

Initial Environmental Examination

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India: North Karnataka Urban Sector Investment Program (Tranche 2)—Gulbarga

Prepared by Karnataka Urban Infrastructure Development Finance Corporation

For the Government of Karnataka
North Karnataka Urban Sector Investment Program

The initial environmental examination is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

ABBREVIATIONS

ADB	–	Asian Development Bank
ASP	–	Activated Sludge Process
BM	–	Bituminous Macadam
DoEEF	–	Department of Ecology, Environment and Forests
EIA	–	Environmental Impact Assessment
EMP	–	Environmental Management Plan
EP Act	–	Environment (Protection) Act, 1986
GoI	–	Government of India
GoK	–	Government of Karnataka
GSB	–	Granular Sub-base
IEE	–	Initial Environmental Examination
KSPCB	–	Karnataka State Pollution Control Board
MLD	–	Million Litre per Day
MoEF	–	Ministry of Environment and Forests
MSL	–	Mean Sea Level
MSS	–	Mix Seal Surface
NKUSIP	–	North Karnataka Urban Sector Investment Program
NOC	–	No Objection Certificate
NOx	–	Oxides of Nitrogen
OM	–	Operations Manual
PCC	–	Profile Concrete Course
PWD	–	Public Works Department
RSPM	–	Respirable Suspended Particulate Matter
SOx	–	oxides of sulphur
STP	–	Sewage Treatment Plant
RSPM	–	Respirable Suspended Particulate Matter
TSPM	–	Total Suspended Particulate Matter
WMM	–	Wet Mix Macadam
WRDO	–	Water Resource Development Organization

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I. INTRODUCTION:

A. Overview:

1. The Government of Karnataka (GoK) through the Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC) has prepared the North Karnataka Urban Sector Investment Programme (NKUSIP) under the Asian Development Bank assistance. The proposed NKUSIP is the logical follow-on investment program to the ongoing Loan 2312-IND. The NKUSIP is being formulated as a sector loan with a multitranche financing facility modality. The project goal is to facilitate economic growth in the five towns of North Karnataka under Package 3 and bring about urban basic services to the citizens that are environmentally sound and operationally sustainable. Outputs from several vital studies, financial assessment and social and **Environmental Assessment**, etc, have formed the backbone for the programme appraisal leading to approval of loan. Initial Environmental Examination (IEE) Report is considered as an important tool for incorporating environmental concerns at the project level. IEE should be carried out as early as the project planning stage as part of feasibility thus it can assure that the project will be environmentally feasible.

2. Initial Environmental Examination (IEE) of the proposed sub projects in '**Gulbarga City**' is provided in this section following the guidelines of Asian Development Bank's (ADB) Environment Policy (2002) and Environmental Assessment Guidelines (EAG) (2003). As the Sewerage Treatment Plan for Gulbarga City in Trench 2 aim to improve the quality of life by significantly improving the environmental conditions of the city, the environmental impacts are expected to be low and hence a rapid assessment has been performed. The Environmental Assessment is based on reconnaissance surveys, primary and secondary data obtained during actual field surveys, analysis, and from various concerned government departments. The report describes environmental baseline condition of city, existing environmental policies and relevant legislations and administrative framework applicable for the proposed sub component of NKUSIP Package-3. The part covers environmental impacts and mitigation measures for construction and operation phases of the project. Categorisation of project impact has been identified. The Environmental Management Plan and Monitoring Plan are substantiating the IEE report. The IEE report has been prepared as per requirements of ToR of Programme Consultants' Services.

B. Methodology

3. Environmental Assessment (EA) is the process in which environmental factors are integrated into project planning and decision making in details so as to achieve ecologically sustainable development. It aims to predict environmental impacts at an early stage in project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision-makers. By using EA both environmental and economic benefits can be achieved, such as reduction of cost and time of project implementation and design, avoid treatment/clean-up costs and impacts of laws and regulations. The methodology adopted for the preparations of feasibility study for the environmental assessment of these sub project are as follows:

- (i) Collection, documentation and analysis of environmental baseline data
- (ii) Environmental Screening.
- (iii) Assessment of Environmental Effects.
- (iv) Mitigation Measures
- (v) Preparation of Environmental Monitoring Plan.
- (vi) Preparation of Environmental Management Plan

1 Collection, Documentation and Analysis of Environmental Baseline Data

4. Data was obtained from secondary sources and also the primary data obtained by conducting survey, testing and field investigation

2 Reconnaissance Survey

5. The study team visited the selected alignment of sewer line and proposed Sewer Treatment Plant, Water Pipe line, Storm water drainage alignments. Environmental features are being carried out in this survey.

3 Collection, Collation and Analysis of Data

6. Most of the data collected from the secondary sources. However, primary data field investigation has been drawn. Secondary information was collected from state maps, town maps, census handbooks, Forest Department, Metrological Department, Water Works Deptt and other government publications as well as reports prepared for other projects in town. The data information collected from both primary and secondary sources were collated and analysed.

4 Documentations of Baseline Conditions

7. The documentation of the baseline conditions was completed for Project Influence Zone as per the ADB Guidelines. Primary surveys were carried out for determination of field existing scenario.

5 Environmental Screening

8. Environmental screening is necessary to assess the environmental effects associated with the Project with respect to human health and natural resources. It is also required to categorise the project in terms of its environmental impacts. Environmental screening has been done in line with the guidelines provided in the EAG of ADB (2003).

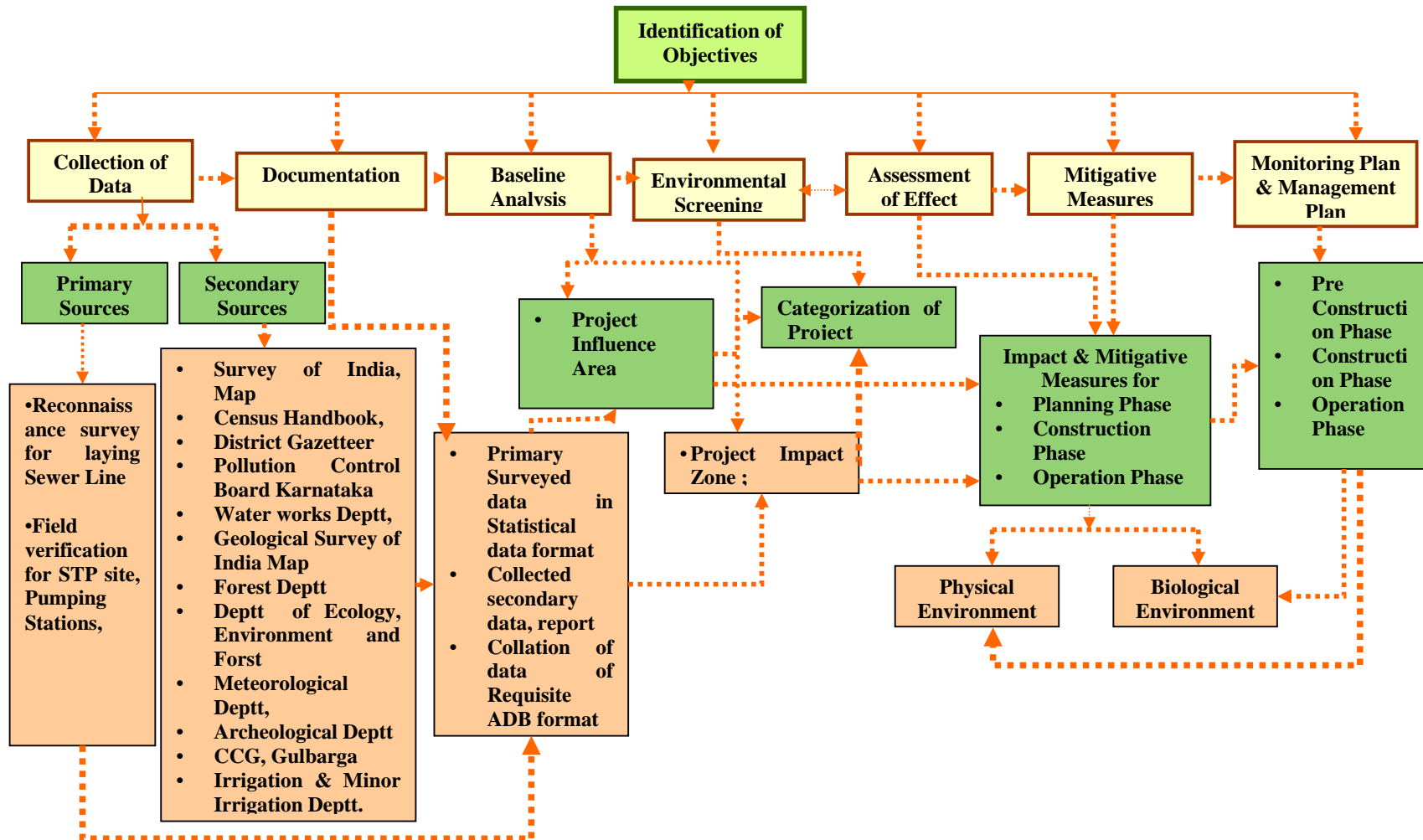
6 Assessment of Environmental Effect

9. Potentials and significant impacts were identified on the basis of analytical review of baseline data (both primary and secondary); review of land uses and environmental factors within the Project Influence Zone (PIZ). Identification of the probable environmental effects and needful actions at an early stage of the project facilitate in mitigation of the effects. The environmental effects are therefore, assessed for three stages of implementation of the project i.e. Planning and Design (Pre-Construction), Construction and Post-Construction.

7 Mitigation Measures

10. Environmental effects anticipated from the Project have been identified based on the environmental screening. Appropriate measures are needed to mitigate such effects. The environmental effects and corresponding mitigation measures required during the Pre-Construction, Construction and Post-Construction phases of the project have been identified accordingly.

Flow Chart 1: Methodology of Initial Environmental Examination



8 Preparation of the Environmental Monitoring Plan and Management Plan

11. Timely actions are needed to help in mitigating the environmental effects. Consultants have therefore prepared an Environmental Monitoring Plan and Environmental Management Plan (EMP) covering environmental issues, mitigation measures and actions required. Actions required for various agencies have also been identified in the EMP. The EMP has been prepared for three phases of the project namely Pre Construction, Construction and Post Construction phases.

C. Environmental Regulatory Compliance

12. The section discusses the existing environmental policies, relevant legislations with respect to the Sewerage projects and the administrative frameworks for the supervision and implementation of the provisions stipulated therein. The environmental guidelines and procedures of Asian Development Bank (ADB) have also been discussed in this section.

D. Asian Development Bank Requirements

13. ADB confirms that project proponents must include appropriate environmental and social considerations, through various measures, so as to prevent or minimize the impact on the environment and local communities which may be caused by the projects for which ADB provides funding, and not to bring about unacceptable effects. It will thus contribute to the sustainable development of regions. In making its funding decisions, ADB conducts screenings and reviews of environmental and social considerations to confirm that the requirements are duly satisfied.

E. Procedures for Confirmation of Environmental Considerations

1. Screening and Categorisation

14. The subproject was screened using a Rapid Environmental Assessment (REA) checklist (Annexure 1). Given the sector and scale of the project, the substance, and degree of potential environmental impact within the environmental and social context of the proposed project site and surrounding areas, the subproject is considered Category B, requiring an IEE (Table 1).

Table 1: Environmental Assessment Requirements for Category B

Category Basic	Environmental Assessment Requirements
B. Projects judged to have some adverse environmental impacts – but of lesser degree and/or significance than category A (OM 20)	IEE <ul style="list-style-type: none">• Public consultation• IEE report to be prepared

Source: Environmental Assessment Guidelines (EAG) (2003)

F. Indian Environmental Law & Regulations

1. The Environmental (Protect) Act, 1986 and the EIA Notification, 2006

15. The Environmental (Protection) Act, 1986 is the umbrella legislation providing for the protection of environment in the country. This act provides the Environment (Protection)

Rules, which were formulated in 1986. The Environmental Impact Assessment Notification, 2006 and the various amendments thereto have been notified under this act. As per the Amendment, formal Environmental Clearance from the ministry is not required for any sewerage, drainage or water supply project

2. The Water and Air (Prevention and Control of Pollution) Acts

16. The Water (Prevention and Control of Pollution) act, 1974 resulted in the establishment of the Central and State Level pollution Control Boards (CPCB and SPCB) whose responsibilities include managing water quality and effluent standards, as well as monitoring water quality, prosecuting offenders and issuing licenses for construction and operational of certain facilities similarly. The Air (Prevention and Control of Pollution) Act, 1981, empowers the SPCBs to enforce air quality standards set by the CPCB.

17. The Environment (Protection) Act, 1986. The EP Act is an umbrella legislation and supplements the existing environmental regulations, the Water Act and the Air Act. As per the Act, “Central Government shall have the power to take all such measures as it deems necessary or expedient for purpose of protecting and improving the quality of environment and preventing, controlling and abating environmental pollution”. The Act empowers the regulatory authority to “restriction of areas in which any industries, operations or processes or class of industries shall not be carried out or shall be carried out subject to certain safe guards”. Under this act Consent for Establishment (CFE) - Form XIII is applicable for siting STP at any place. In this project STP site is applicable for Green Category (only domestic sewage). Under this act State Pollution Control Board plays as regulatory authority to provide No Objection Certificate (NOC) for establishment of STP at particular site.

18. The Project requires the obtaining of clearances from the State Pollution Board of Karnataka pursuant to the Water (Prevention and Control of Pollution) act of 1974, the Cess Act of 1977 and Air (Prevention and Control of Pollution) Act of 1981.

3. The Ancient Monument and Archeological Sites and Remains Act, 1958

19. According to this act, area within radii of 100 m and 300 m from the protected property are designated as “protected area” and “Controlled area” respectively. No development activity (Including building, mining, excavating, blasting) is permitted in the “protected area” and development activities likely to damage the protected property are not permitted in the “controlled area” without prior permission of the Archeological Survey of India (ASI) if the site/remains/monuments are protected by ASI or the protected by the State. Within 100m radii of Fort area there is no excavation will take place. The Proposed alignment is not close to any protected property and therefore, this act will not be applicable for the project.

4. Gulbarga Municipal Council

20. Gulbarga Municipal Council is mainly responsible for handling key responsibilities like supply of portable water, sanitation and public hygiene, public lighting, sustainable urban growth, regulation of building construction and licensing of commercial activities, etc.

21. With special reference to the sewerage and drainage system, the Gulbarga Municipal Council is involved in:

- (i) Operation and maintenance of drainage and proposed sewerage systems.
- (ii) Construction and maintenance of surface drains, deep drains along the road and lanes within municipal maintenance.

5. Key Environmental Laws and Regulations

22. The environmental regulations and legislations relevant to this Project and its applicability of Acts and Rules described above have been summarized in Table 2 for Sewerage Sub Project.

