

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

ENVIRONMENT AND SOCIAL SYSTEMS ASSESSMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF

US\$426 MILLION EQUIVALENT

то

INDIA

FOR THE

KARNATAKA WATER SECURITY AND RESILIENCE PROGRAM (P506272)

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Water Global Practice

South Asia Region

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List of Acronyms

AMRUT	Atal Mission for Rejuvenation and Urban Transformation
BBMP	Bruhat Bengaluru Mahanagara Palike
BWSSB	Bangalore Water Supply and Sewerage Board
CHS	Community Health and Safety
CSO	Civil Society Organizations
DLI	Disbursement Linked Indicators
DRM	Disaster Risk Management
ECSMF	Environmental Climate Change and Social Management Framework
E&S	Environmental and Social
EIA	Environment Impact Assessment
EMP	Environmental Management Plan
ESSA	Environmental and Social Systems Assessment
FCO	Fertilizer Control Order
FD	Finance Department
FGD	Focus group discussion
FM&P	Financial Management & Procurement
FSA	Fiduciary System Assessment
GDP	Gross Domestic Product
GIS	Geographic Information System
GO	Government Orders
GoK	Government of Karnataka
GRM	Grievance Redress Mechanism
GSDP	Gross State Domestic Product
GST	Good and Services Tax
ICT	Information and Communications Technology
IDIs	In-depth interviews
IFC	International Finance Corporation
IPF	Investment Project Financing
ISM	Implementation Support Mission
IVA	Independent Verification Agency
JICA	Japan International Cooperation Agency
KCHRIS	Karnataka Climate Hazard and Risk Information System
KSAPCC	Karnataka State Action Plan on Climate Change
KSDMA	Karnataka State Disaster Management Authority
KSNDMC	Karnataka State Natural Disaster Monitoring Center
LCC	Life Cycle Costing
M&E	Monitoring and Evaluation
MIGD	Minor Irrigation and Groundwater Department
MIS	Management Information System
MoEFCC	Ministry of Environment, Forest and Climate Change
MLD	Million Liters per Day
MTR	Midterm Review
NDMA	National Disaster Mitigation Authority, Government of India
NBS	Nature-Based Solution
NDRF	National Disaster Response Fund
NGT	National Green Tribunal
NRW	Non-Revenue Water
0&M	Operation and Maintenance
OHS	Occupational Health and Safety
OPEX	Operational Expenditures
OSR	Own Source Revenue
PAP	Program Action Plan
РВС	Performance-Based Contract

PCRs	Physical Cultural Resources
PDO	Program Development Objective
PE	Procurement Entities
PforR	Program for Results
PPSD	Project Procurement Strategy for Development
PWD	Public Works Department
RA	Result Areas
RCA	Root Cause Analysis
SBM	Swachch Bharat Mission
SC	Scheduled Caste
SDU	Sustainable Development Unit
SDMA	State Disaster Management Authority
SDRMF	State Disaster Risk Management Fund
SEA/SH	Sexual Exploitation and Abuse / Sexual Harassment
SIDM	State Institute of Disaster Management
SORT	Systematic Operations Risk-Rating Tool
SPD	Standard Procurement Document
ST	Scheduled Tribe
STP	Sewage Treatment Plant
SW	Solid Waste
SWD	Storm Water Drainage
SWM	Solid Waste Management
ТА	Technical Assistance
ToR	Terms of Reference
KWSRP	Karnataka Water Security and Resilience Program
KSPCB	Karnataka State Pollution Control Board
UGSS	Underground Sewerage System
ULB	Urban Local Body (Municipal Corporation or Municipality)

