		
Noise pollution	Dust and Litter Control		
Hazardous Substances	Trees and Vegetation		
Site Restored to Original Condition	Yes		No

Signature _____

Sign off _____

Name _____
Position _____

Name _____
Position _____

**SOUTH ASIA REGIONAL DEPARTMENT
SAFEGUARDS INFORMATION LOG FOR SAUW PROJECTS**

Project:	IND: Karnataka Integrated Urban Water Management Investment Program (Tranche 2)		
Loan No.:		Package No.: 02KDP01	Improvements for 24 x 7 Water Supply System for Town Municipal Council in Kundapura
Components:	(i) Rehabilitation works and replacement of electromechanical equipment in Jack well at Jambu (Japthi village), and provision of a new diesel generator (ii) Rehabilitation of the existing 7.60 MLD WTP (iii) Feeder main (4.8 km length 200 mm diameter), from an existing clear water main to proposed overhead tank (OHT) at Kodi (iv) Two OHTs - 0.5 million liter (ml) and 0.4 ml capacity (v) Distribution network – 31.6 km - 75 mm to 250 mm diameter (vi) House service connection with water meters		
Contract Type:	NCB		
Date of IEE:	Updated / Final IEE: August 2018		
	Draft IEE	Updated/Revised IEE	Others
	Draft IEE approved by ADB in July 2018	Updated with final designs and site specific EMP in August 2018 -	IEE will be further updated if required to reflect any changes in project design, location, or construction during the implementation phase

	Section	Status		Comments/Remarks (include date accomplished or obtained, if applicable)
1.	Environmental assessment report (EIA/IEE/envi due diligence) has been prepared?	Yes ✓	No	KIUWMIP Cat B project. IEE is required. Final IEE was prepared during project preparation based on the detailed project report.
2.	EIA/IEE/envi due diligence based on project components and detailed engineering design?	Yes	No ✓	
3.	Statutory Requirements	-	Forest Clearance	Kodi OHT and pipelines in Kodi Zone falls in CRZ II. NOC already obtained from Karnataka Coastal Zone Management Authority
		-	No Objection Certificate	
		-	Site Location Clearance	
		-	Environmental Compliance Certificate	
		-	Permit to Construct (or equivalent)	
		-	Permit to Operate (or equivalent)	
		✓	Coastal Regulation Zone (CRZ) clearance / No objection certificate (NOC)	

	Section	Status			Comments/Remarks (include date accomplished or obtained, if applicable)	
		✓	Tree cutting permission		(KCZMA). Tree cutting permission required the Tree officer, Forest Department	
4.	Policy, legal, and administrative framework	Adequate		Not Adequate		
		✓				
		EIA/IEE/envi due diligence included discussion on:				
		✓	National regulation/law on EIA			
		✓	Environmental agency			
		-	Relevant international environmental agreements		No discussion	
		✓	Environmental standards (IFC's EHS Guidelines)			
5.	Anticipated environmental impacts and mitigation measures	EIA/IEE/envi due diligence satisfactorily discussed impacts and risks on:		Mitigation measures provided?		
				Yes	No	
			Biodiversity conservation		n/a	Endangered species and habitats not present in subproject sites.
		✓	Pollution prevention and abatement	✓		
		✓	Health and safety	✓		
			Physical cultural resources (PCR)		n/a	There are no places of archeological / historical importance or protected monuments
		X	Cumulative impacts			No mitigation measures required.
		X	Transboundary impacts			Not applicable
6.	Impacts from Associated Facilities	Addressed	Not Addressed	Not applicable	Corrective measures suggested, and those measures are included in the subproject	
		✓				
7.	Analysis of Alternatives	Yes		No	Not required for Cat B and no need to include in IEE.	
				✓		
8.	EMP budget included	Yes		No	Included in provisional sums of the contract	
		✓				
9.	EMP implementation integrated in PAM, and in bid and contract documents	Yes		No	EMP is part of bid document	
		✓				
10.	Consultation and Participation	Yes		No	Included in IEE	
		✓				
11.	Grievance Redress	Yes		No	Included in IEE	

	Section	Status		Comments/Remarks (include date accomplished or obtained, if applicable)
	Mechanism	✓		
		Description of GRM		Included in IEE
		Identification of GRC members		Included in IEE
12.	Disclosure		Endorsement to disclose on ADB website	Draft IEE disclosed on ADB Website For final IEE, this will be requested when the IEE has been cleared by ADB.
			Disclosed on project website	Draft IEE disclosed; For final IEE, this will be requested when the IEE has been cleared by ADB.
			Relevant information available to stakeholders and affected people in language and form they understand	Made available to stakeholder during draft stage
13.	Mobilized PMU Environment Specialist	Yes	No	At present, additional charge of environmental safeguards is given to an incumbent Assistant Executive Engineer. No dedicated person for environmental safeguards Action required: Appoint a dedicated environmental expert in the PMU
		✓		
14	Mobilized Environmental Safeguards Officer in Regional PMU		✓	Not yet mobilized
15.	Mobilized PIU Environment Specialist	Yes	No	An assistant engineer (AE) is designated as safeguards officer
		✓		
16.	Mobilized PMC Environment Specialist at PMU level	Yes	No	No environmental specialist available in the PMC
			✓	
17.	Confirm bid and contract documents and/or EMP include requirement for the contractor to appoint EHS supervisor and/or nodal person for environmental safeguards	Yes	No	IEE / EMP specifies EHS supervisor requirement, which is part of the bid
		✓		
18.	If contract awarded already, confirm contractor's appointment of EHS supervisor and/or nodal person for environmental safeguards	Yes	No	Yet to be mobilized
			✓	
19.	Awareness training on compliance to safeguard requirements	Yes	No	Not yet conducted by PMU/PMC
			✓	
20.	Monitoring and Reporting	Yes	No	Included in the IEE
		✓		
21.	Others/Remarks	Draft IEE was approved by ADB. This final IEE is yet to reviewed and		

	Section	Status	Comments/Remarks (include date accomplished or obtained, if applicable)
		<p><u>approved by ADB</u></p> <p><u>Specific comments for further follow up:</u></p> <ul style="list-style-type: none"> -This IEE report is finalized based on detailed design of subproject. It needs update only if there are any changes in design, location or construction during implementation of subproject -Mobilize a dedicated environmental specialist in PMU -Mobilize safeguards officer in the Regional PMU, Mangalore -Mobilize environment specialist in PMC -Obtain tree cutting permission 	