Table 2: Summary of Relevant Environmental Legislations for Sewerage Sub Project in Gulbarga

No	Acts	Year	Applicability		Reason
			Yes	No	
1	Air (Prevention and Control of Pollution) Act	1981	√	<input type="checkbox"/>	This act will also be applicable to the project during construction for two new STPs and operation for three STPs of proposed 129 MLD for ultimate design year 2041. However under phase I for year 2026 design capacity of 39 MLD will be constructed at Nandikur village.
2	Ancient Monuments and Archaeological Sites and Remains Act	1958	<input type="checkbox"/>	√	City is rich in having monuments and protected sites like Fort. However, no construction work is proposed near these structures, which can affect them. Therefore, this act is not applicable to the project.
3	Bio-Medical Waste (Management and Handling) Rules	1998	<input type="checkbox"/>	√	These rules are not applicable, as the project would deal with sewerage system.
4	Environment (Siting for Industrial Projects) Rules	1999	<input type="checkbox"/>	√	The said project is an urban infrastructure development project, so rules are not applicable
5	Environment Impact Assessment Notification	2006	√	<input type="checkbox"/>	Environment Impact Assessment Notification has been issued for requirement of EIA and activities requiring clearance from Ministry of Environment and Forests and State Government: the activities of STP are not included in this notification. Therefore, the NKUSIP as an urban sector investment program does not require environmental clearance from MoEF and State Government.
6	Environmental (Protection) Act	1986	√	<input type="checkbox"/>	Since, all the environmental notifications, rules and schedules are issued under this act, it is applicable.
7	Forest Conservation Act	1927 1980	<input type="checkbox"/>	√	In present case this act will not be applicable, as project does not require any forestland to be cleared.
8	Hazardous Waste (Management and Handling) Rules	1989 2003	<input type="checkbox"/>	√	These rules are not applicable because the process does not required handling of any hazardous material
9	Land Acquisition Act	1894 1989	√	<input type="checkbox"/>	This act will be applicable because the project requires 21 acres land acquisition for the construction of a new STP at Nandikur village for Phase 1 and ultimate

No	Acts	Year	Applicability		Reason
			Yes	No	
					design period 2041 will be done under UIDSSMT Fund in second phase of this project.
10	Municipal Solid Waste (Management and Handling) Rules	2000	√	<input type="checkbox"/>	The provisions of these rules shall be applicable as the solid wastes in terms of sludge; grit and screened waste are to be handled.
11	National Forest Policy	1952 1988	<input type="checkbox"/>	√	This policy shall not be applicable; the project does not require any forest land to be cleared.
12	Noise Pollution Regulation and Control Act	1990	√	<input type="checkbox"/>	This act will apply to the present project. Noise pollution may results during the construction and operation of the STPs. The buffer zone is proposed for mitigation measures.
13	Water (Prevention and Control of Pollution) Act	1974	<input type="checkbox"/>	√	This act will not be applicable as the project does not abstract the raw water from source of water
14	Wild Life (Protection) Act	1972	<input type="checkbox"/>	√	This act will not be applicable as there is no wild life within the project area to be affected.

Source: EIA Notification 2006, EAG 2003 and Analysis

23. Pollution Control Board (PCB) is a regulatory authority for providing No objection Certificate (NOC) for Consent of Establishment (CFE) of any STP at particular site. Here Gulbarga Pollution Control Board plays role of regulatory body for furnishing Consent of Establishment. Obtaining NOC Form XIII will be submitted very soon with compliance of earlier submitted document to PCB, Gulbarga. Further on Field verification to be obtained from PCB, Gulbarga.

E Scope of IEE:

24. Main Scope of this work to assess the categorization of projects components and assessment of potential impacts to be analysed. As per ADB guidelines Projects judged to have some adverse environmental impacts (OM 20) and preparation of mitigation plan, responsibility matrix, Monitoring plan and detailed Environmental Management report.

F Report Structure:

25. This report contains the following heads:

- (i) Stage 1: Description of the Investment Programme in this city
- (ii) Stage 2: Project Description
- (iii) Stage 3: Description of Environment
- (iv) Stage 4: Environmental Screening of Sub Component
- (v) Stage 5: Potential Environmental Impact & Mitigation Measures
- (vi) Stage 6: Institutional Roles and Responsibility
- (vii) Stage 7: Environmental Monitoring Plan
- (viii) Stage 8: Environmental Management Plan
- (ix) Stage 9: Public Consultation and Information Disclosure
- (x) Stage 10: Findings & Recommendations

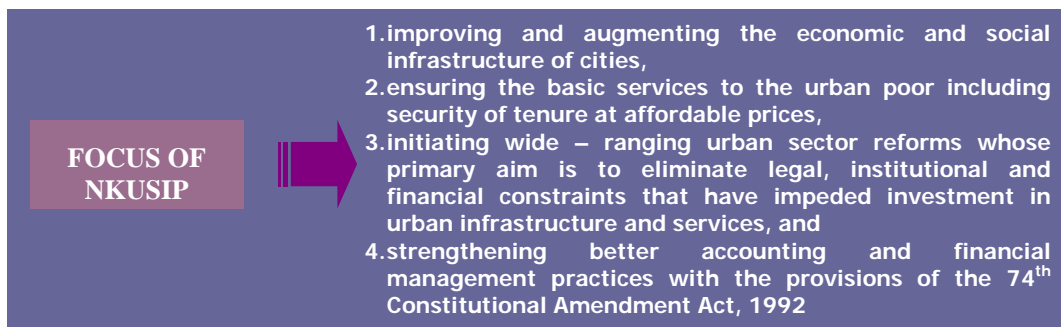
II. DESCRIPTION OF THE INVESTMENT PROGRAMME COMPONENT

A. NKUSIP Investment Programme Goal

26. Government of Karnataka (GoK) through the Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC) has prepared the North Karnataka Urban Sector Investment Programme (NKUSIP) under the Asian Development Bank assistance. The goal of the programme is to improve the level, quality and sustainability of basic urban services in selected Urban Local bodies (ULBs) contributing to improve quality of life among the urban Poor. The NKUSIP is consistent with GOIs urban reform objective for the Tenth Plan Period (2002-2007), which entails a reform agenda to initiate the process of:

- (i) Enhancing the capacity of Urban Local bodies (ULBs) to assume their functions in accordance with the 74th Constitutional Amendments, with greater sustainability and accountability.
- (ii) Strengthening local finance through rationalising and improvement of property tax, and levy of sufficient user charges;
- (iii) Ensuring improved maintenance of existing assets; and
- (iv) Introducing better accounting and financial management practices.

27. The NKUSIP would provide the momentum for the overall reform by supporting these objectives in Karnataka and promoting the emergence of better functioning cities.



28. The development purpose is designed to assist Urban Local Bodies (ULBs) to “promote good urban management, and develop and expand urban infrastructure to increase economic opportunities and to reduce vulnerability to environmental degradation and urban poverty”. Outputs from several vital studies, financial assessment and social and **Environmental Assessment**, etc, have formed the backbone for the programme appraisal leading to approval of loan.

B. Need for Infrastructure Improvement:

29. To encourage reforms and fast track planned development of the cities and efficiency in urban infrastructure and urban services delivery mechanisms and accountability of Municipal areas towards citizens the following Prime objectives have been framed out:

- (i) Design & rehabilitate essential municipal infrastructure
- (ii) Rehabilitate essential non municipal services
- (iii) Raise the quality of life of urban population of Gulbarga City.

30. NKUSIP comprises the following seven components. Parts A through D is designed to address the urban development needs of the Gulbarga City; Part E is designed to address requirement for fire services, tourism development; Part F is designed to address capacity

building initiatives of the Investment Program ULBs and training requirement for staff; and Part G is designed to assist Investment Program implementation.

- (i) Part A : Environmental Sanitation Infrastructure;
- (ii) Part B : Urban Storm Water Drainage
- (iii) Part C : Urban Roads Improvement;
- (iv) Part D : Poverty Alleviation;
- (v) Part E : Non-Municipal Infrastructure;
- (vi) Part F : Institutional Development; and
- (vii) Part G : Investment Program Assistance Facility.

Part A: Environmental Sanitation Infrastructure

31. This component comprises (i) sewerage and sanitation, which includes rehabilitation of existing sewer networks, Supplying and Laying of network of Lateral Trunk Main & Laterals in Proposed Sewerage Zone, sewage treatment plants and sewage pumping stations, Flushing cisterns & Ventilating shafts and construction/expansion of new sewerage system including network and treatment plants;

Part B: Urban Storm Water Drainage

32. The storm water drainage system in Gulbarga is predominantly open drain system and extends to a drainage network length of 150 km covering 12.4 percent of the total road length in the city. The Proposed work under drainage sub project has been identified that the main drain of the city of length about 10 km needs to be rehabilitated. Under the proposed work the following component are being carried out:

- a. Desilting, deweeding and cleaning in entire stretches.
- b. Redesign of the drain sections at selected stretches.
- c. Excavation of the drain in encroached stretches
- d. Construction of side walls and bottom slab with base flow channel of the selected stretches of drain as per redesign
- e. Construction of top slab of the drain wherever it is required.
- f. Repairs to culverts
- g. Construction of New Culverts.

Part C: Urban Road Improvement

33. This component comprises improvements to ULB roads, and comprises improvement and strengthening to critical road links, traffic management measures and street lighting.

Part D: Poverty Alleviation

34. This component will address the environmental conditions of informal and formal low income settlements. NKUSIP will improve environmental services in these settlements by providing water supply, sewerage, drainage, and pavements. For settlements not recognized by the ULB, the Investment Program will provide for public conveniences catering to the environmental sanitation needs of dwellers.

Part E: Non-Municipal Infrastructure

35. Fire services, tourism and heritage conservation, lake conservation, etc. shall form a part of the non-municipal infrastructure component under the Investment Program. The components will be detailed during the detailed design phase and considered for funding during the mid-term review.

Part F: Institutional Development

36. The institutional development component will comprise capacity building of Investment Program ULBs through (i) computerization, property tax assessment and service utility line mapping through a Geographical Information System; (ii) facilitating transition of ULB accounting functions to a Fund Based Accounting System through computerization of accounting and financial management functions; and (iii) providing training of ULB and State Line Department staff regarding Investment Program implementation and urban governance.

Part G: Investment Program Assistance Facility

37. Procurement of consulting services – Investment Program management, design and supervision, and benefit monitoring and evaluation – will form a part of the Investment Program assistance facility. The Investment Program Assistance Facility (IPAF) will finance incremental administration at the two Investment Program Management Units (IPMU) and shall cover staff, office and equipment costs required for supporting the Investment Program. Information, Education and Communication (IEC) requirement by sector and payment towards Investment Program Consultant (IPC) services will form a part of the IPAF.

C. Project Component:

38. In Gulbarga City, sewer network was laid in mostly 70% of the total area. Remaining areas, individual septic tanks and dry latrines provide the disposal system for domestic sewage.

39. Under the Multisector Project for Infrastructure Improvement in Gulbarga, sample subprojects under the following sewerage plan were identified and the IEEs were conducted for typical works. The project area, present and projected population in Gulbarga City are as below.

Table 3: Project Area, Present and Projected Population in Gulbarga City

Project Area	Extent of Area (Sq. km)	Census Population 2001	Projected Population in 2026 (Intermediate Stage Design Year)	Projected Population in 2041 (Ultimate Stage Design Year)
All areas under jurisdiction of Gulbarga Municipal Corporation	65.00	4,30,265	8,29,319	11,39,530

40. The design horizon for the project is 2041. The sewerage system improvement works are proposed in three phases. It is considered that the works under first phase will be implemented under NKUSIP and the works under the second phase may be taken up under

UDISSMT & third phase works will be taken up in future in other projects. Works proposed in the first phase works under NKUSIP is for the core developed areas of the city. Works proposed in the second phase is for peripheral and recently developed areas of the city and will be implemented in UDISSMT and as well as siting of STP at Nandikur village. There are several components are adhere to make comprehensive development of City for better future as follow:

Table 4 Details of Sewerage Infrastructure Proposed in Gulbarga

Infrastructure	Description	Location	Land Acquisition
A. Components to be built under ADB financing (Phase I works)			
Rehabilitation of the existing lateral for Zone A and B (including replacement)	Zone B Replacement of existing sewer network: 19.4 Km Dia 150-500 mm	Zone B: wards 16,45,33,43,17,3 5,34,40,42,19,6,2 3,24,47,21,36,41, 20,48,49,22,52,1 8	No Acquisition Required
Construction of new proposed Sub mains and Trunk mains for Zone A and B	Zone B: Dia Pipe Line 350 2689 400 439 500 2144 700 1881	Zone B: wards 16,45,33,43,17,3 5,34,40,42,19,6,2 3,24,47,21,36,41, 20,48,49,22,52,1 8	No acquisition
Construction of new proposed laterals for Zone A and B	Zone B: Dia Pipe Line 150 62705 200 2063 250 743 300 332 350 1180	Zone B: wards 16,45,33,43,17,3 5,34,40,42,19,6,2 3,24,47,21,36,41, 20,48,49,22,52,1 8	
STP in Nandikur Village	Total 78 Mld Population mld 2026 363343 39	Sub Zone B, Part of A and C	21 Acre of Private land. Status: 4(1) Notification completed and notice has sent to individual land owners
Sludge Drying bed	1 unit of 20 m dia circular sludge drying bed. 2 units are being proposed	Within total area of proposed STP site at Nandikur Village Agricultural land	Sub Component will be within total acquired land for proposed STP site for 21 acre

Source: DPR, Sewerage Works, Gulbarga

D. Project Description:

1 Sewerage System Sub Project Work:

41. Gulbarga has been the district's headquarter since 1873. Gulbarga city is located at an altitude of 458 meters above mean sea level (MSL) and its geographical coordinate is 17°22' North latitude and 76°46' East longitude. Gulbarga City accounts for 14% of the district's total population and about 50% of its urban population. As per census 2001 the city addressed as Gulbarga Urban Agglomeration (GUA) comprises of City Corporation Gulbarga and three outgrowths namely Kopnoor (part), Rajapur and Kotnoor Darwesh. In 1961 the Board area was 25 sq.km and had 31 wards. In 1995-96 the corporation area became 55.15 sq. km. The territorial jurisdiction of the City Corporation Gulbarga (CCG) has increased from 55 sq. km to 65 sq. km due to inclusion of the three outgrowths within the CCG boundary so as to provide the municipal services. So, study area covers total 65 sq km with 2001 census population of 430,265 with density of 6619.462 population per sq km. **Map 1** show the **Project Area**. The project area is the area under jurisdiction of **Gulbarga Municipal Corporation**. The project area is bounded by Kapnoor village, Bidar road on the North, Gulbarga university compound, Sedam road on East, Netaji Nagar, Jewargi Road on South and High Court Peet, Afzalpur Road on West.

42. In Gulbarga City, sewer network was laid in mostly 65% of the total area. Remaining areas, individual septic tanks and dry latrines provide the disposal system for domestic sewage. There is one Waste Stabilisation Pond sewage treatment plant in the city. Existing sewage treatment plant is partially functional and not maintained properly. Hence, it has been proposed to rehabilitate the existing sewage treatment plant at Kotnoor village. Total capacity is sufficient to cater the total sewage generation for ultimate design period 2041 for two sub zones. **Map 2** shows the existing sewer network along with zones for Gulbarga City.

43. The entire Gulbarga city has been divided in three sewerage zones and seven sub zones viz. A, B, C, G, D & E and F. Except sewerage zone F, all sewerage zones are drainable by gravity to the southern part of city. The sewer laid in the old areas of Gulbarga City, where population density is high. The sewer is choked in initial and many stretches. Due to non functioning of the sewer, all road side drains are carrying domestic sewage. The sewer is passing through open areas. The Kotnoor nala carries mostly the untreated sewer of city.

44. Under the Multisector Project for Infrastructure Improvement in Gulbarga, sample subprojects under the following sewerage plan were identified and the IEEs were conducted for typical works. This project includes sewerage pipeline, pumping stations and one new STP at near Nandikur Village under this phase II of Trench 2. The proposed STP at Kapnoor village will be constructed under Phase III. The sewerage Zone F under this STP is presently very sparsely populated area.

45. The Proposed Gulbarga city sewerage system divided into three STP zones as below. Proposed Sewerage Zone and network Map is shown in **Map 3**.