ENVIRONMENTAL AND SOCIAL SYSTEMS ASSESSMENT

EXECUTIVE SUMMARY

- A) Due to pre-existing precarities of water security, Karnataka is witnessing an increasing frequency of extreme weather events including flooding, landslides, severe droughts, and erratic monsoon patterns. Further, with rapid and unplanned development, Bangalore has struggled to extend water supply, sewer, and storm water infrastructure and services to the expanded areas and residents—thus relying on private borewells, septic tanks, and limited Storm Water Drains (SWDs). To address these concerns, the Government of Karnataka (GoK) initiatives on climate resilient and disaster risk management, as outlined in the Karnataka State Action Plan on Climate Change (KSAPCC) 2024, contains the state government's strategic plan to combat climate change across various sectors. The government program largely overlaps with the World Bank financed Program for Results (PforR).
- B) The program development objective (PDO) is to improve water security related municipal services, institutions, and financing in Bengaluru. There are three results area under the PforR: RA 1: Improving infrastructure and services for enhanced water security and resilience; RA 2: Strengthening water security institutions; and RA 3: Enhancing financial capabilities and resources of key institutions.
- C) Under RA 1, the Program will support construction of new (173 km) and rehabilitation of (80 km) existing storm water drain, which is fully integrated with adjacent lakes (50 lakes) and include modern flood management control measures such as sluice gates and remote sensing. Establishment and operationalization of nine STPs with a combined capacity of 148 MLD and one advance water treatment plant. Under RA 2, program will support joint O&M plans and infrastructure quality control systems for SWDs; approval of integrated sub-catchments flood management plans; Nature Based Solution (NBS) interventions in each of the eight zones; development of Greater Bengaluru water security plans and basin water audits; development of an industrial wastewater pollution monitoring and management system; implementation of DRM Reform Program Action Plan; and replacement of 100 km of pipeline through Performance Based Contracting for NRW reduction. Under RA 3, the program will support preparation of Medium-Term Fiscal Plan and adoption of long-term capital investment planning and assets management systems, including implementation of Utility Financial Enhancement Program Action Plan. The action plan includes non- revenue water (NRW), energy efficiency, PPP implementation, and revenue increase of BWSSB. Additionally, implementation of disaster risk and climate adaptation financing capacity building program. Lastly, the PforR will support filling of 40 tanks with holding capacity of 773.44 Mcft for the proposed Lift-4 (Gopalapura Lift) of Vrushabhavathy Valley Project.
- D) This Environmental and Social System Assessment (ESSA) examined the following aspects: (a) the environmental and social (E&S) impacts of the PforR Program including direct, indirect, induced, and cumulative impacts, as relevant; (b) the borrower's capacity—legal framework, regulatory authority, organizational capacity, and performance to manage those impacts; (c) an assessment of the Borrower's systems—laws, regulations, standards, procedures, and implementation performance against the core principles and key planning elements to identify any inadequacies that could affect Program performance; (d) the likelihood that the proposed Program achieves its E&S objectives; and based on the above, provides recommendation of measures to address any shortcomings pertaining

to capacity and/or implementation performance relevant to managing the Program risks through a set of actions under the Program Action Plan.

E) Nature and significance of Environmental and Social risks related to the PforR Program: The main environmental risks are: (a) the substantial occupational safety and hazard risks for workers and communities due to numerous (approximate 1,000) work fronts for construction and upgradation of sewage treatment plants (STPs), sewers, lining of storm water drains (SWDs) within the densely populated urban settings, and potential traffic disruptions; (b) the residual pollution of SWDs discharging into lakes downstream if broken manholes of underlying sewers are not readily repaired as planned; (c) management of solid wastes in the SWDs to be fully integrated into Bengaluru's overall solid waste management program, which is being pursued in parallel; (d) ensuring of water quality during construction of SWDs and sewage treatment plants (STPs); (e) minimization of tree-felling at STP sites; (f) management of usual construction-related pollution, dust, oil spills, noise, and so on, and (g) reputational risks if the lake water quality continues to be poor due to constraints in sewage treatment considering that many current STPs cannot upgrade to tertiary treatment facilities, due to a shortage of land. The environmental risk rating ranges from moderate to substantial.

The key social risks are: (a) potential disruptions to and impacts on livelihoods of communities/vulnerable groups that have, at few locations, encroached upon the existing 'Right of Way' (or land within the Buffer zone of SWDs) and catchment areas, that will be used for upgradation of SWD network and tank-filling scheme; (b) risks of disruption, safety and gender-based violence (GBV)/ sexual exploitation and abuse (SEA)/ sexual harassment risks to communities, particularly in congested urban locations wherein nine STPs are proposed on encumbrance free government lands that have already been identified; (c) inadequate measures at construction sites on city roads that have led to accidents/fatalities in the past and might occur again; (d) inadequate information dissemination to communities on use of treated water, etc. and (e) inadequate community awareness in disaster situations.

- F) Assessment against the PforR core principles. Assessment of the E&S management systems of the respective implementing agencies and capacity against the six core principles indicated: i) that their systems are largely aligned with the first five core principles¹ and ii) presented gaps pertaining to lack of adequate screening, assessment, and monitoring procedures and these shall require to be addressed through ESSA recommendations and Program Action Plan. The sixth core principle² was found to be 'not applicable'.
- G) **Program exclusion.** The assessment confirmed the activities do not include those which are not eligible for PforR financing. There are potentially no significant adverse E&S impacts likely to arise from activities under the Program. During the implementation, it will be required to ensure that all such activities ineligible for PforR financing remain excluded.
- H) Adequacy of the legal and institutional framework applicable to the PforR Program activities. Comprehensive and overarching legal and regulatory provisions on E&S exist at the national and state levels, e.g., legal provisions along with elaborate processes and provisions exist for removal of

¹ Core Principle #1: relates to Program E&S management systems, Core Principle #2: relates to natural habitats and physical cultural resources, Core Principle #3 relates to public and worker safety, Core Principle #4 relates to land acquisition and loss of access to natural resources and Core Principle #5 relates to rights and interests of Indigenous Peoples and to the needs or concerns of vulnerable groups.

² Core principle 6 relates to fragile, post conflict areas.

encroachments that are found in vicinity of lakes/tanks and on SWDs, thereby providing reasonable protection to individuals and communities against 'forced eviction'. Further, government-owned encumbrance free sites have been identified for construction of STPs and one WTP, whereas for tank-filling, due legal processes through direct purchase (willing buyer-willing seller) will be followed to acquire the two acres of identified land parcel. Also, the usage of compressed design of STPs and treatment techniques help to minimize land requirement in densely congested urban settings and the risk of emanating odour to communities in the vicinity, respectively. BWSSB, BBMP, and MIGD responsible for executing infrastructure works— have a robust grievance redressal mechanism and a well- developed system of citizen/stakeholder engagement (detailed in Section H). Lastly, contract documents require contractors engaged for works, to adhere to all applicable labour regulations and is broadly monitored by implementing agencies, even though evidence-based reporting on E&S requirements during preparation and construction phases are areas of concern.

Similarly, while environmental norms and guidelines exist to guide the construction activities undertaken by BBMP, BWSSB and MIGD on SWDs, STPs, sewerage networks, lakes etc., adopting ISO 14001 (Environmental Management System) and ISO 45001 (Occupational Health and Safety Management System) certifications represents an industry best practice. Implementing these certifications ensures that environmental impacts and occupational health and safety risks are effectively identified, managed, and mitigated, aligning with both regulatory requirements and organizational objectives. The adoption of ISO 14001 facilitates systematic environmental management, ensuring compliance with environmental regulations, such as waste management, air and water quality standards, and ecosystem conservation, during the planning, construction, and operational phases of these projects. Similarly, ISO 45001 certification establishes robust safety protocols to reduce workplace hazards, safeguard workers' health, and meet legal requirements under labour and safety laws, such as the Building and Other Construction Workers Act. The qualification criteria for prospective bidders should emphasize relevant track records, including compliance with state and national labor laws and adherence to environmental and safety standards. Contractors with certifications in environmental management systems (ISO 14001) and occupational health and safety (ISO 45001) should be prioritized. As most of the construction works (specifically, trunk sewers and SWDs) are expected to take place on or along the busy and already congested roads. specific traffic management plans will/should be prepared and agreed with the relevant authorities (such as the Traffic Police) prior to tendering of the civil works contracts, and such plans are to be duly implemented by the contractors, with daily reports to be monitored by the IAs.

Key gaps identified therefore include the need for: (a) strengthening compliance with applicable E&S laws related to contractor's environmental management systems, including occupational and community health and safety (OHS, CHS) and diligent monitoring of contractors by implementing agencies (and PMCs, if applicable) through formal reporting; (b) strengthening of the system of water quality monitoring; and (c) provisions to manage the physical and economic displacement impacts of civil works on 'vulnerable' encroachers/unauthorized occupants in relation to the activities under the World Bank-financed Program.

Institutional structure and capacity for implementing the relevant laws and regulations, including information on the relevant track record. The primary implementing agencies under the Program are as follows: (1) Revenue Department (RD) is the nodal agency for the Program. A Program Management Unit (PMU) will be established at the RD which will have overall responsibility for compliance, monitoring, and implementation of the Program. (2) Bruhat Bengaluru Mahanagara Palike (BBMP) will

be responsible for the construction of SWDs, lakes and integrated flood management. (3) Bengaluru Water Supply and Sewerage Board (BWSSB) will lead the implementation on STPs and one WTP, nonrevenue water (NRW), energy efficiency, Public-Private Partnerships (PPPs) and its revenue generation. (4) Karnataka State Disaster Management Authority (KSDMA) will lead on the DRM activities including the establishment of the blended financing mechanism. Karnataka State Natural Disaster Monitoring Center (KSNDMC) is the Project Executive Entity under KSDMA. (5) Minor Irrigation and Groundwater Department (MIGD) will lead the tasks on filling of tanks/lakes with secondary treated sewage water. Of the four implementing agencies (IAs) – BWSSB, BBMP, KSDMA and MIGD, BWSBB and MIGD have prior experience of working with donor organizations such as JICA, World Bank (under Atal Bhujal Yojana) and therefore have a degree of familiarity with E&S requirements. In terms of staffing, while there are no designated/dedicated E&S staff in KSDMA— BBMP, BWSSB, and MIGD have a Public Relations /Public Information Officers and KSNDMC has a Human Resource Manager— who oversee various IEC and community outreach/awareness generation initiatives. Given the nature of works, BWSSB, BBMP, MIGD, KSDMA including KSNDMC will manage E&S issues arising from their respective sub-projects either through dedicated/designated E&S staff hired by their department or by outsourcing these functions to the Project Management Consultants (PMC) firms that are contracted to support their respective activities. Such hiring will take place before the commencement of subproject activities.