Zone 1- Nandikur STP zone
(A, B, C & G sub zones)

46. This zone includes existing three sub zones A1, B, C and G(A2). G is new sub zone located on outer side of ring road at south east of City. The zone is covered by cotton market area and industrial area on north and Vijay Vidyalaya and Rajpur village on south side, areas along Sedem Road on East side, areas along Aland road on west side, areas along Shahabad and Bangaluru roads on south east side and South side area between Jewargi road and railway line towards Bangaluru. This zone consists of core area of Gulbarga city. The existing landuse of this zone is primarily residential area. The major residential colonies are Roza, Yadulla Colony, Nurani Colony, Khaja colony, Payan area, Mominpura (I & II), Mecca Colony, Millat Nagar, Basaveshwar Nagar, Badepur Colony Phase- I,II and III, Buland parvez colony Jagat Gazipura, Old Jagat Area, Shahbazar, Devi Nagar, Shaik Roza, Kale Layout, Sharan Nagar, Mahalaxmi Layout, Aland Colony, Maktampura, Asif Gunj,

Shahabazar, Super Market, Brahampur, Mominpura, Shahabaaz Colony, Rahmat Nagar, P&T Colony, Sadashiv Nagar, Sideshwar Colony, Market area etc.

Zone 2- Kotnoor STP zone
(D & E sub zones)

47. This zone includes existing two sub zones D and E. This zone is covered by Stone quarry area, Basavanagar, MSK Mill area on north and Right side area along Jewargi road on south side. Areas along Afzalpur road on west side and K S E B. areas on east side of zone. The natural topography of this zone is north to south. Major residential colonies are Gudutai Colony, Bhagwati Nagar, Venkatesh Nagar, Shastri Nagar, NGO Colony, Part of Jewargi colony, Karuneshwar Nagar. Shanti Nagar, MSK mill Area, Jeelanabad colony, Basava nagar, Ashok nagar, Vidya nagar, Dhangar Galli, Manikeshwari Nagar, CIB colony, Shakti nagar, Kanta Layout etc

Zone 3- Kapnoor STP zone
(F sub zone)

48. The zone includes the industrial area along Gulbarga road on north of city. The natural topography of this zone is south to north. Areas are within this zone are Kapnoor area, Chanveer Nagar, Raju Gandhi Nagar, Suvarna Nagar Tanda, Gandhi Nagar, Taj Nagar, Munim Sang Area, Nandi colony, Islamabad Colony, Revanasideshwar Colony, Surrounding Warehouse Area. These area are sparsely populated.

Table 5: Project Description

Sewerage Sub Zone	Projected Population 2041	Quantity of Sewage Generation 2041 (MLD)	Area Description
Zone A	220,132	25	Ward No : 5, 16, 10, 11, 2, 25, 26, 15, 12, 9, 4, 14, 31, 27, 28, 29, 44, 45, 30, 47, 46, 24
Zone B	284,048	32	Ward No:18, 6, 23, 16, 22, 19, 35, 33, 24, 36, 34, 17, 40, 42, 43, 45, 41, 47, 52, 49, 48, 46, 20
Zone C	79,187	9	Ward No: 52, 54, 53, 48
Zone G	107,354	12	Ward No: 13, 29, 30, 46, 47
Zone D	63,806	7	Ward No: 51, 54, 55, 49, 52
Zone E	179,610	20	Ward No: 20, 21, 37, 39, 38, 50, 55, 22, 36, 51, 41
Zone F	205,393	23	Ward No: 6,23, 1, 7,8, 3, 9, 4, 32, 2
Total	11,39,530	129	

Source: Analysis

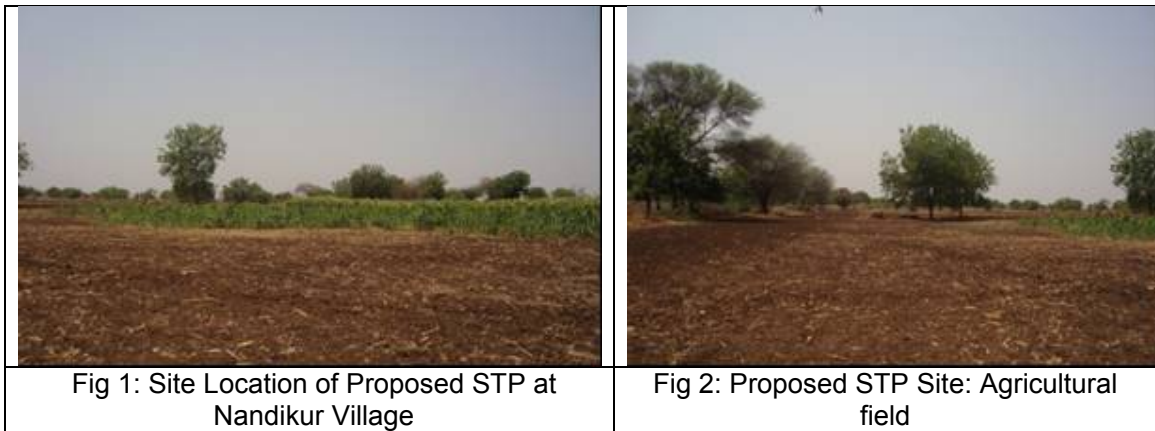
a. Treatment Technologies

49. Activated Sludge Pond (ASP) selected as treatment technology for 74.6 MLD STP at Nandikur village for ultimate design period 2041. For existing WSP STP at Kotnoor Village for 28 MLD with rehabilitation work for year 2041 is proposed. Near Kapnoor Village for 22 MLD will adhere in Phase III. The technology meets the standards stipulated in the guidelines of CPHEEO Manual. The treated sewage will be used for land irrigation. The sludge will use for manure and solid waste will be disposed off at disposal site. The proposed STPs are designed to handle 129 MLD expected in year 2041. It is proposed to develop the one STP at Nandikur village in phased manner considering the future developments. During phase 1 only part of sub zone A, complete of sub zone B and C are

expected to cover by 2026 for which the STP is constructed only for 39 MLD. Further STP can be upgraded by providing additional units as and when required. Second phase and up gradation of existing STP at Kotnoor and the balance will be executed in the third phase at Kapnoor STP. **(Ref map 4).**

b. Site Selection

50. The STP will be constructed sufficiently away from the settlement area. This land is presently use for agriculture purpose. Natural drain is passing approximately 200 m away from proposed site. This land is neither placed at lowline area nor flood plain area. The proposed site is already bypassing the natural drain. There is no drinking water source nearby the site area. The sites selections have been justified because the treated effluent form the plant will be used in agricultural purposes, etc. The existing condition is clearly vivid in following figures. The proposed STP site is predominantly agricultural field.



51. There is no habitation within proposed area. Settlement is not in vicinity. The land is flat terrain with Black cotton soil. The sparsely vegetated cover can make use for buffer area.

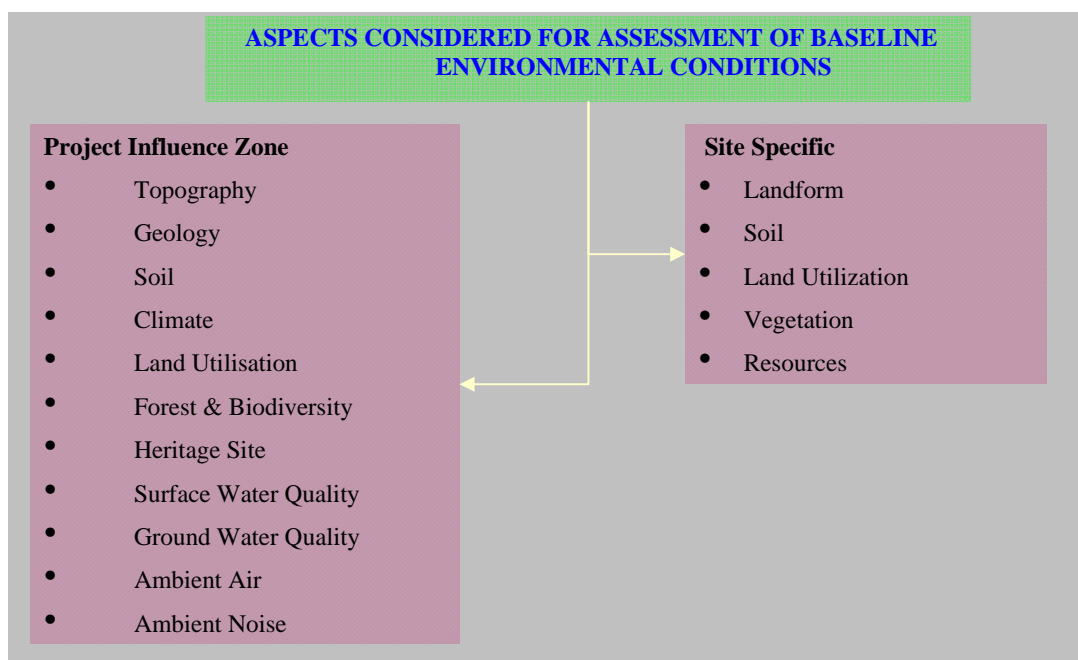
52. Sewer Cleaning & Desiltation Process; Sewer Lines are to be clean with sucking and jetting machines. With period of time man holes are to be opened and clean with Sucking and jetting machines and ultimately will disposed off in designated landfill site of CCG at Udnoor village.

53. Proposed pipe lines are to be laid all along road. In Zone A1 existing trunk to be rehabilitated at Mamipura naya mohalla, ward 44 , 45 where as A2 main trunk line passes through Adarsh Nagar, Prashant Nagar, Basewweshar Nagar, Om Nagar, Virendra Sagar Patil layout Yamuna Nagar area. In Zone B trunk passes through Ialigiri Cross Behind Corporation Park, Ward 48, in Zone C trunk main linewill belaid all along road at hinayat Nagar, Iswar Nagar and in Zone D at Ganesh Nagar, New Sai Baba Colony main trunk line will be laid. In zone E from Hirapur follwed by ring road, afjalpur road to Shakti nagar main trunk will be laid. There is no laid pipeline and proposed line are to be traversed any park or open land or any protect areas. Trunk lines are to be laid all along road.

III DESCRIPTION OF THE ENVIRONMENT

A. Environmental Profile of Gulbarga

54. The baseline environmental status of the project influence area is based on available secondary information and collection of primary data by conducting field survey within proposed sewer line and STPs. It will help in assessing the magnitude of potential effect both beneficial as well as adverse due to the proposed project activities on the environment. In order to assess the baseline environment conditions of the project area, the following aspects have been considered.



55. Gulbarga has one sewerage treatment plant but it is not functioning properly. Solid wastes are also dumped into the open drains. These unsanitary practices has created major health problem in the area. To facilitate assessment of adverse environmental impacts, the existing scenario of environmental status of the project region is studied.

1. Topography & Geology

56. Gulbarga is located on the vast expanse of gently undulating plain. The terrain drains towards south and southeast towards Bhima River (25 kms away), which is a major tributary of Krishna River. It is surrounded by small hillocks towards the north and northwest side. The city is spread around the natural lake (The Sharana Basveshwara Tank), which is the lowest point of the city and catchment for all run-off and storm water.

57. Gulbarga district consists of Deccan traps and sedimentary rock formation. Black cotton soil, a very fertile soil, overlays the Deccan trap and the Bhimas. Its spread on the rock is as much as 30 inches thick at some places. Areas occupied by granite have the cover of loamy soil to sandy soil. The laterite rock is the commonly available cheap building material in the area. Apart from the limestone and granite deposits in some pockets of the district, the other natural resources are quartz, gypsum, Fuller's earth, and some minor minerals. Stone quarries are found on the periphery of the city. Shahabad stones are famous in the region for its light blue colour.

2. Soil

58. The red laterite soil and black cotton soil are the main soil types found in the area. The laterite rock is the commonly available cheap building material in the area. The black cotton soil is found in patches and is utilized for mainly agricultural purpose. The physiochemical properties of Gulbarga soil is drawn in following table:

Table 6: Soil Condition of Gulbarga City

Sl No.	Parameter	Component of Black Soil	Condition of Soil in Gulbarga City
1.	Organic matter	6-10	0.86
2.	pH	8-9	7.8
3.	Moisture (%)	50-54	19.28
4.	N (%)	0.69	0.59
5.	P (%)	12.18	12.10
6.	K (ppm)	178	166
7.	Zn (%)	0.64	0.60
8.	Fe (%)	3.80	3.55
9.	Cu (%)	3.81	3.15
10.	Lime (%)	6.3	6.5

Source: Gulbarga University Tested Data

59. The physicochemical condition of soil is not very productive. Organic component is moderate but soil is mainly normal. Moisture content is very low. The NPK value is on lower side. Even micro nutrients are almost lower end. Proposed STP site is covering black cotton soil. This parent soil will be used for preparation of impervious bed of STP site which will protect the groundwater leaching and further contamination.

3. Climate

60. The meteorological observatory for the district is located in the Gulbarga city. The city generally experiences hot and humid climate with prolonged summer. The summer season starts by about middle of February and continues to about the first week of June with May as the hottest month. The south-west monsoon season follows thereafter and extends up to the end of September. October and November constitute the post-monsoon season. The period from December to middle of February is the winter season with December as the coldest month. The annual mean of monthly maximum temperature is 33.7° C annual mean of minimum monthly temperature is 20.7° C. The maximum temperature is observed in month of May i.e. 40.6 °C and minimum temperature is on December.

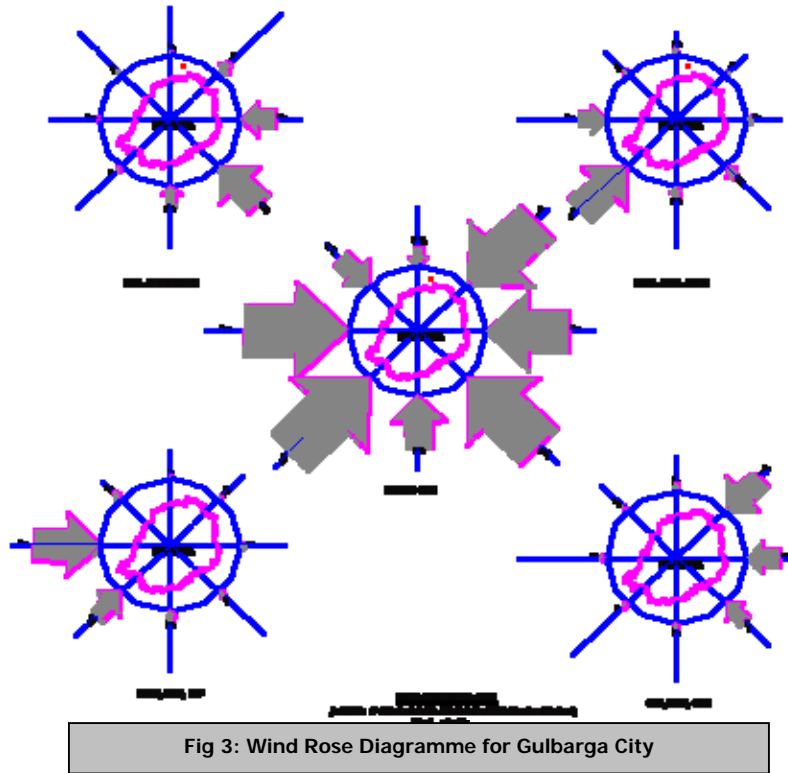
Table 7: Seasonal Variation of Temperature

Season	Month (extreme condition)	Mean Daily Temperature	
		Maximum Value	Minimum Value
Winter	December	29°C	14.8°C
Summer	May	40.6°C	25.9°C

Source: Master Plan, Gulbarga

61. The period from December to May is the driest when the relative humidity ranges between 60 per cent (in the morning) and 40 per cent (in the evening). Humidity increases by about 20 to 30 per cent during the southwest monsoon months. Winds are generally light to moderate with increase in force in latter half of summer and the monsoon season. In rainy season, the predominant wind direction is from West and South West. In winter wind

direction is from East and North East. In summer season, winds are variable in direction, but by May, winds from direction between west and north predominate.