Environmental. While in case of externally funded projects, BWSSB ensure: (i) preparation of detailed EIA with EMP and monitoring of EMP implementation, and (ii) includes Environment experts in PMC's contracts, it is not a requirement in its own funded projects. There is a lack of dedicated procedures for screening and/or assessing scheme-specific E&S issues and preparation of commensurate schemespecific environmental management Plans (EMPs), even though BWSSB already has Sanitation experts/environmental engineers with commensurate expertise. In respect of industrial wastewater and monitoring of effluent, there appeared to be some uncertainty as Water quality monitoring reports indicate high levels of chemical oxygen demand³ although test reports from sludges may not record any heavy metal residue. The current system of effluent monitoring is paid by the operation and maintenance (O&M) contractors with third-party monitoring by certified monitoring laboratories. The overall monitoring system should ideally operate for the STPs integrated with the water quality monitoring system for the (inlets to the) lakes and the overall storm water drainage network. Similarly, tendering and contracting documents also do not adequately cover scheme-specific E&S requirements that become part of the contractor's contractual obligations. The BBMP also has a substantially large division responsible for conservation of the lakes in the Bengaluru Metropolitan Area and implementing the relevant parts of the Climate Action Plan for the city. Another division is responsible for solid waste management. It is proposed that an inter-divisional team, reporting directly to the Project Director at BBMP, is constituted to ensure implementation of environmental management plan, the overall water quality and sludge/sediment monitoring system along with BWSSB and MIGD, and regular inspection of the work sites under the program to identify and prepare remedial plans for any unsafe work practices.

Social. Though as noted above, there is no forced eviction of encroachers/squatters without legal recourse, BBMP currently does not have designated/dedicated personnel or processes to systematically identify vulnerable persons/households who might experience physical and/or

³ As high as 950mg/l.

Karnataka Water Security and Resilience Program- ESSA

economic displacement impacts resulting from its proposed works in the SWDs or lakes. However, given the high visibility of their works and active participation of citizens in Bengaluru, the IAs – MIGD, BWSSB and BBMP have Public Relations Office (PRO) Cell and a well-developed robust system of citizen/stakeholder engagement that include various initiatives on water conservation such as Green star rating and Jalarushi Puruskar (award) schemes; holding of seminars such as Eco-restoration and Water Conservation; deployment of Jalamitra (water friends), Jalasenani and Jalasnehi comprising citizens, activists, etc. to support BWSSB on conservation of water amidst severe water scarcity by inviting applications; usage of theme parks to provide ideas to citizens on rain water harvesting; creating awareness of use of 'aerators'; signing of agreements between BWSSB and Bengaluru Apartment Federation (BAF) that aims to enhance the usage of treated water in apartment complexes. Citizen engagement has been further enhanced in April 2024, by deployment of mobile based applications to monitor treated sewage from sewage treatment plants; penalising those who use drinking water for non-essential purposes; application to dig borewells and collect the no objection certificate (NOC) for their residences and monitor the leakage of water, drains issues, and for other purposes of the BWSSB.

Likewise BBMP, too: undertakes public engagement through forums, workshops, and social media to provide updates on environmental initiatives and gather feedback; collaborates with Resident Welfare Associations (RWAs), NGOs, and citizens to participate in lake conservation activities, clean-up drives, and awareness campaigns; forms Lake Management Committees (LMCs) and encourages the local residents, NGOs, and BBMP officials to oversee lake maintenance and conservation efforts and undertakes public awareness campaigns; and conducts campaigns to raise awareness about the importance of lake conservation and involve the community in conservation activities in enhancing the water bodies' importance, Biological co-existence and Biodiversity in lakes.

In respect of grievance management, BWSSB, BBMP, MIGD and KSDMA have robust systems that comprise multiple modes for registration of grievances (website, helpline, app, phone-in programs, water Adalat (court), AI chatbot, etc), well-advertised procedures, database for managing grievances and with suitable escalation provisions. Apps such as Sajala, Sahaaya 2.0 and Janaspandana Integrated Public Grievance Redressal systems too are in place. Likewise, BBMP through its Integrated Command and Control Centre (ICCC), KSDMA and BWSSB through its 24x7 call centre provide quick services on a whole range of citizen related services.

I) Consultative process followed in formulation of ESSA: This included review of secondary literature review, consultations (field and state level), assessment of E&S system strengths, and areas for improvement. Site visits were undertaken to locations wherein new STPs and SWD works are proposed, besides which meetings were held with officials of BBMP, BWSSB, KSDMA, MIGD and KSNDMC between June and December 2024. A varied set of stakeholders were consulted to solicit feedback (refer to the ESSA report for details on stakeholders consulted). Further, a State-level consultation stakeholder workshop organized by the World Bank with facilitation support from the Government of Karnataka, was held on December 20, 2024.

During the consultations and state-level stakeholder workshop, feedback was given on the institutional arrangement for the proposed program, , involvement of communities, civil society organizations and relevant stakeholders throughout the project period, IEC activities, complaint redressal, occupational and community health and safety during construction, gender inclusion and community inclusive approach to tackle wastewater, rainwater harvesting etc., access to welfare schemes by vulnerable or marginalized groups, need for nature-based solutions, improvement of

water quality monitoring, among others. Besides noting the given suggestions for suitable incorporation in the ESSA, clarifications and suitable responses were provided to the participants on their observations and comments.

Disclosure. The above-mentioned stakeholder workshop was organized to disclose the draft ESSA. The Executive Summary of the ESSA was translated into local language (Kannada) and distributed to all invited stakeholders before the workshop. The feedback obtained during the workshop was used to further refine and finalize the ESSA. The draft and revised/final ESSA report has been disclosed on the World Bank portal.

Action Description	Source	DLI #	Responsibi lity	Timing		Completion Measurement
Institutional Enhancement for Social & Environmental Management: (i) Hiring at PMU State-Level: Social Specialist and Environment Specialist; (ii) Appointing dedicated Environmental Officers within each implementing agency.	Environ mental and Social Systems	NA	RD, BWSSB, KSDMA, KSNDMC, MIGD	Other	Before the commence ment of sub-project activities	Staff contracted and joined duties.
Develop and enforce a Construction Zone Management Plan to mitigate E&S risks pertaining to occupational and community health and safety including	Environ mental and Social Systems	NA	BWSSB, MIGD, KSDMA	Other	Throughout construction period.	CZM Plan developed and enforced through regular inspections and corrective actions to address any identified risks effectively.

J) Inputs to the Program Action Plan

traffic management.						
Development and Implementation of Program Specific Comprehensive Water Quality Monitoring Network and Plan: Design and implement a comprehensive, program-specific water quality monitoring network for raw and treated sewage at STPs, SWDs and lakes.	Environ mental and Social Systems	NA	BBMP and BWSSB	Other	Develop the Plan within 6 months of program effectivenes s; Implement within 2 years of program effectivenes s.	Water quality monitoring network and plan, Implementation report.
Receipt of IAs' monitoring reports to comply with E&S provisions included in contract agreements of PforR investments— during construction and O&M phase.	Environ mental and Social Systems	NA	BWSSB, MIGD and KSDMA	Recurr ent	Semi- annually during construction and O&M	Monitoring template for semi- annual reporting. Semi-annual E&S monitoring reports submitted till completion of works.

1 PROGRAM DESCRIPTION

1.1 Program Context

1. Due to pre-existing precarities of water security⁴, Karnataka is witnessing an increasing frequency of extreme weather events including flooding, landslides, severe droughts, and erratic monsoon patterns. As per one estimate,⁵ high-intensity rainfall events are now two to six times more likely than during the 1999-2019 period. Cyclones affect coastal districts with higher intensity in addition to storm surges, erosion, and landslides in the coastal, Malnad, and northern districts. The impact of these events is significant in cities, where rapid unplanned development is exacerbating climate risks. Bengaluru population has grown from 4 million in 1991 to around 14 million in 2024 and is projected to reach 28 million by 2041⁶. As a result of rapid and unplanned development, the city struggled to extend water supply, sewer, and storm water infrastructure and services to the expanded areas and residents rely on private borewells, septic tanks, and limited Storm Water Drains (SWDs).

2. There are 204 cascading lakes in Bengaluru, of which 21 have been reclaimed for infrastructure such as a stadium and a bus terminal. The remaining 183 lakes hold great potential for reintegration into a system where lakes serve as balancing reservoirs during floods and droughts. In the absence of a proper sewage system in the expanded area, raw sewage is discharged into SWDs, and lakes are currently intentionally bypassed to avoid raw sewage in city lakes. With support from the Japan International Cooperation Agency (JICA), the Government of Karnataka (GoK) is currently constructing 14 sewage treatment plans (STPs) in the expanded area, but an additional 9 STPs are needed to prevent sewage from entering the SWDs and lakes. Further, the core area of the city receives 1,450 million liters per day (MLD) of water lifted 300m from the Cauvery River. The city's water demand is 2,100 MLD, leaving a deficit of 650 MLD. Out of 10,995 government city borewells, water levels decreased or dried up in 4,900 of them during recent droughts. Bengaluru generates 1,500 MLD of wastewater, of which only 18 MLD is reused for industrial and commercial use. Investment in water reuse technologies would provide additional revenue for Bengaluru Water Supply and Sewerage Board (BWSSB), increase the total available water to the city during droughts, and help rejuvenate city lakes with the additional benefit of increased groundwater recharge.

3. Both the Bengaluru Water Supply and Sewerage Board (BWSSB), responsible for water and wastewater, and the Bruhat Bengaluru Mahanagara Palike (BBMP), the municipality of Bengaluru responsible for SWDs, have limited staffing capacity and integrated master planning is not carried across agencies. BBMP's two departments responsible for SWD and lakes largely work in silos and building codes and Nature-Based Solutions (NBSs) lack an integrated approach. Another challenge is the lack of institutional capacity to monitor industrial and municipal wastewater, a growing concern in the state. The Karnataka State Pollution Control Board (KSPCB) is mandated but not capacitated to systematically monitor and control wastewater pollution. Minor Irrigation and Groundwater Department (MIGD) looks after planning, designing, investigation, construction and maintenance of tanks, *Bhandaras*, and lift irrigation schemes for command areas ranging from 40 to 2000 hectares in the state. The department rejuvenates tanks and lakes located on government land, which are considered as community properties. It has already implemented K.C. Valley/ H.N. Valley/ Anekal taluk Tank Filling Projects to augment ground water in Kolar, Chikkaballapura, Bengaluru Urban and Rural Districts.

⁴ Karnataka's rural economy is largely agrarian and heavily affected by droughts. At least 77 percent of its land is considered arid or semi-arid. The state contains seven river basins and has high rainfall, diversity, with an annual 4,000 mm of rain in the west, compared to 500 mm in the east. Almost 60 percent of the state experienced drought conditions between 2001 and 2020, and 23 of the 31 districts face acute water scarcity.