4. Land

Land Use Pattern (LUP)

62. According to the existing landuse pattern of year 2007 comprises of 36% residential area followed by 27% under transport and communication and 21% under public and semi-public. The maximum land under use for residential purpose. So there is need to make city hygienic and proper sewerage system. The present landuse pattern has been given in following table

Table 7: Existing Landuse Pattern (LUP)

Landuse	Existing landuse 1997		Existing landuse 2007	
	Area (ha)	% age	Area (ha)	% age
Residential	1,203.47	42.62	1416.38	35.83
Commercial	121.01	4.29	186.46	4.72
Industrial	297.39	10.53	228.72	5.78
Public, Semi-public*	597.75	21.17	839.22	21.22
Parks, Play ground, Open spaces	96.31	3.41	178.05	4.50
Public Utility	7.97	0.28	37.54	0.95
Transportation & Communication	173.55	6.15	1067.08	27.00
Vacant	326.37	11.56		
Total Developed area	2,823.82	100 (93.85)	3953.45	100 (91.09)
Water sheet	36.78	1.22	386.77	8.91
Agriculture	148.34	4.93		
Total urbanized area	3008.94	100.00	4340.22	100.00

Source: Gulbarga Development Authority

5. Water Quality

a. Surface Water

63. Development of Gulbarga city water supply took place in year 1993, as the earlier two stages from Bhosga Reservoir and Bennithora River, which were not dependable for steady supply to the city throughout the year. This system was designed to supply water through Storage Barrage across Bhima River, near village Saradgi, about 27.50 km from the city and to store water in the riverbed. The river Bhima is originated at Maharashtra and several other rivers adjoin with it. From several barrage put up the flow of river is in control. As a result the homeostatic mechanism of water itself becomes poor along with the course of stretch. Industrial effluents are also added some extent to make it polluted. Presently, STP is not functioning properly to make environmentally good to river course. Subsequently the result is poor.

64. As per CPCB Norm the standard of water quality of surface water is as follows:

Table 8: CPCB Standard for Water Quality of Surface Water

Standard for Water Quality of Surface Water		
Class	Beneficial Use	
A	Drinking without conventional use	
B	Bathing	
C	Drinking after conventional use	
D	Propagation of Wild Life and fisheries	
E	Irrigation, cooling & controlled waste Disposal	
Details of parameter of each Class:		
Class	Parameter	Criteria
A	D.O	>6 mg/lit
	B.O.D	<2 mg/lit
	Coliform	<50/100 mt
	PH	6.5-8.5
B	D.O	>5 mg/lit
	B.O.D	<3 mg/lit
	Coliform	<500/mt
	PH	6.5-8.0
C	D.O	>4 mg/lit
	B.O.D	<3 mg.lit
	Coliform	< 5000/100 mt
	PH	6.0-8.0
D	D.O	>4 mg/lit
	PH	6.5-8.5
	Coliform	<5000/100 mt
	Free Amonia	<1.2 mg/lit
E	PH	6-8.5
	Sodium Ratio	<26
	Boron	<2.0 mg/tonnes
	Electrical conductivity at 25 degree Celsius	<2250 mcromos /cm

Source: CPCB

65. Karnataka State Pollution Control Board, Gulbarga has monitored three points of water quality at this Bhima River. The location point of water quality testing is at near to Gangapur Bridge, at near Firozabad Village and one confluence point of present sewage disposal point at Saradgi town i.e. 5 km away from Firozabad water quality testing location. The tested data has been tabulated as under:

Table 9: Surface Water Quality, Gulbarga

SI No	Parameters	Unit	Drinking Water Standard IS 10500	Location Point		
				Gangapur Bridge 35 km away from Gulbarga City: Upstream	Firozabad Village 28 km away from Gulbarga City: Downstream	Near Jewargi town 35 km away from Gulbarga City: Downstream
1.	pH		6.5-8.5	8.70	8.54	8.29
2.	Turbidity	N.T.U	5	12	10	16
3.	Conductivity	Micr s/cm		1.20	1.00	0.51
4.	Colour	Hazen Unit	10	Colour less	Colour less	Grey colour
5.	Odour			Odour less	Odour less	Odour less
6.	Total iron	mg/l	0.3	0.26	0.82	0.84
7.	Nitrate as NO3	mg/l	<1.2	0.25	0.12	0.22
8.	Alkalinity as CaCo3	mg/l	200	192	172	198
9.	Dissolve Solids	mg/l	500	584	612	620
10.	Sulphate as SO4	mg/l	150	136	156	156
11.	Chloride	mg/l	250	116	132	131
12.	Total Hardness	mg/l	300	244	238	256
13.	Calcium as CaCO3	mg/l	75	84	42	72
14.	Magnesium as CaCO3	mg/l	30	160	196	180
15.	DO	mg/l	>6	6.8	6.9	6.8
16.	BOD	mg/l	5	1.90	1.30	1.30
17.	COD	mg/l	3	20	16	30
18.	Faecal Coliform	MPN / 100 ml	Nil	10	nil	30
19.	Total coliform	MPN/ 100 ml	<50	220	220	190

Source: KSPCB, Gulbarga

Criticality

66. Viewing above data it is revealed that the overall surface water quality is not within permissible limit. The turbidity level in water is very high. The flow of water is poor. Subsequently TDS value of water has increased. COD level is more than permissible limit. It reveals that the intercepts of sewage in river Bhima without any treatment. The mixing of solids are also in huge amount all three cases where the limit is only 500 mg/l. The quantity of Dissolve solids are more in all three samples. It could be only possible due to mixing of silt. As a result the pH value is in also higher side. At Jewargi town sample water is also in grey colour. Total Coliform is also presence in water. After review the above data it is clearly

noticed that there is need to treat waste water which is presently directly outfall into surface water Bhima and pollutes it

b. Lake Water Quality:

67. The inland water is one of the most important features in this city. The Sharanabasaweshwar lake is key feature for tourist attraction and beautification of city. This lake is far away from proposed STP site and even trunk line will be laid all along road .There will be no impact anticipated by this proposed project. The quality of water in this lake has been monitored by KSPCB, Gulbarga at four different points, as under:

Table 10: Lake Water Quality, Gulbarga

SI No	Parameters	Unit	Drinking Water Standard IS 10500	Location 1:	Location 2:	Location 3:	Location 4:
				Ambedkar Statue	Opposite Science Centre	Near Darga	Opposite L.L. M. Show Room
1.	pH		5.5-9	8.96	9.00	9.00	8.60
2.	DO	mg/lt	6	5.5	4.6	5.7	3.3
3.	COD	mg/lt	30	95	87	71	91
4.	BOD	mg/lt	5	10	10.5	7.2	12.6
5.	Total Hardness as CaCO3	mg/lt	300	404	400	110	392
6.	Calcium(Ca)	mg/lt	75	19	20	16	21
7.	Magnesium	mg/lt	30	87	85	90	83
8.	Chloride	mg/lt	250	296	290	300	300
9.	Sulphate	mg/lt	200	125	138	132	134
10.	Total alkalinity	mg/lt	200	330	342	340	336
11.	Nitrate	mg/lt	20	1.24	1.24	0.83	0.67
12.	Fluorite	mg/lt	1.5	0.07	0.06	0.05	0.05
13.	Dissolve Solids	mg/lt	500	1012	1062	990	1058

Source: KSPCB, Gulbarga Criticality

68. The lake water is deteriorated over the period. The main cause of deterioration is adding of pollution load to water body, waste water intrusion, sewage water outfall and immersed of Ganesh idols. The chemical color of idol deteriorates water body. Hence, the restoration and reclamation has been taken care. Fencing and barrier are already been provided over here. Still the water quality is not very well. COD level is high. It is more than permissible limit in all four sample points. The BOD levels are also high in all four corners of lake. Chloride content is still very high which shows the high level intrusion of waste water in lake. Even siltation rate is also high. The total dissolve solids are also high and more than desirable limit

c. Ground Water:

69. Ground water is drawn through open wells and bore wells fitted with hand pumps. To asses the water quality of city and people access of water quality is to be assessed by examining the water quality of these open wells and bore wells. At present water level of city

on an average is 100-150 feet bgl. Although the ground water table is depleted day by day. Basis of secondary data of KSPCB, there are four open wells are monitored in different time. Recent data has been tabulated as under for assessing the status of GW quality:

Table 11: Ground Water Quality, Gulbarga

Sl No	Parameters	Unit	Drinking Water Standard IS 10500	Location 1:	Location 2:	Location 3:	Location 4:	Location 5:	Location 6:
				Royapur Colony	HKOB Quarter	University	Unoni Medical College	Kapnaou Ind Area	ARLS
1.	pH		6.5-8.5	7.13	7.60	8.16	7.58	7.90	7.94
2.	Turbidity	N.T.U	5	01	01	01	01	01	01
3.	Colour	Hazen Unit	10	Colour Less	Colour Less	Colour Less	Colour Less	Colour Less	Colour Less
4.	Hex-Ct ⁴⁰	mg/l	0.05	ND	ND	ND	ND	ND	
5.	Fluorite	mg/l	0.6-1.2	0.619	0.412	0.666	0.619	0.452	0.426
6.	Total iron	mg/l	0.3	-	-	-	-	-	-
7.	Nitrate as NO ₃	mg/l	45	29.23	27.24	42.30	17.49	5.09	22.47
8.	Alkalinity as CaCO ₃	mg/l	200	428	324	144	316	192	228
9.	Dissolve Solids	mg/l	500	2170	840	716	458	422	410
10.	Sulphate as SO ₄	mg/l	150	209	30	61	60	15	32
11.	Chloride	mg/l	250	642	240	230	120	90	62
12.	Total Hardness	mg/l	300	904	464	350	346	320	340
13.	Calcium as Ca	mg/l	75	227	37	36	43	24	38
14.	Magnesium as Mg	mg/l	30	82	90	63	58	63	60

Source; KSPCB, Gulbarga

Criticality

70. The overall assessment of this city's water quality is potable. Maximum tested water sample are saline and within permissible limit. TDS value is also within permissible limit. The color of water shows the cleanliness of water and basic parameter to identify the potability for drinking purpose. All stations tested value is color less and physical quality is good. Even fluorite content of water is showing in all sample is acceptable. Nitrate concentration in aquifer is also less. But the calcium and magnesium value are not acceptable in all cases. At location 1 calcium value is more than desirable limit but rest are within acceptable unit. It might be due to the physico-chemical composition of aquifer. The sulphate, chloride content is in higher range at location 1. The presence of chloride is just because of pollution generation by sewage. But in this case may be due to presence of iron and other minerals, the result is beyond permissible limit. Treatment is needed for drinking purpose over here. Although, chemical condition of ground water is good but there is some chlorination and removal of hardness is needed.

d. Waste Water:

71. There is one time data available to assess the waste water quality of Gulbarga City of Kotnoor STP. The Environmental quality of waste water is written as follow:

Table 12: Waste Water Quality at Kotnoor Existing STP Site, Gulbarga

Sl No.	Parameters	Indian Standards for Industrial and sewerage Effluent discharge in to public sewers is 2490-1982	Results mg/l
1.	BOD	30 mg/l as per EPR 1986	20 mg/l
2.	Suspended Solids	100 mg/l	120 mg/l
3.	Dissolved Solids	1500 mg/l	1200 mg/l
4.	Total Solids	1200 mg/l	1320 mg/l
5.	Organic	500 mg/l	990 mg/l
6.	Inorganic	500 mg/l	330 mg/l
	pH	5.5-9.0	7

Source: CCG ,Gulbarga

6. Ambient Air Quality:

72. The ambient air quality is one of the most significant indicators of environmental health of a city. Ambient air quality monitoring has been carried out at I location in the Gulbarga City. The locations were selected on the basis of sensitive place and designated as silence zone. For the Ambient Air quality monitoring, pre-calibrated High Volume Air Sample were installed at this locations. Sampling and analysis was done as per the IS methods. Ambient air quality was monitored for

**Respiratory Suspended Particulate Matter (RSPM)
Suspended Particulate Matter (SPM)
Sulphur Dioxide (SO₂) and
Oxides of Nitrogen (NO_x)**

73. The one location has been identified by KSPCB, Gulbarga to assess of standard of air quality of Gulbarga city as a whole. This place is

A1:Government General Hospital: Sensitive Area

74. As per CPCB norms the standard for Ambient Air quality of any particular area is as follows:

Table 13: Ambient Air Quality Standards (National)

Pollutants	Time-Weighted Average	Concentration in Ambient Air			Method of Measurement
		Industrial Areas	Residential, Rural & Other Areas	Sensitive Areas	
Sulpher Dioxide (SO ₂)	Annual Average*	80 µg/m ³	60 µg/m ³	15 µg/m ³	Improved West and Geake Method Ultraviolet Fluorescence
	24 hours**	120 µg/m ³	80 µg/m ³	30 µg/m ³	
Oxides of Nitrogen as (NO ₂)	Annual Average*	80 µg/m ³	60 µg/m ³	15 µg/m ³	Jacob & Hochheiser Modified (Na-Arsenite) Method

Pollutants	Time-Weighted Average	Concentration in Ambient Air			Method of Measurement
		Industrial Areas	Residential, Rural & Other Areas	Sensitive Areas	
	24 hours**	120 µg/m ³	80 µg/m ³	30 µg/m ³	- Gas Phase Chemiluminescence
Suspended Particulate Matter (SPM)	Annual Average*	360 µg/m ³	140 µg/m ³	70 µg/m ³	- High Volume Sampling, (Average flow rate not less than 1.1 m ³ /minute).
	24 hours**	500 µg/m ³	200 µg/m ³	100 µg/m ³	
Respirable Particulate Matter (RPM) (size less than 10 microns)	Annual Average*	120 µg/m ³	60 µg/m ³	50 µg/m ³	Respirable particulate matter sampler
	24 hours**	150 µg/m ³	100 µg/m ³	75 µg/m ³	
Lead (Pb)	Annual Average*	1.0 µg/m ³	0.75 µg/m ³	0.50 µg/m ³	- ASS Method after sampling using EPM 2000 or equivalent Filter paper
	24 hours**	1.5 µg/m ³	1.00 µg/m ³	0.75 µg/m ³	.
Ammonia ¹	Annual Average*	0.1 mg/m ³	0.1 mg/m ³	0.1 mg/m ³	.
	24 hours**	0.4 mg/m ³	0.4 mg/m ³	0.4 mg/m ³	.
Carbon Monoxide (CO)	8 hours**	5.0 mg/m ³	2.0 mg/m ³	1.0 mg/m ³	- Non Dispersive Infra Red (NDIR)
	1 hour	10.0 mg/m ³	4.0 mg/m ³	2.0 mg/m ³	Spectroscopy
*Annual Arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.					
** 24 hourly/8 hourly values should be met 98% of the time in a year. However, 2% of the time, it may exceed but not on two consecutive days					

Source: CPCB

75. The following table shows the result of monitoring value of above stated location and gives clear picture to the ambient air quality of area as whole.

Table 15: Ambient Air Quality, Gulbarga

Location of monitoring Station	Landuse Type	RSPM	SPM	SO ₂	NOx	Cause for Criticality
Standard sensitive area to residential-industrial			70-350 mg/m ³	1.5-8 mg/.m ³	1.5-8.0 mg/m ³	
Standard-Residential			140	6.0	6.0	
A1: Government General	Sensitive Zone	91	250	2.8	10.5	Emission of Hydrogen sulphide

Location of monitoring Station	Landuse Type	RSPM	SPM	SO ₂	NOx	Cause for Criticality
Standard sensitive area to residential-industrial			70-350 mg/m ³	1.5-8 mg/.m ³	1.5-8.0 mg/m ³	
Standard-Residential			140	6.0	6.0	
Hospital						

Source, KSPCB

Criticality

76. The main pollutant in ambient is SPM. Suspended particulate matter is mainly emitted by dust and physical characteristic of area. The area is mainly under deccan trap where latterite soil persists. The adhesiveness of soil is less and most of the area is unpaved. As a result the SPM level is also high in residential and commercial area rather industrial premises. Another pollutant in ambient is NOx. Mainly NOx is formed by combustion process in automobile emission by diesel. All public vehicles are running by diesel driven motors and as result the total emission rate is more than the permissible limit and deteriorating the condition of the area. SO₂ is characterized from industrial pollution from Hydrogen sulphide use. The concentration of Sulphur-di-oxide is mainly found more than a range. There are several industries unit are producing this kind of effluent in this regard. More harmful is SPM which is leading to bronchitis or asthma and is carcinogenic. Maximum concentration is noticed in commercial area, where air pollution buffering or protecting measures are to be taken care of.