⁵ CSTEP (2021) Climate Change Risks to Rainfed Agriculture in Karnataka: Implications for Building Resilience.

⁶ Expert Committee Report, Government of Karnataka, 2010.

4. In addition, Karnataka lacks holistic long-term integrated water management plans to manage all aspects of the water cycle and DRM, especially considering climate change and rapid urbanization. A focus on water audits and river basin planning will lay the analytic foundation to inform any future decisions around water allocations and investments.

5. Further, there is currently no mechanism to quantify the risks and take informed decisions on diversifying disaster risk financing (DRF). Since 2009, flood- or drought-related annual estimated losses have been higher than US\$ 1.2 billion for every affected year, going as high as US\$ 4 billion in some years. Between 2008 to 2024, funding from Government of India (GoI), primarily via the National Disaster Response Fund (NDRF), was only 8 percent of the total estimated losses for droughts and 6 percent for floods. Currently, the only ex ante source of funds that are available to states is the State Disaster Risk Management Fund (SDRMF), which for 2021-2026 (15th Finance Commission) is about US\$497 million. Most of the funds were used for the floods in 2021 and 2022 and the drought in 2023. Private insurance penetration is low in the state, in line with the trend across India–less than 10 percent of homes and less than 30 percent of farmers and cropped area are insured. Adopting similar approaches for quantifying the needs and leveraging blended finance opportunities for financing climate adaptation and mitigation measures can enable Karnataka to meet its climate goals.

1.2 Government Program

6. The Government of Karnataka (GoK) initiatives on climate resilient and disaster risk management, as outlined in the Karnataka State Action Plan on Climate Change (KSAPCC) 2024, contains the state government's strategic plan to combat climate change across various sectors. The KSAPCC contains an estimated budget of US\$ 6.3 billion to implement measures in agriculture, forestry, energy, water resources and several other sectors between 2025 and 2030. There are four additional elements that represent the PforR Program boundary: (a) the Climate Action Plan for Bangalore launched by BBMP in 2023, (b) the Water Policy Implementation Roadmap (GoK 2023), (c) the State Disaster Risk Management (DRM) Plan, and (d) Atal Mission for Rejuvenation and Urban Transformation (AMRUT 2021) 2.0 scheme designed to provide universal coverage of water supply and sewerage management in 500 Indian cities.

1.3 World Bank Financed Program for Results (PforR): Scope

7. **The government program largely overlaps with the PforR.** Several guiding principles were used to determine the PforR Program boundaries and select the state-level interventions for PforR Program support. First, while the government interventions focus on discrete action for climate resilience, the PforR will support interventions under an umbrella of water security, climate resilience, and disaster risk management (DRM), with infrastructure investments focused on Bengaluru. Second, the PforR will support institutional reforms, integrated planning, and enhanced coordination between the five critically interlinked institutions namely Bengaluru Water Supply and Sewerage Board (BWSSB), Bruhat Bengaluru Mahanagara Palike (BBMP), Karnataka State Disaster Management Authority (KSDMA), Karnataka State Natural Disaster Monitoring Center (KSNDMC) and Minor Irrigation and Groundwater Department (MIGD). Third, the PforR will focus on a range of activities to reduce the financing gap required for climate resilience. The Karnataka Water Security and Resilient Program (KWSRP) will be implemented over a period of **five years (2025-2031)**. In terms of geographic scope, the PforR prioritizes Bengaluru due to its economic salience to the state of Karnataka, population concentration, and climate vulnerability. However, many of the results under the PforR will have statewide benefits.

1.4 Program Financing

8. The Program budget is US\$670 million, with US\$426 million from IBRD, US\$246 million from the GoI, and US\$5 million from commercial financing.

1.5 Program Development Objective (PDO)

9. The PDO is to improve water security related municipal services, institutions, and financing in Bengaluru.

10. The PDO level outcome indicators are:

Outcome 1: Improving infrastructure and services for enhanced water security and resilience

PDO indicator 1: People with enhanced resilience to climate risks (Corporate, number, gender disaggregated) PDO indicator 2: People provided with safely managed sanitation (Corporate, number, gender disaggregated)

Outcome 2: Strengthening institutions and integrated planning

PDO indicator 3: Disaster risk governance institutional reform program implemented

Outcome 3: Enhancing financial capabilities and resources of key institutions

PDO indicator 4: Own source revenue increased

1.6 Result Areas and PDO Level Outcome Indicators

Table 1: Snapshot of Result Areas, DLIs, and Fund Allocation for the Program

Rationale for DLI	DLI Description	Amount (JPY) and (US\$ indicative)
RA 1: Improving infrast		
Strengthening and integrating SWDs, lakes, and NBS in a flood management system will improve resilience to floods.	DLI 1: Integrated flood management system strengthened This DLI includes four disbursement linked results (DLRs): DLR 1.1 disburses upon the city's 8 zones having achieved institutional enhancement of social and environmental management; DLR 1.2 disburses upon completion of scaled NBS in each of the city's eight zones; DLR 1.3 involves 40 MI lakes able to receive treated water from Bengaluru; and DLR 1.4 disburses upon completion by BBMP of 16 integrated flood management systems. This includes SDW improvements and integration and rejuvenation of in-city cascading lakes, including sensors for depth and water quality.	12,019,140,000 (US\$84 million)
Operationalizing scaled circular economy investments and removing raw sewage from SWDs will improve water availability and public health outcomes.	DLI 2: Circular economy operationalized DLI 2 supports the construction of nine new STPs in the expanded area and one advanced water treatment plant that will produce drinking water from in-city lakes. For the STPs, reuse of tertiary treated wastewater, methane capture and biogas generation, solar sludge dryers, and long O&M design-build-operate contracts will be operationalized at scale. The DLI's three scalable DLRs will disburse upon: completion by BSWSSB of 10 circular economy sites (DLR 2.1); establishment by BSWSSB of 100,000 household sewer connections (DLR 2.2); and a 100 percent increase in volume of wastewater reuse over baseline (DLR 2.3).	5,723,401,000 (US\$40 million)
RA 2: Strengthening wa		
Enhancing scientific understanding and systems for integrated flood management.	DLI 3: Water security system enhanced DLI 3 disburses against: (i) the operationalization by BBMP of a digital environment and water governance system (DLR 3.1) that includes: (a) streamlining environment and water procedures, such as monitoring, permitting and inspections; (b) industrial wastewater pollution monitoring; and (c) implementation of a public-facing lake health index; and (ii) operationalization and integration of advanced stormwater modelling (DLR 3.2).	5,141,760,000 (US\$36 million)

Institutionalizing a coordinated O&M approach for all SWDs in Bengaluru will increase water availability and climate resilience.	DLI 4: Municipal O&M institutions integrated and professionalized This DLI applies to all of BBMP's SWDs (860 km) and all 183 lakes and seeks to systematically improve and modernize municipal O&M institutions through a periodic performance score. It includes maintaining annual flood management professional score at 50 (DLR 4.1), fixing leaking machine-holes in the SWDs by BWSSB (DLR 4.3), and achievement of utility enhancement program score of 100 (DLR 4.2). The DLI tracks city-wide sector performance across the eight zones of Bengaluru.	9,014,355,000 (US\$63 million)
Implementing reform and operationalizing DRM institutions in alignment with legal mandates and global best practice.	DLI 5: Disaster risk governance institutional reform program implemented The DLI disburses against achievements within the Program's disaster risk governance reform program. Disbursements will be made against the establishment of KSDMA's operational program (DLR 5.1), launch of the KCHRIS data model by KSDMA (DLR 5.2), establishment of CoE (DLR 5.3), establishment of the mitigation unit and creation of mitigation project pipeline by KSDMA (DLR 5.4), and achievement of energy efficiency performance enhancement score of 100 (DLR 5.5). The reform program is detailed in the Program Operational Manual (POM).	11,017,603,250 (US\$77 million)
RA 3: Enhancing financ	ial capabilities and resources of key institutions	
Increasing OSR and meeting the 2021 FBM Rules promulgated by GoK.	DLI 6: Own source revenues, financial reporting, and transparency improved DLRs 6.1-6.2 disburse against pro-rated OSR growth with a target of 45 and 30 percent increase over baseline for BBMP and BWSSB, respectively. DLR 6.3 disburses against achievement of municipal financial reporting and transparency score of 100 per GoK's 2021 Fiscal and Budgetary Management (FBM) rules 6 and 8.	12,877,655,000 (US\$90 million)
Strengthening the financial foundation for a climate-resilient water-secure city by moving BWSSB toward creditworthiness.	DLI 7: BWSSB's financial and operational efficiency improved To be eligible for disbursement under this DLI, BWSSB will demonstrate achievements towards improved financial and operational efficiency. Disbursements will be made against execution of performance-based contracts for NRW reduction (DLR 7.1), execution of energy efficiency investment at river Cauvery (DLR 7.2), ISO 50001 certification on energy management (DLR 7.3), completion of PPP transaction advisor's project feasibility report (DLR 7.4), and signing of a PPP contract (DLR 7.5).	3,577,140,000 (US\$25 million)
Enabling risk and resilience financing through strategic and market-based mechanisms.	DLI 8: Financing for addressing disaster and climate risks enhanced To be eligible for disbursement under DLI 8, KSDMA will establish an institutional mechanism for financing disaster and climate risks (DLR 8.1), mobilize capital using market-based DRF instruments (DLR 8.2), and mobilize capital from non-GoK sources to the blended finance facility (DLR 8.3). The three DLRs are further detailed in the POM.	1,431,860,000 (US\$10 million)
Front end fee		152,385,750
Total		60,954,300,000 (US\$426 million)

1.7 Program Implementation Arrangements

11. The primary implementing agencies under the Program are as follows:

a) **Revenue Department (RD)** is the nodal agency for the Program. A Program Management Unit (PMU) will be established at the RD which will have overall responsibility for compliance,

monitoring, and implementation of the Program. The PMU will include specialized technical personnel as well as environment, social, financial management, and procurement experts. The staff may either be brought in on deputation or hired from the private market.