7. Ambient Noise Quality :

77. Noise can disturb our work, rest, sleep and communication. It can damage our hearing and evoke other psychological and possibly pathological reactions. This fact has been experienced widely and is a serious concern to every one. The Govt. of India has timely included noise as an air pollutant in the amended act of 1997 for which has laid down as following:

78. The Central Pollution Control Board in exercise of its powers under section 16 (2) (h) of the Air (Prevention and Control of Pollution) Act, 1981, notified the ambient air quality standard in response as:

Table 16: Standard of Noise Level

Category of Area	Day time limits in Decibels (dB)	Night time limits in Decibels (dB)
Industrial Area	75	70
Commercial Area	65	55
Residential Area	55	45
Sensitive Zone	50	40

Source: CPCB

79. There is not a single station it has been monitored to assess the Noise Quality of city. The scenario of the commercial zones is as similar as other town of NKUSIP- Pkg III. The Bus stand is very crowded and noisy. At present no noise buffering system is provided on road side or sensitive area or even residential area.

8. Social Environment

a. Ethnic Minorities and Indigenous Peoples

80. 28 number of Schedule cast title holders have been reported within the project area.

b. Health and Hygiene

81. No safe disposal method does presently exist. A large number of dry latrines still exist but the night soil freely flows in the open causing serious unsanitary conditions and health hazard. The problem needs immediate attention as it pollutes the public water courses also.

82. The absence of municipal taps and non-availability of staff for maintenance have resulted in the poor state of the public latrines, which are largely being used by the slum population.

9. Forest & Biodiversity:

83. There is no forest area traversed the project site. But some big trees are found on road and open land. There is no endangered species found. There are approximately 50 trees in total vacant and. Out of total there is only one mango tree presents. There are 95 trees under Neem (*Azadirachta Indica*) and 54 trees are babool (*Acacia Nilotica*) category. Other than total trees thorny bushes present. Overall there is no loss of precious tree.

84. There are no endangered species found within site and as peripheral areas.

10. Demographic Characteristics:

85. **Population Growth:** As per census 2001 the city addressed as Gulbarga Urban Agglomeration (GUA) comprises of City Corporation Gulbarga and three outgrowths namely Kusnoor (part), Rajapur and Kotnoor Darwesh. The city experienced an average population growth rate of 40 per cent in the last two decades, against a high growth rate of 50 per cent in the 60's and 70's. Based on the development plan proposals, taking into consideration the present trends and absorption capacity, the projected population 11,39,530 has been adopted for ultimate design period 2041. The total number of households in Gulbarga city according to the census 2001 is 73,845 thus the average household size comes as 5.8. Sex ratio (female population per 1,000 male populations) in Gulbarga City was 924 for the census year 2001.

86. **Old City:** Density of population in the old city is as high as 895 persons per hectare. The density pattern reveals higher concentration in the old city area and along the transport corridors. The spatial distribution of population reveals striking difference with density ranging from as low as 16 persons per hectare in ward no. 50 (mainly comprises of Station area) to a high of 895 persons per hectare in ward no. 25 (Mominpura).

87. **Peripheral Areas:** Gulbarga City is expanding horizontally, with people preferring to stay in the peripheral areas where they could avail of better infrastructure facilities being provided by the Gulbarga Development Authority. The outgrowths have been in the south-eastern parts of the CCG. Newly developed areas on the south eastern part of the city include residential areas of Jayanagar, Om Nagar, Veerendra Patil Nagar, Puja Colony, etc. The areas are at relatively lower elevation than the city. There are many urban villages scattered located on the northern part of the city.

Socio Economic Characteristics:

88. The share of working population also known as workers participation rate (WPR) in Gulbarga is 27 per cent (2001) as against 29 per cent of the District Urban WPR and 36 per cent of the State Urban WPR. The city WPR had been stable at 24% during seventies and eighties followed by increase to 27% in nineties.

B. Environmental Setting of Investment Programme Component Sites:

Site Selection for Sewerage Treatment Plant at Nandikur Village

89. The location of sewerage treatment plant is selected based on the natural slopes of city to provide the gravity flow till the disposal point. The city follows the natural slope from North towards south and therefore STP location is chosen as southern site. The STP location is shown in Map 5



Map 5. Proposed STP Site and Surrounding

90. The flow for phase 1 period is estimated to be 39 MLD, it has been estimated that the land requirement per MLD of sewage is 0.55 acre. So the total land requirement is to be 21 acre. Land including approach road, 21 acre under acquisition by KUWS & DB.

91. The topography of the predominantly flat. The environmental condition is as same as city general. There is no environmental sensitive area is prevalent within project area not even 100 m of project influence zone. STP will be constructed sufficiently away from the settlement area. The sites selections have been justified because the treated effluent form the plant will be used in agricultural purposes. The sludge can be excessively use for



Fig 5: Seasonal stream: near Proposed STP site

Fig 6: Stream Water use for local need

manure process and sold waste will be dumped at disposal site. The access road will be constructed from Nandikur Village Cart Track road is already existed to approach the proposed STP site. Site is surrounded by agricultural fields. Due to non-availability of irrigation facilities only rain fed crops are cultivated here. Cotton and pulses are the main crops cultivated in the area. No groundwater extraction points such as bore wells are located with in the vicinity. A small seasonal stream is passing side of proposed STP site. The stream runs through agricultural fields where farmers are utilizing the waste water for irrigation purpose.

IV ENVIRONMENTAL SCREENING OF SUB COMPONENTS:

92. The proposed sewerage system consists of trunk mains, sub trunk mains and laterals connected to the main sewers. Old town area is congested but new area is planned. The impacts of proposed works are site-specific, and few are irreversible. In most cases, mitigation measures can be designed to minimize the impact. So this sewerage sub project will be categorized as **Category B** project. The detail REA checklist for sub components of sewerage sub project for Gulbarga city is appended in Annexure 1

V POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Overview:

93. This section identifies and assesses the probable impacts on different environmental parameters during planning, construction and the operation of the proposed development. After studying the existing baseline environmental scenario, initial field surveys, reviewing the process and related statutory norms, the major impacts have been identified and assessed for the design, construction and the operation phases. Potential positive impacts or improvements are also reviewed.

94. Planning and Design covers the construction details, materials of construction etc. that ultimately decides the impact during later phases. Most of the impacts are during construction and operation phase. While some of the construction phase impacts are temporary, some are permanent. The permanent impacts would be positive in nature such as increase in business & employment opportunities, reduction in accidents, and comfort in journey.

95. Screening of environmental impacts has been based on the impact magnitude (negligible/moderate/severe – in the order of increasing degree) and impact duration (temporary/permanent). The following table shows the screening of impacts; N/T represents the lowest impact while S/P represents the highest impact. Numerator represents the Degree of Impact and denominator represents the Duration of impact.

Table 17: Screening of Impacts

Duration of Impact	Magnitude (Degree of Impact)		
	Negligible(N)	Moderate(M)	Severe(S)
Temporary(T)	N/T	M/T	S/T
Permanent (P)	N/P	M/P	S/P

Source: Analysis

The following tables provide the potential environmental impacts and mitigation measures of sewerage components proposed under NKUSIP in Gulbarga

Table 18: Environmental Impact Assessment and Mitigation Measures of Sub Component

Environmental Impact	Damages to Environment	Screening of Impacts	Recommended Feasible Protection Measure	Comments	Implementing Agency
Problems related to siting for facilities					
Land Acquisition	Land degradation	N/P	Payment of compensation before taking possession of land	It is under process. Total land requirement is 21 acre. It is predominantly agricultural land. But lack of water availability is become fallow or only pulses are cultivated in season	ULB, (CCG Gulbarga)
Interference with other utilities	Nuisance/ disturbance to public	M/T	There is a provision for restoration of utility services, if any. All utility all along sewer line to be addressed in construction period and restoration work will be done.	No interference with existing utilities as the construction will carry out outskirts of town.	ULB, (CCG Gulbarga)
Interference with street traffic/ blocking of access to building	Nuisance/disturbances to public	M/T	In order to ensure access diversions to be prepared.	No interference expected in major road only sub arterial roads some part are to be affected for local traffic	ULB, (CCG Gulbarga)
Inadequate resettlement provision	Social inequities	N/P	Adequate budget provisions to be made for temporary and permanent resettlements as per govt compensation	No rehabilitation measures suggested	ULB, (CCG Gulbarga)

			practice.		
Contamination of groundwater resources due to leaching of ponds	Ground Water Pollution	N/P	Impervious bed will be constructed in ASP. Black Cotton Soil will be used for preparation of impervious bed.	This may not be significant as the groundwater table is deep at around 100-150 ft	Contractor
Loss of amenity and odor nuisance to neighbors.	Odour Nuisance	N/P	Village habitation is far from proposed STP location. There is no anticipated nuisance is predicted.	Proposed land is far from village habitation.	Design Engineer
Design Phase					
Overflow/bypassing hazards	Contamination of environment plus flooding	N/T	Diversion and disposal of run off is needed	Adequate design measures to be taken	Design Consultant
Discharge of partially treated sewage will have potential to pollute the agricultural fields.	The treated sewage may be used for irrigation. However, this may not be significant as treatment will be designed to meet inland surface water discharge standards which is stringer than irrigation standards	N/P	The effluent from the STP shall be confirmed to the following standards of discharge for inland surface water disposal: <ul style="list-style-type: none"> ▪ BOD < 30 mg/l ▪ Suspended solids < 100 mg/l 	Environmental Quality Standard to be monitored	Design Consultant
Nuisance due to leakage / overflowing of sewers.	Contamination of land	N/P	Regular maintenance will nullify the impact. Usage of maintenance equipment would substantially reduce the maintenance time.	Monitoring the operation practice	Implementing Agency, ULB
Nuisance due to mosquito breeding, rodents and bad odours from STP.	Odour and Mosquito breeding, Disease	M/P	Development of buffer zone as a physical separation and visual screen around the facility will also address this impact. A buffer zone in the form of	Cleaning of Sludge and cleaning of banks of ponds, prohibit the grow the bushes and grasses.	O& M under ULB

			landscaping and earthwork shall be created around the STP. To avoid/reduce mosquito breeding, the banks of ponds shall be kept clear of grasses bushes, etc. Although ASP technique has small retention period in pond so probability of mosquito breeding will be less. Even chlorination process will help to mitigate this anticipated impact. Rat trappers shall be kept.		
Pollution due to improper sludge disposal methods. Sludge removal from the ponds may be done once for every 7 years, depending on the sludge generation.	Quantity of sludge generation will not be considerable. Contaminated work area may cause health hazards.	M/P	Safe sludge handling methods shall be employed. Personal protection equipment such as gloves, boots, shall be provided to the workers. Sludge shall be dried in drying beds before its disposal in low-lying areas. A sludge management plan shall be prepared.	Cost to be included for sludge management	O& M under ULB
Adequate monitoring of gas	Regular monitoring of gas of manhole is not possible.		Shaft is already provided to remove the gas of manholes.	Cost is considered in DPR	O& M under ULB
Construction Phase					
Silt runoff from construction of STP	Soil erosion plus damage to water quality and aesthetics	M/T	Arrangements are to be made by the contractor for proper and quick discharge of run off.	Site Engineer will ensure that works are done in such a way that there is quick disposal	Contractor

			Desiltation will be addressed in construction work .	of silt runoff from the site.	
Dust/odour/fumes/ noise/vibration from construction	Health hazard/nuisance to workers and public	M/T	Careful planning, control and monitoring Adequate buffer zone around the proposed treatment works.	PPEs to be provided during construction by the contractor	Contractor
Inconvenience to access business, residential and other immediate facilities for the public and impact on livelihood due to loss of access to business.	The access for business and other facilities along the proposed sewer laying areas will be disturbed during construction period.	M/T	During construction period, planks / makeshift pathways should be provided along the construction areas for the public to access their requirements for residential, shopping and other facilities.	EMP should be executed during this construction phase	Contractor
Inconvenience to public during sewer laying along thick commercial areas and narrow streets; where public facilities are located.	Reduced pedestrian and vehicle access to residences and businesses	M/T	Construction should be expedited in the least time frame. Activities requiring maximum access control should be done during non peak hours. Excavation along the road should be done in such a way that entire stretch will not be trenched at a time. Traffic management with diversion through alternate routes will be implemented by providing adequate sign boards.	Barricade during excavation and construction should be provided	Contractor ULB Gulbarga

<p>Nuisance due to dust and noise; road blocking due to laying of sewer network; and, increased traffic flow due to vehicle movement for construction activities.</p>	<p>Dust generation may be significant as the dry weather condition prevails in the town.</p>	<p style="text-align: center;">M/T</p>	<p>Construction material shall be stockpiled to minimize traffic blockages. In case of excavations for sewer lines in busy streets such as central areas of the town (market area, old town area), adequate arrangements for traffic diversion including prior intimation and by erecting proper sign board shall be provided.</p> <p>Considering the market and dense residential areas in the core town area, preparation of construction site management plan is necessary. Poor performance of the contractor may potentially exacerbate these impacts and therefore qualified contractors to be appointed. The contracted work includes the implementation of construction site management plan, which will address these issues.</p>	<p>Sprinkler should be used for reducing dust and modern technology should be used for meeting desire noise limit</p>	<p style="text-align: center;">Contractor</p> <p style="text-align: center;">ULB Gulbarga</p>
<p>Dust and noise from construction of STP and</p>	<p>Sewer network will be laid all over the town</p>	<p style="text-align: center;">M/T</p>	<p>Construction material shall be stockpiled.</p>	<p>Part of construction cost</p>	<p style="text-align: center;">Contractor/CCG Gulbarga</p>

<p>lying/rehabilitation of sewer network activities.</p>	<p>including high density areas.</p> <p>As the proposed STP is located away the habitation, as far as laying of sewer network is considered, the dust and noise nuisance may be considerable in the core town area and in all other areas it may be negligible.</p>		<p>Adequate arrangements for traffic diversions including erection of sign boards.</p> <p>Dust generation must be arrested by water spraying. Ensure usage of standard equipment to reduce the noise nuisance. Equipment shall comply with the noise levels of construction equipment laid out by the CPCB. High noise generating activities including material unloading shall be avoided during nights. The surrounding people shall be informed, especially in densely populated area, of nature and schedule of the high noise generating activities, if any</p> <p>A construction site management plan shall be prepared. Poor performance of the contractor may potentially exacerbate these impacts and therefore qualified contractors to be appointed. The contracted work</p>		
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			includes the implementation of construction site management plan, which will address these issues.		
Pollution and health hazards due to improper sludge disposal methods	Quantity of sludge generation will not be considerable. Contaminated work area may cause health hazards.	M/P	Safe sludge handling methods shall be employed - Personal protection equipment such as gloves, boots, shall be provided. Sludge shall be dried in drying beds before its disposal. This sludge may be used as manure for non- food crops or land filled. ASP technique has itself Sludge Management Process. Sludge is to be digested in digester and decompost in DryingBed. Dried sludge will be used as manure	CCG Gulbarga	Part of O & M costs
Nuisance due to overflowing/choking of sewers.	No major water bodies and ground water is very deep. However nuisance may be considered.	N/P	Implement the mitigation measures suggested in the design stage to avoid chocking. Sewer cleaning equipments have been provided	CCG Gulbarga.	Part of Construction Cost.
Water logging and/or overflowing of sewer due to clogged sewer lines	Health hazard and public nuisance	M/P	Design construction, O&M, plus monitoring during monsoon	Periodic cleaning of sewer lines	CCG Gulbarga

Workers exposed to toxic gases in sewers in sewage during maintenance work	Serious/health/safety hazards	S/T	There should be proper measurement of hazardous gases in the sewers with the help of gas sensors. Safety equipment likemask, oxygen cylinder shall be kept for safety measure.	Not expected, safety measures would be taken by the contractor	CCG Gulbarga
Inadequate operations stage monitoring	Nuisance/ hazard to Public in terms of effluent disposal, odour etc.	M/P	O&M and monitoring other than the recommended measures	Regular monitoring to be carried out.	CCG Gulbarga
Operation Phase					
Public health risks of using sewerage for agriculture;	Land degradation	M/P	Sewage used for land irrigation is to be tested by relevant authorities (PCB) before land application to ensure it is not contaminated or pose risks to public health.	Periodical Monitoring	CCG Gulbarga

Source: Analysis

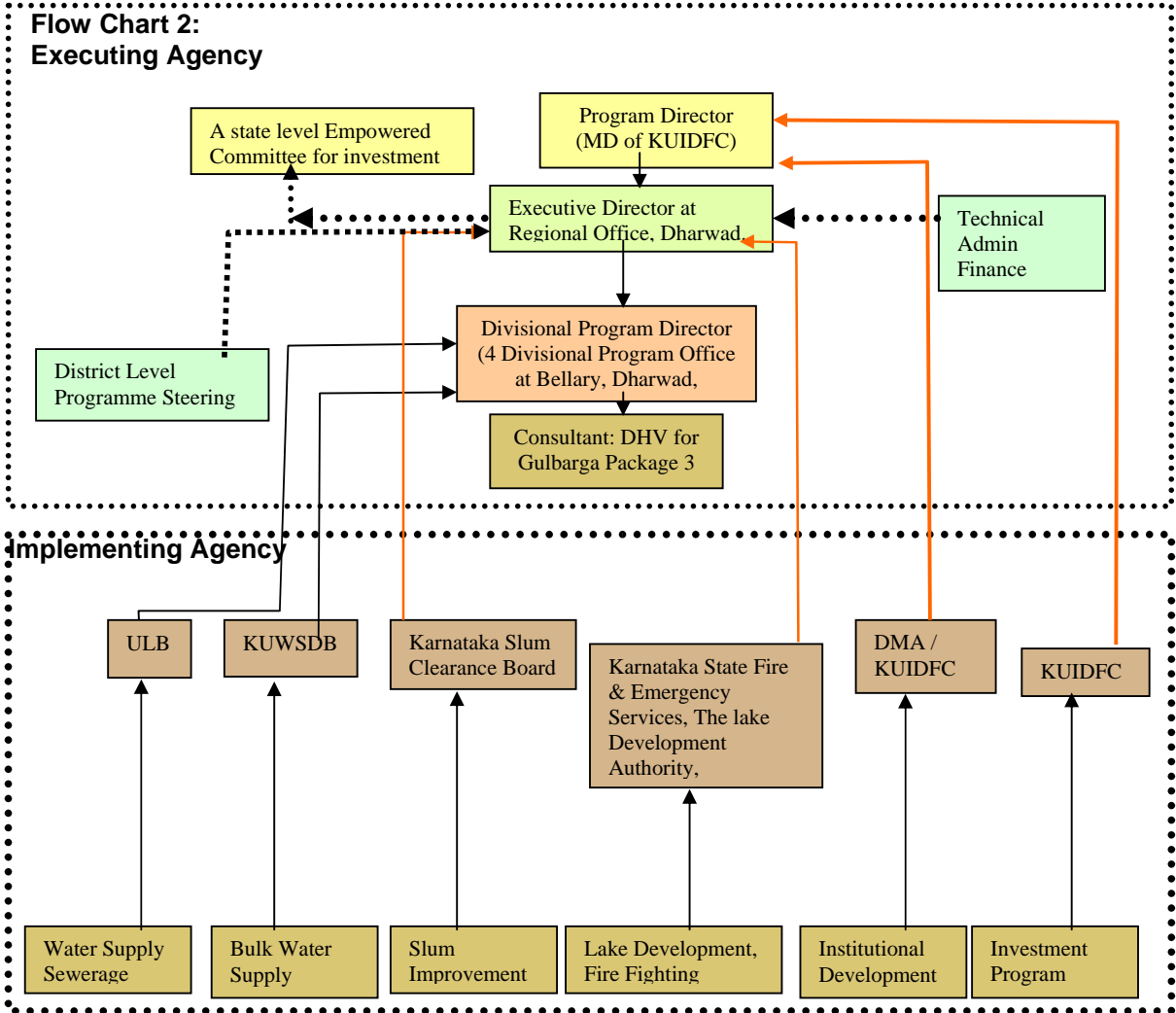
VI INSTITUTIONAL ROLES AND RESPONSIBILITY

96. Nodal Executing Agency (EA): The Government of Karnataka (GoK) through the Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC) has prepared the North Karnataka Urban Sector Investment Programme (NKUSIP) under the Asian Development Bank assistance. The proposed NKUSIP is the logical follow-on investment program to the ongoing Loan 2312-IND. Karnataka Urban Infrastructure Development & Finance Corporation (KUIDFC) is the nodal executing agency (EA) responsible for implementing NKUSIP. Investment Program implementation activities will be monitored by KUIDFC through a separate Investment Program Management Unit (PMU), which will be set-up within KUIDFC. The Managing Director/KUIDFC will head the PMU and will be assisted by an Executive Director at the Regional office of KUIDFC at Dharwad to oversee the Investment Program progress. A team of senior technical, administrative and financial officials will assist the Executive Director in controlling and monitoring Investment Program implementation activities. The Executive Director at Regional Offices are supported By Divisional Program Offices headed by Divisional Program Director, located at Gulbarga for Package 3. The consultant team will be under the Divisional Programme Director and will be involved in project planning, preparation of subproject and cost estimates, co ordination, technical guidance and supervision, financial control, training and overall subproject management. All Investment Program decisions will be made by the Executive Director who shall operate from the PMU, Dharwad; only interactions with GoK, GoI and ADB shall be conducted through the KUIDFC office at Bangalore.

97. A state level Empowered Committee for investment Program with representatives from GoK and PMU of KUIDFC has been constituted and Executive Director from Dharwad will be reporting to this committee as and when needed. The committee members include Additional Chief Secretary (Committee Chair), MD of KUIDFC (Committee Secretary), Principal Secretary of the Urban Development Department, Principal Secretary of Planning Department, Secretary for municipalities and urban development authorities of Urban Development Department, secretary for expenditure of the finance department and director of Directorate of Municipal Administration.

98. Implementing Agency (IA): The ultimate implementation responsibility lies with ULB in co ordination with various other Departments of GoK. The programme component A, B, E will be implemented by ULB reporting to Divisional Program Director. Under the component B, for bulk water supply, Karnataka urban Water Supply and Drainage Board (KUWSDB) will be acting on behalf of ULB reporting to Divisional Program Director. Slum upgradation will be done through Karnataka Slum Clearance Board reporting to Executive Programme Director. Component D will be implemented through co ordination of Karnataka State Fire & Emergency Services, The lake Development Authority, Department of Information and relevant ULB reporting to Executive Programme Director. Component F will be implemented through DMA and or KUIDFC reporting to Programme Director and Component G through KUIDFC reporting to Programme Director.

99. Other than the above institutional set up, District Level Programme Steering Committee will be set up in each district to monitor implementation of subprojects and institutional reforms. The District Level Programme Steering Committee shall consist of Deputy Commissioner of District, Divisional Program Director from concerned divisional office, Municipal Commissioners' / Chief Officers of Investment programme ULB and President / Chair of investment programme ULB. The District Level Programme Steering Committee will be reporting to Executive Programme Director. The organization hierarchy is as presented in Flow Chart 2.



- Component A - Sanitation (Sewerage & Drainage)
- Component B – Water Supply
- Component C – Slum Improvement
- Component D – Non Municipal Infrastructure
- Component E - Urban Transportation
- Component F – Institutional Development
- Component G - Investment Program Assistance

Table 19 : Institutional Roles and Responsibilities

Investment Program Phase	Activity	Details	Responsible Agency
Pre construction phase	Investment Program Categorization	Conduct Rapid Environmental Assessment (REA) for each sub-components using REA checklists	ULB
		Reviewing the REA and assigning Investment Program category (Ea/Eb/Ec) based on NKUSIP Environmental Assessment Guidelines and ADB Guidelines	PMU
	Conducting EA	Conducting IEE/EIA based on the Investment Program categorization Conducting Public Consultation and information disclosure Preparation of SIEE/SEIA	Investment Program Consultants
	Investment Program clearances	Fulfilling GoK/Gol requirement such as clearances from other Government Agencies	ULB
	Review of EIA/IEE	Reviewing the EIA/IEE and SEIA/SIEE Reports to ensure compliance of the report as per ADB Guidelines and approval of the same	PMU
	Disclosure of SEIA/SIEE	Information disclosure -SIEE/SEIA reports should be made available to the public, and on request IEE/EIA also made available.	ULB
	Incorporation of mitigation measures into Investment Program design	Incorporation of necessary mitigation measures identified in IEE/EIA in Investment Program design and in contract documents.	Investment Program Consultants
	Review of design documents	Review of design and contractual documents for compliance of mitigation measures	PMU
Construction Phase	Implementation of mitigation measures	Implementation of necessary mitigation measures	Contractor
	Monitoring	Environmental monitoring as specified in monitoring plan during construction stage; monitoring of implementation of mitigation measures	Investment Program Consultants
	Preparation of progress reports	Preparation of monthly progress reports to be submitted to PMU including a section on implementation of the mitigation measures	ULB in assistance of PC
	Review of progress reports	PMU to review the progress reports, consolidate and send to ADB review	PMU
Operation Stage	Environmental Monitoring	Conducting environmental monitoring, as specified in the environmental monitoring plan.	ULB
	Compliance Monitoring	Compliance monitoring to review the environmental performance of sub-project component, if required and as specified in Monitoring Plan	KSPCB

a. Training Needs

100. As described in the above table the PMU will involve in monitoring the Investment Program implementation while the ULB will implement the Investment Program. It is therefore important that these agencies and particularly the officials involved in the Investment Program to have understanding of the ADB's environmental assessment procedures and also of environmental issues of various urban infrastructure components. As far as implementation of mitigation measures on site is concerned the Contractor will be involved. Hence, it is important to orient the contractors and supervisory staff towards the implementation of mitigation measures and their consequences. Hence, considering the existing capabilities of the agencies involved in NKUSIP, the following training program is suggested. The following table presents the suggested training program.

Table 20. Training Needs (2010 – 2026)

Description	Contents	Schedule & Cost	Participants	Person Responsibility
Program 1 Orientation Program / Workshop for and Implementing Agency and Executing Agency	<p>Module 1 – Orientation Investment Program Cycle of NKUSIP ADBs Environmental Assessment Guidelines EA requirements of NKUSIP Indian Environmental Laws & Regulations relating to urban infrastructure Investment Program Environmental impacts of urban infrastructure Investment Programs</p> <p>Module 2 Environmental Assessment Process Investment Program categorization as per ADB IEE/EIA process, Formats and Reports Identification of Environmental Impacts Identification Mitigation Measures Formulation of Environmental Management Plan Implementation and Monitoring Summary EIA/IEEs Review of EIA/IEE reports to comply with ADB requirements Incorporation of mitigating measures in the Investment Program design and contracts</p>	2 days Per day Rs. 10,000/-	PMU officials involved in the Investment Program ULB officials involved in Investment Program implementation	PMU (Environmental Specialist)
Program - 2 Orientation Program / Workshop for Contractors and Supervisory staff	<p>Module 1 Implementation of Mitigation Measures Environmental issues related urban infrastructure Investment Programs during construction Implementation of mitigation measures Monitoring of implementation</p>	1day Rs. 7500/-	Contractors involved in NKUSIP Supervisory staff of ULB	DHV Consultant (Environmental Specialist)
Program - 3 Experience Sharing	<p>Module – Experiences and Best Practices Experiences on implementation in terms of environmental concerns of implemented Investment Programs Best Practices followed</p>	1 day (every alternative year from the start of Investment Program, i.e. 2010) Rs. 5000/-	PMU officials ULB officials Local NGOs	DHV Consultant (Environmental Specialist)

Source: Analysis

VII ENVIRONMENTAL MONITORING PLAN

1. Detailed Environmental Monitoring Plan for Proposed Sewerage Project Components

101. To ensure the effective implementation of mitigation measures and environmental management plan, during construction and operation phase of the sub component of sub-project, it is essential that an effective Environmental Monitoring Plan be designed and followed as given below:

a. Ambient Air Quality (AAQ) Monitoring

102. RSPM, SPM, SO₂ and NO_x are to be monitored at designated locations starting from the commencement of construction activities. Monitoring should be done near construction sites during construction phase in accordance to National Ambient Air Quantity Standards.

b. Noise and Vibration Monitoring

103. The measurements of noise and vibration levels should be carried out near construction sites during construction phase in accordance to the ambient noise standards formulated by Ministry of Environment and Forests (MoEF).

Environmental monitoring cost

104. The environmental monitoring cost for the proposed sub-project is summarized in the table given below:

Table 21: Environmental Monitoring Cost for Sewerage Work

S.N	Description.	Unit	Rate
1.	Monitoring of following environmental parameters as per direction of ULB		
	a Construction Phase		
	i Air	Samples	5000
	ii Noise	Samples	1000
	b Operation Phase		
	i Water Quality	Samples	5000
	ii Waste Water Quality	Sample	2500

2. Environmental Monitoring Plan

105. The environmental monitoring plan for the proposed sub-project is summarized in the table given below:

Table 22: Environmental Monitoring Plan for Sewerage System

Mitigation Measures	Parameters to be Monitored	Location	Measurement	Frequency	Responsibility	Preliminary Costing																																																
Pre-construction Stage																																																						
All location and design related mitigation measures. The measures are to mitigate the following through appropriate design of process and layout. (i) loss of amenity and nuisance (ii) sludge disposal	Incorporation of mitigation measures in the design including air dispersion modeling for STP site.	N/a.	Verification of Investment Program design documentation	One-off inspection of designs	PMU	N/a. Design checking																																																
Testing of Water Quality at Bhima at 100 meters upstream and 100 meter downstream from discharge point of treated waste water	<table border="1"> <thead> <tr> <th>Parameters</th> <th>Unit</th> <th>Standard</th> </tr> </thead> <tbody> <tr> <td>pH</td> <td>-</td> <td>6.5-8.5</td> </tr> <tr> <td>Turbidity</td> <td>N.T.U</td> <td>5</td> </tr> <tr> <td>Colour</td> <td>Hazen Unit</td> <td>10</td> </tr> <tr> <td>Hex-Ct₄₀</td> <td>mg/l</td> <td>0.05</td> </tr> <tr> <td>Fluorite</td> <td>mg/l</td> <td>0.6-1.2</td> </tr> <tr> <td>Total iron</td> <td>mg/l</td> <td>0.3</td> </tr> <tr> <td>Nitrate as NO₃</td> <td>mg/l</td> <td>45</td> </tr> <tr> <td>Alkalinity as CaCO₃</td> <td>mg/l</td> <td>200</td> </tr> <tr> <td>Dissolve Solids</td> <td>mg/l</td> <td>500</td> </tr> <tr> <td>Sulphate as SO₄</td> <td>mg/l</td> <td>150</td> </tr> <tr> <td>Chloride</td> <td>mg/l</td> <td>250</td> </tr> <tr> <td>Total Hardness</td> <td>mg/l</td> <td>300</td> </tr> <tr> <td>Calcium as Ca</td> <td>mg/l</td> <td>75</td> </tr> <tr> <td>Magnesium as Mg</td> <td>mg/l</td> <td>30</td> </tr> <tr> <td>DO</td> <td>Mg/l</td> <td>5</td> </tr> </tbody> </table>	Parameters	Unit	Standard	pH	-	6.5-8.5	Turbidity	N.T.U	5	Colour	Hazen Unit	10	Hex-Ct ₄₀	mg/l	0.05	Fluorite	mg/l	0.6-1.2	Total iron	mg/l	0.3	Nitrate as NO ₃	mg/l	45	Alkalinity as CaCO ₃	mg/l	200	Dissolve Solids	mg/l	500	Sulphate as SO ₄	mg/l	150	Chloride	mg/l	250	Total Hardness	mg/l	300	Calcium as Ca	mg/l	75	Magnesium as Mg	mg/l	30	DO	Mg/l	5	Bhima River Drinking Water Standard IS 10500	Verification of Investment Program design documentation	One-off inspection of designs	PMU	N/a. Design checking
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Mitigation Measures	Parameters to be Monitored	Location	Measurement	Frequency	Responsibility	Preliminary Costing
control the dust and noise nuisance, road blocks and provide access to businesses while pipe laying						
Implementation of construction site management plan: (i) noise and dust nuisance at site, (ii) traffic maintenance	Dust and noise nuisance and disturbance to traffic	at the sewer laying sites and surroundings	Monitoring of air quality and noise is not required. Ensure the implementation of mitigation measures (usage of standard equipment complying with CPCB Noise Standards for Construction Equipments); assess the situation through visual inspection and interviews with local people	Weekly	CCG Gulbarga with the assistance of Investment Program Consultants	Part of consultancy cost
Operation Stage						
Check for contamination of groundwater/ agricultural fields due to discharge of untreated/partially treated STP effluent.	Influent wastewater quality	Inlet of STP	Analyze the wastewater characteristics including heavy metals such as Mercury (As Hg), Lead (as Pb) Cadmium (as Cd), Total chromium (as Cr), Copper (as Cu), Zinc (as Zn) and Nickel (as Ni)	Monthly as part of plant operation	CCG Gulbarga	Sampling and laboratory test costs: Rs.5000 per sample
	Treated wastewater quality at outlet discharge point of STP	Outlet of STP	Analyze the characteristics to comply with the PCB disposal standards. These include: <ul style="list-style-type: none"> BOD < 30 mg/l pH – 5.5 – 9.0 SS < 100 mg/l 	Monthly as part of plant operation Seasonal (four seasons) as third party monitoring.	CCG Gulbarga KSPCB	N/a. Routine Operation Sampling and laboratory test costs: Rs.5000 per sample (Rs.20000 per year)
Implementation of the	Health status of	N/a	Health check up	Yearly once	CCG Gulbarga	Rs.5000 per

Mitigation Measures	Parameters to be Monitored	Location	Measurement	Frequency	Responsibility	Preliminary Costing
Sludge Management Plan - Check for health hazards due to sludge handling.	STP staff		for STP staff			person/year
Potential for Gas explosion in pipes	Gas monitoring for sewage pipes		Shaft is provided with manholes for removing gas. But periodical check of its functionability is important	Once in three month	CCG Gulbarga	Rs. 100 per location per unit time
Bad odours emanating from sewerage pipes	Leakage monitoring		Mitigation measure and maintenance process to be addressed to remove odour	When it is needed	CCG Gulbarga	Depends on length of leakage and maintenance requirement
Emergency Plan			Mask, hand gloves, adequate fire fighting equipment, oxygen		CCG Gulbarga	

Source: Analysis

VIII PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Overview

106. A checklist of questions was kept ready and responses were elicited from people and guidelines were issued to field assistants for the purpose. The questions were kept simple for people to comprehend. Notes were made for the responses and viewpoints presented by people. The following table shows the details of it. Further Focus Group Discussions were carried out with the houses located at the nearest vicinity of STP Site. The issues raised during Public Consultation and the mitigation measures incorporated in design and IEE and presented in **Table 22.A**.

Table 22.A: Issues Addressed during Public Consultation along STP Site, Gulbarga

Sl. No	Issues Raised during Focus Group Discussion	Mitigation Measures
1.	Loss of Livelihood and Income restoration Options	This issue was raised by maximum number of villagers as loss of fertile land will deteriorate their income sources. Instead of lump sum money they were more interested for limited regular income. Particularly those person whose land belongs to land. Though land is not very fertile land, so consultant was discussed and actual requirement has been told. It was discussed that there is no loss of livelihood or any displacement. But leakage and open drain intercepts sewer affects the health problem and vice versa agricultural land.
2.	Water Logging and Drainage	Participants had a fear that during construction widening and alignment of sewer, water a pipeline will alter natural drainage pattern in the area and may cause un ease situation for local people.
3.	Odour and Mosquito Breeding which will raise disease of Nandikur Village	The ASP has proposed for identified STP location. But ASP does not pose any odour nuisance and proper buffer zone will evacuated the odour which won't reach to habitation of village. Regular monitoring and cleaning on pond side to restrict the growth of grass and others to enhance mosquito. Regular cleaning and periodical sludge removal does not poses any health disease over area. Provision of Visual Screens and landscaping has been integrated as a part of STP which will effectively control the nuisance to the immediate surrounding.
4.	Over flowing of untreated Sewage and polluting agricultural lands and affecting livelihood of public.	STP unit is adequately sized to handle the sewage and desirable discharge limit. It won't affect the irrigation potentiality and not will hamper the productivity of land.
5.	Safety Measure for any leakage of gas which will affect the local people	Proper safety measure are in build in design and proper operation and maintenance no anticipated gas leakage is predicted. But still during O&M proper safety measure to control any leakage will be taken care of.

Source: Public Consultation

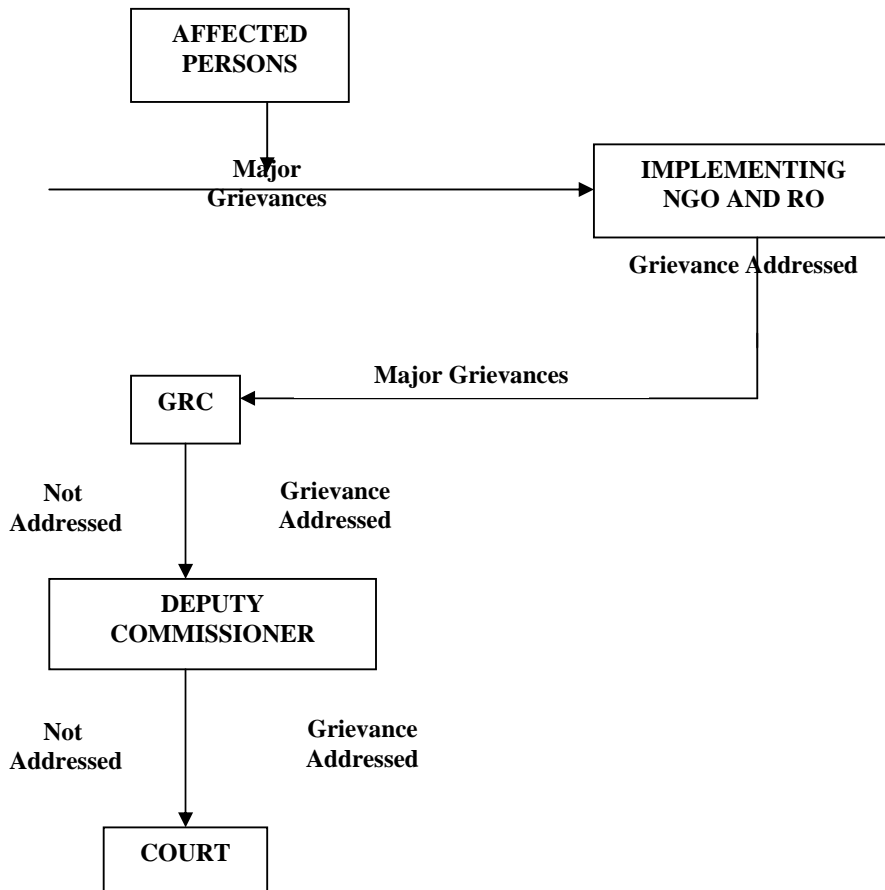
107. During month of January 2009 (Dated 6th January, 7th January, and 3rd July 2009) Public consultation had been conducted.

B. Grievance Redressal Mechanisms

108. A District Level Project Steering Committee (DLPSC) headed by the Concerned District Commissioner (DC) has been established under the NKUSIP project vide GO: No N. A. E. 45 PRJ 04 dated 18/06/04 for 21 towns, in addition to the functions of the committee, Grievance redress was included as additional function vide GO: No N. A. E. 167 PRJ 05 dated 22/09/05 for the same towns and for the additional four towns of Shahabad, Nipanni, Illkal & Sindhanur which were included later the DLPSC was established along the function of grievance redress vide Go No N. A. E124 PRJ 2007, dated 29/11/07, hence a grievance redress mechanism is in place for the project.

109. A Grievance Redressal Committee (GRC) is formed to ensure that grievances are addressed in a timely manner, facilitating timely project implementation. The GRC will comprise representatives from APs (ensuring representation of vulnerable households), local government/Gulbarga ULB, Investment Program Officials – Deputy Project Director of NKUSIP, and NGOs/ community based organizations (CBOs). The GRC redresses grievances at the local-level in a consultative manner and with the participation of the affected households, or their representatives. GRC meetings will be convened as necessary to address complaints as they arise. The time and date of GRC meetings will be announced to APs by the implementing NGO and RO a week in advance.

110. The Process of Grievances Redressal Mechanism is as follow:



IX ENVIRONMENTAL MANAGEMENT PLAN

A. Overview:

111. In order to address the impacts predicted in the earlier sections, mitigation measures are discussed in this section and an Environmental Management Plan (EMP) is recommended. EMP also identifies the role of various agencies in the implementation of these measures.

112. No major environmental or social issues are anticipated due to the implementation of the proposed sewerage system. The critical issues will however be to minimise air and noise quality impacts during the execution of this project.

113. While, the impacts are not very severe and permanent, care has to be taken to ensure that the ambient environmental conditions do not deteriorate. The project on the whole will improve the health and sanitary conditions, water portability and drainage system of the project area.

1. Environmental Management Plan for Sewerage Work:

114. The identified impacts and suggested mitigation measures with institutional responsibilities are tabulated in Table 23

Table 23: Environmental Management Plan for Proposed Sewerage & Sanitation System

Environmental Issue / Component	Remedial Measures	Approximate Location	Timeframe	Institutional Responsibility	
				Implementation	Super-vision
A. Design Phase					
A.1. Existing water supply and other utility lines	During design, it will be ensured that water supply and other utilities may not get affected. If any kind of public utilities are required to be shifted, then this shifting be done before start of construction phase and in minimum time duration.	All along the proposed sewerage system and STP	During design phase	Contractor	Design Consultant
A.2. Interference with street traffic/ blocking of access to building	In order to ensure access diversions to be prepared. Though no interference expected in major road only sub arterial roads some part are to be affected for local traffic	Arterial and Sub arterial road	During design phase	Contractor	Design Consultant
B. Construction Phase					
B.1 Construction waste generation and disposal	During the construction phase the silt and solid waste generated, shall be disposed of at the site approved by engineer. The operations related to the cleaning, removal, storage and transportation of the waste materials shall be performed in strict adherence to the central & State Pollution Control Board norms.	Construction sites	During Construction phase	Contractor	Design Consultant
B.2. Use of water for construction	<ul style="list-style-type: none"> ▪ The contractor will make arrangements for water required for construction in such a way that water availability and supply to nearby communities remain unaffected. ▪ For construction purpose water will be taken from surface body. 	Construction sites	During Construction phase	Contractor	Design Consultant
B.3. Urban Services	<ul style="list-style-type: none"> ▪ Construction wastes should be collected and disposed in environmentally sound manner as soon as construction is over at a particular stretch. ▪ In a particular stretch, where construction activities are being initiated, local people should be made aware about the construction schedule so that they co-operate with the construction activities. ▪ For construction purpose, local water resource should be used judiciously so as to avoid any shortage 	Construction sites	During Construction phase	Contractor	Design Consultant

Environmental Issue / Component	Remedial Measures	Approximate Location	Timeframe	Institutional Responsibility	
				Implementation	Super-vision
	of water to other stakeholders.				
B.4. Air pollution and dust emissions from construction activities	<ul style="list-style-type: none"> ▪ Vehicles transporting construction waste, loose and fine materials, like sand and fine aggregates should be fitted with tailboards to reduce spills. ▪ Water sprinkling to suppress dust shall be carried out at the construction sites (if required). ▪ The contractor will take every precaution to reduce the level of dust from construction activities and machineries either by sprinkling of water or encapsulation of dust source and by erection of screen/barriers/curtains. ▪ Regular maintenance of machinery, vehicles and equipment will be carried out. ▪ All vehicles, plants and equipment used in construction will conform to the MOEF/SPCB air quality standards. ▪ Ambient air quality monitoring should be carried out to ensure the effectiveness of mitigation measures. 	Construction sites	During Construction phase	Contractor	Design Consultant
B.5. Noise Levels	<ul style="list-style-type: none"> ▪ Protection devices (ear plugs or ear muffs) should be provided to the workers operating in the vicinity of high noise generating machines. ▪ Construction equipments and machinery should be maintained properly. ▪ Operation of construction machines will be scheduled to coincide with period when people would least likely be affected. ▪ The unloading of materials at construction sites in/close to settlements will be restricted to daytime only. ▪ Noise levels should be monitored during construction phase and suitable control measures should be taken, if noise levels are found to be above the prescribed standards. 	Construction Sites	During Construction phase	Contractor	Design Consultant
B.6. Sanitation and waste disposal in construction	<ul style="list-style-type: none"> ▪ The construction camps will be located away from the habitation. ▪ Supply of sufficient quantity of potable water in 	At Construction camp locations, wherever located along the Project	During Construction phase	Contractor	Design Consultant

Environmental Issue / Component	Remedial Measures	Approximate Location	Timeframe	Institutional Responsibility	
				Implementation	Super-vision
camps/worker's camp (Based on requirement of camp)	every workplace/labour camp site at suitable and easily accessible places and regular maintenance of such facilities is to be ensured. <ul style="list-style-type: none"> ▪ The contractor will provide garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner. ▪ Unless otherwise arranged by local sanitary authority, arrangements for disposal of night soils (human excreta) will have to be provided by the contractor. ▪ Contractor will keep the sewage system for the camp area in such a fashion that no health hazard occurs. ▪ Separate toilets/bathrooms, wherever required, screened from those from men (marked in vernacular) are to be provided for women. ▪ Adequate water supply is to be provided in all toilets and urinals. ▪ Temporary medical facilities to be provided by the contractor to the workers. 	corridor			
B.7. Drainage and run-off	<ul style="list-style-type: none"> ▪ Contractor will ensure that construction materials like earth, stone or appendage are disposed off in a way not to block the flow of water of any water course. ▪ In addition to the design requirements, the contractor will take all required measures as directed by the Engineer to prevent temporary or permanent flooding of the site or any adjacent area. 	Throughout Project Corridor	Construction Phase	Contractor	Design Consultant
B.8. Accessibility	<ul style="list-style-type: none"> ▪ The contractor will provide safe and convenient passage for vehicles and pedestrians. The contractor will not disturb the existing access for any construction activity without providing adequate alternate provisions. ▪ Barricade during excavation and construction should be provided 	Throughout Project Corridor	Construction phase	Contractor	Design Consultant
B-9. Inconvenience to access business,	The access for business and other facilities along the proposed sewer laning areas will be disturbed during	Throughout Project Corridor	Construction Phase	Contractor	Supervision Consultant

Environmental Issue / Component	Remedial Measures	Approximate Location	Timeframe	Institutional Responsibility	
				Implementation	Super-vision
residential and other immediate facilities for the public and impact on livelihood due to loss of access to business.	construction period. During construction period contractor will place planks / makeshift pathways along the construction areas for the public to access their requirements for residential, shopping and other facilities				
B.10. Flora and Fauna	<ul style="list-style-type: none"> ▪ The contractor will take reasonable precautions to prevent his workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal/bird). ▪ The unloading/dumping of construction and waste materials should be done away from the existing trees. 	Throughout Project corridor/ Worker's camp	Construction phase	Contractor	Design Consultant
B.11. Safety near construction activities	<ul style="list-style-type: none"> ▪ To ensure safe construction, temporary accesses during construction, lighting devices and safety signal devices will be installed. ▪ First aid facilities to be provided by the contractor at the construction sites. ▪ The contractor will take all necessary measures for the safety of traffic and people during construction and provide, erect and maintain such barricades, including signs, markings, flags, lights and flagmen as required by the Engineer for the information and protection of traffic approaching or passing through the construction areas. ▪ The contractor will comply with all the precautions as required for ensuring the safety of the workmen as per the International Labor Organization (ILO) Convention No. 62 as far as those are applicable to this contract. ▪ The contractor will not employ any person below the age of 14 years for any work and no woman will be employed on the work of painting with products containing lead in any form. 	Construction sites	During Construction phase	Contractor	Design Consultant
B.12. Contamination of soil from fuel and	<ul style="list-style-type: none"> ▪ Construction vehicles and equipment will be maintained and refueled in such a fashion that oil/diesel 	Throughout Project Corridor	Construction Phase	Contractor	Design Consultant

Environmental Issue / Component	Remedial Measures	Approximate Location	Timeframe	Institutional Responsibility	
				Implementation	Super-vision
lubricants	spillage does not contaminate the soil.				
B.13. Contamination of soil from construction wastes	<ul style="list-style-type: none"> Construction wastes, generated, will be dumped by contractor in consultation with Engineer at suitable site. 	Throughout Project Corridor	Construction Phase	Contractor	Design Consultant
B.14. Check for contamination of groundwater/ agricultural fields due to discharge of untreated/partially treated STP effluent.	<ul style="list-style-type: none"> Construction wastes, generated, will be dumped by contractor in consultation with Engineer at suitable site. 	Throughout Project Corridor and STP site	Construction Phase	Contractor	Design Consultant
B.15. Noise and air quality testing	<ul style="list-style-type: none"> As per CPCB ambient air quality and Noise quality standard 	Throughout Project Corridor	Construction Phase	Contractor	Design Consultant
C. Contractor's Demobilization					
C-1. Clean-up Operations, Restoration and Rehabilitation	<ul style="list-style-type: none"> The clean-up and restoration operations are to be implemented by the contractor prior to demobilization. The contractor will clear all temporary structures; dispose all garbage and night soils waste as desired by Engineer. All construction zones used/affected by the project will be left clean and tidy, at the contractor's expense, to the entire satisfaction to the Engineer. 	Throughout Project corridor	Construction Phase	Contractor	Design Engineer
D. Operation Phase (Defect Liability Period)					
D.1. Waste water quality	<ul style="list-style-type: none"> After treatment and before Treatment waste water quality to be monitored 	At identified locations	Operation Phase	CCG Gulbarga	CCG Gulbarga
D.2 Pollution and health hazards due to improper sludge disposal methods	<ul style="list-style-type: none"> Safe sludge handling methods shall be employed - Personal protection equipment such as gloves, boots, shall be provided. Sludge shall be dried in drying beds before its disposal. This sludge may be used as manure for non- food crops or land filled. 	STP Site	Operation Phase	CCG Gulbarga	CCG Gulbarga

Environmental Issue / Component	Remedial Measures			Approximate Location	Timeframe	Institutional Responsibility	
						Implementat ion	Super-vision
	<ul style="list-style-type: none"> ASP technique has itself Sludge Management Process. Sludge is to be digested in difgester and decompost in DryingBed. Dried sludge will be used as manure 						
D.3. Water logging and/or overflowing of sewer due to clogged sewer lines	<ul style="list-style-type: none"> Monitoring during monsoon 			STP Site	Operation Phase	CCG Gulbarga	CCG Gulbarga
D.4. Workers exposed to toxic gases in sewers in sewage during maintenance work	<ul style="list-style-type: none"> There should be proper measurement of hazardous gases in the sewers with the help of gas sensors. Safety equipment likemask, oxygen cylinder shall bekept for safety measure. 			STP Site	Operation Phase	CCG Gulbarga	CCG Gulbarga
B. 13 Testing of Water Quality c at 100 meters upstream and 100 meter downstream from discharge point of Treated waste water at Bhima.	Parameters	Unit	Drinking Water Standard 10500	St Bhima River	Operation Phase	CCG Gulbarga	CCG Gulbarga
	pH	-	6.5-8.5				
	Turbidity	N.T.U	5				
	Colour	Hazen	10				
	Hex-Ct ⁴⁰	mg/l	0.05				
	Fluorite	mg/l	0.6-1.2				
	Total iron	mg/l	0.3				
	Nitrate as NO3	mg/l	45				
	Alkalinity as CaCo3	mg/l	200				
	Dissolve Solids	mg/l	500				
	Sulphate as SO4	mg/l	150				
	Chloride	mg/l	250				
	Total Hardness	mg/l	300				
	Calcium as Ca	mg/l	75				
	Magnesium as Mg	mg/l	30				
	DO	Mg/l	5				

Environmental Issue / Component	Remedial Measures	Approximate Location	Timeframe	Institutional Responsibility	
				Implementation	Super-vision
	▪				
Waste Water Quality	BOD COD Total Solid	Inlet of STP Outlet of STP	Monthly as part of plant operation	CCG Gulbarga	CCG Gulbarga
Public health risks of using treated sewerage for agriculture	Sewage used for land irrigation is to be tested by relevant authorities (PCB) before land application to ensure it is not contaminated or pose risks to public health.	Outlet of treated waste water from STP	Monthly as part of plant operation	Relevant Authorities (PCB, Gulbarga)	CCG Gulbarga

Source: Analysis

X FINDINGS AND RECOMMENDATIONS

1 Prioritization based on Environmental Issues

115. The present study is an attempt to highlight important environmental considerations undertaken in study of construction of new sewage system under NKUSIP and use finding from this study to determine the nature and focus under EIA and IEE.

116. Environmental indicators are developed based on the severity of negative impacts produced by the sewage improvement program. An indicator so selected has been assigned depending upon the nature and severity of externalities.

2 Environmental Screening Matrix / Results for Sewerage Work

117. A matrix of environmental impacts, as shown below in Table: 24 was developed from examination of potential environmental impacts and mitigation measures discussed in earlier Sections.

Table: 24 Matrix of Environmental Impacts of Proposed Sewerage System Works

	Physical Resources			Environmental Attributes				Human and Economic Development						Quality of Life Values						
	Topography	Soil/Geology	Erosion/Sedimentation	Surface Water	Ground Water	Air Quality	Ecology	Land Use	Communities	Trade/Commerce	Infrastructure	Housing	Transportation	Socio-economic	Resettlement	Public Health	Flooding/Water	Cultural/Historical	Aesthetics	Recreation
Construction Phase	□	↓	↓	↓	↓	↓	□	□	▼	□	□	□	□	□	□	□	↓	□	□	□
Operation Phase	□	□	□	↑	↑	□	□	□	▲	↑	▲	↑	↑	↑	□	▲	▲	□	↑	□

<i>Insignificant impact, no change over existing conditions</i>	□
<i>Minor short time negative impact</i>	↓
<i>Moderate short-term negative impact</i>	▼
<i>Positive impact</i>	↑
<i>Significant positive impact</i>	▲

Source: Analysis

118. As evidenced from the above matrix, the project is not expected to cause any irreversible impact on the area. However, most of the environmental impacts that are likely will occur for a short period of time during construction phase. The project upon completion would realize several positive impacts, most significant of which being the improved water supply and centralised sewerage system.

- a. The Environmental Management Plan (EMP) along with monitoring plan should be ensured for p
- b. roper implementation from contractor.

- c. Since the city does not have any sewerage system, the CCG should take appropriate action for commissioning of 129.00 MLD STP to promptly solve the unsanitary conditions prevailing in the city.
- d. It may be emphasized that, owing to: (i) scale of activity, (ii) location of the proposed sub-project component, and (iii) 'no environmental sensitivity' of the sub-project town, none of the components required to go through the process of EIA. It may be emphasized that the present IEE, which identifies potential impacts and suggests appropriate mitigation measures, is sufficient enough to safeguard the environment. There are no significant adverse impacts, which are irreversible or may lead to considerable loss/destruction of environment, envisaged. All the impacts are simple and moreover proven mitigation measures exist to minimize/mitigate the same. Hence, no further study such as an EIA is required.

ANNEXURE

APPENDIX 1: RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST

SEWAGE TREATMENT

Instructions:

- This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Regional and Sustainable Development Department.
- This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department.
- This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development.
- Answer the questions assuming the “without mitigation” case. The purpose is to identify potential impacts. Use the “remarks” section to discuss any anticipated mitigation measures.

Country/Project Title: India / North Karnataka Urban Sector Investment Program

Sector Division: Urban Development

SCREENING QUESTIONS	Yes	No	REMARKS
B. PROJECT SITING			
IS THE PROJECT AREA.			
▪ DENSELY POPULATED?	√	<input type="checkbox"/>	It is densely populated.
▪ HEAVY WITH DEVELOPMENT ACTIVITIES?	√	<input type="checkbox"/>	Activity is all along road but not hamper any other development activity.
▪ ADJACENT TO OR WITHIN ANY ENVIRONMENTALLY SENSITIVE AREAS?	<input type="checkbox"/>	√	Proposed work is not traversing any Environmentally Sensitive areas.
▪ Cultural heritage site	<input type="checkbox"/>	√	There is no cultural heritage site is traversed through pipe line.
▪ Protected Area	<input type="checkbox"/>	√	
▪ Wetland	<input type="checkbox"/>	√	
▪ Mangrove	<input type="checkbox"/>	√	
▪ Estuarine	<input type="checkbox"/>	√	
▪ Buffer zone of protected area	<input type="checkbox"/>	√	
▪ Special area for protecting biodiversity	<input type="checkbox"/>	√	
▪ Bay	<input type="checkbox"/>	√	

SCREENING QUESTIONS	Yes	No	REMARKS
A. POTENTIAL ENVIRONMENTAL IMPACTS			
WILL THE PROJECT CAUSE...			
<ul style="list-style-type: none"> ▪ Impairment of historical/cultural monuments/areas and loss/damage to these sites? 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	The project work is not traversing any old heritage building or site and even new sewer line is all along the parallel to existing sewer line. There is no loss or damage of private property also.
<ul style="list-style-type: none"> ▪ Interference with other utilities and blocking of access to buildings; nuisance to neighboring areas due to noise, smell, and influx of insects, rodents, etc.? 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	During desiltation and dewatering process removal of waste material make nuisance to the project corridor area, but proper mitigation measures has been addressed to mitigate the impact.
<ul style="list-style-type: none"> ▪ dislocation or involuntary resettlement of people 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	For proposed STPs and Pumping stations (PS) land acquisition is required but exiting land is predominantly agricultural land, so there is no displacement and dislocation of settlement.
<ul style="list-style-type: none"> ▪ Impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage? 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	During desiltation and dewatering process removal of waste material make nuisance to the project corridor area, but proper mitigation measures has been suggested to reduce the adverse impact. After commissioning of project there will be no untreated sewage intercepts in downstream.
<ul style="list-style-type: none"> ▪ Overflows and flooding of neighboring properties with raw sewage? 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Detailed EMP has been worked out to mitigate the adverse impact during the periodic maintenance of sewer to avoid overflowing and flooding of neighboring properties.
<ul style="list-style-type: none"> ▪ Environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers? 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	As per design capacity sludge has to be removed once in 3 years. Sludge can be used for manure and solid waste shall be disposed in pre-identified disposal sites to avoid surface water and soil pollution. It is suggested in EMP that the CCG has to ensure that no industrial effluent will illegally get discharged to the sewer lines.
<ul style="list-style-type: none"> ▪ Noise and vibration due to blasting and other civil works? 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	It is suggested in EMP that all construction machineries used will comply with the noise standards as suggested by Central Pollution Control Board.

SCREENING QUESTIONS	Yes	No	REMARKS
<ul style="list-style-type: none"> Discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers? 	√	<input type="checkbox"/>	The closed sewer trunk line does not allow to intercept any illegal hazardous material into sewer. The EMP has ensured that CCG During desiltation and dewatering process removal of waste material make nuisance to the project corridor and project impact area, but proper mitigation measures required, the implementing agency would take care to prohibit the illegal hazardous materials into sewers.
<ul style="list-style-type: none"> Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances, and protect facilities? 	√	<input type="checkbox"/>	Buffer zone with screens and landscaping is suggested to provide proper shielding such that operation of STP will not have nuisance to surroundings.
<ul style="list-style-type: none"> Social conflicts between construction workers from other areas and community workers? 	<input type="checkbox"/>	√	The local labour force will be utilized by the contractor for construction activities and hence there is no possibility for social conflict regarding employment opportunities during construction phase.
<ul style="list-style-type: none"> Road blocking and temporary flooding due to land excavation during the rainy season? 	√	<input type="checkbox"/>	Road blocking and traffic re routing will be required during construction stage for laying of sewer lines. Temporary flooding is not anticipated as there is no deep excavation or filling of low laying area envisaged in the project.
<ul style="list-style-type: none"> Noise and dust from construction activities? 	√	<input type="checkbox"/>	It is suggested in the EMP that all the construction machineries should comply with the noise standards as suggested by Central Pollution Control Board. Sprinkling of water should be done along the construction area for dust suppression.
<ul style="list-style-type: none"> Traffic disturbances due to construction material transport and wastes? 	√	<input type="checkbox"/>	Traffic management with re routing of traffic during construction period is required to avoid conflict of public transport with construction material / waste transport.
<ul style="list-style-type: none"> Temporary silt runoff due to construction? 	√	<input type="checkbox"/>	The construction waste water will be channeled such that it will have sufficient time to settle the solids and do not deteriorate water quality of discharging courses.
<ul style="list-style-type: none"> Hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system? 	√	<input type="checkbox"/>	Regular maintenances of sewer line have to be carried out to avoid over flow of sewer lines and related impact of public health due to pollution. There is no possibility for groundwater pollution due to failure in sewerage system as the ground water table is very deep (100-150feet)

SCREENING QUESTIONS	Yes	No	REMARKS
<ul style="list-style-type: none"> ▪ Deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water? 	√	<input type="checkbox"/>	<p>Sludge from the bottom of ASP has to be removed at regular intervals (normally once in 7 years) to avoid re-suspension in the treated water and there by deteriorating treated water quality.</p> <p>Direct discharge of untreated sewage water is not anticipated.</p>
<ul style="list-style-type: none"> ▪ Contamination of surface and ground waters due to sludge disposal on land? 	√	<input type="checkbox"/>	<p>Sludge should be disposed off only in pre-identified disposal sites. The sludge disposal areas should be properly lined with geosynthetic lining such that it will not leach to the nearby water courses / land and pollute environment. It will disposed off into landfill site at Udnoor village</p>
<ul style="list-style-type: none"> ▪ Health and safety hazards to workers from toxic gases and hazardous materials which may be contained in sewage flow and exposure to pathogens in sewage and sludge? 	√	<input type="checkbox"/>	<p>Mixing of hazardous / industrial effluents with sewage may result in toxic gas formation in sewer and STP which should be avoided through proper law and enforcement.</p> <p>The sewer cleaning and STP workers should be provided protective measures such as boots, masks etc to avoid exposure to pathogens in sewage and sludge.</p>