- **b)** Bruhat Bengaluru Mahanagara Palike (BBMP) is the administrative municipality responsible for the greater Bengaluru metropolitan area. Under the Program, the BBMP will be responsible for the construction of SWDs, lakes and integrated flood management.
- c) Bengaluru Water Supply and Sewerage Board (BWSSB) will lead the implementation on STPs, non-revenue water (NRW), energy efficiency, Public-Private Partnerships (PPPs) and its revenue generation.
- d) Minor Irrigation and Groundwater Department (MIGD) will implement the Vrushabhavathy Valley Reclaimed Water Project (V Valley Project) which will fill 308 MLD of secondary treated sewage water to 259 tanks in Bengaluru Urban, Bengaluru Rural, Tumkur, and Chickballapura districts with treated water from Vrushabhavathi valley. The World Bank will support the development of proposed Lift 4- Gopalpura Tank to fill 40 tanks with 773.44 Mcft capacity.
- e) Karnataka State Disaster Management Authority (KSDMA) will lead on the DRM activities including the establishment of the blended financing mechanism. Karnataka State Natural Disaster Monitoring Center (KSNDMC) is the Project Executive Entity under KSDMA.

12. **The Program will have a Program Steering Committee (PSC).** The PSC will provide policy guidance, oversight, and strategic direction including inter-ministries, departments, and agencies. Other key entities participating in the Program in collaboration with the implementing agencies include the Karnataka Pollution Control Board, and Advanced Centre for Integrated Water Resources Management (ACIWRM).

1.8 Structure of ESSA Report

13. This report is the ESSA for the Program and discusses the assessment of E&S systems and capacities for the Program. The report is organized into six Chapters, as follows:

- Section 1: **Program Description**: presenting the overall program context, result areas of the World Bankfinanced P4R and the program implementation arrangements.
- Section 2: Purpose and Objectives of ESSA and its methodology.
- Section 3: Description of **Expected Program Environmental and Social Effects** discusses Result Area (RA) wise Environmental and Social Effects (Benefits, Risks, and Opportunities to manage these).
- Section 4: Assessment of Environmental and Social Management Systems and Implementation Capacity discusses the systems, regulatory aspects, gaps, and proposed actions related to systems and implementation capacity against the Core Principles and Key Planning Elements,
- Section 5: presents the **Environmental and Social Inputs to the Program Action Plan** for mitigating impacts and risks and enhancing environmental & social benefits and overall E&S management.
- Section 6: is on **Consultation and Disclosure** and describes the key formal and informal consultations undertaken as part of the ESSA process, important input and recommendations received, and how and when the ESSA was disclosed.

2 OBJECTIVES AND METHODOLOGY OF ESSA

2.1 Purpose and Objective of ESSA

14. An Environment and Social Systems Assessment (ESSA) was carried out in line with Program. This was undertaken to: (a) identify the possible environmental and social benefits/opportunities, risks, and impacts applicable to the interventions of the Program; (b) review the policy and legal framework related to the management of environmental and social impacts of Program interventions; (c) assess the institutional capability regarding environmental and social management systems within the Program system; (d) assess the performance of the Program system with respect to the basic principles of the PforR instrument and identify gaps; and (e) submit recommendations and Program Action Plans (PAPs) to address gaps and improve performance during the Program's implementation.

15. The ESSA covered an assessment of implementing agencies i.e., BBMP, BWSSB, KSDMA (KSNDMC is the project executive entity) and MIGD— lead and coordinated by the Revenue Department for the implementation of the program. The ESSA assessed or considered the extent to which the Program's environmental and social management systems are adequate for and consistent with six core environmental and social principles (Environmental and Social Management, Natural Habitats and Physical Cultural Resources, Public and Worker Safety, Land Acquisition, Indigenous Peoples and Vulnerable Groups, and Social Conflict) hereafter, Core Principles, as may be applicable or relevant under PforR circumstances.

16. The findings, conclusions, and opinions expressed in this document are those of the World Bank and the recommended actions that flow from this analysis have been discussed and agreed with counterparts in the Revenue Department including other implementing agencies and will become legally binding agreements under the conditions of the new loan.

2.2 ESSA Methodology

17. The World Bank prepared this ESSA report that provides an overview and analysis of the implementing agencies' policies and regulatory frameworks to understand the impact of the program on environmental and social aspects. The methodology included both: secondary literature review and primary data collection. The team reviewed the relevant secondary literature prior to and during the conduct of the ESSA. The key documents included applicable Acts, Rules, policies, Government Orders, Circulars, Gazette notifications, guidelines, standard bid documents, reports and studies commissioned as part of program preparation. The list of secondary literature reviewed is included in **Annexure 1**. As part of primary data collection, the team held meetings and discussions with representatives of key government departments and agencies, technical institutions, contractors, consultants, academia, and community members/ citizens through residential associations and civil society groups. Field visits were also conducted to potential sites related to storm water drain, sewerage treatment plants, tanks and wastewater management — in and around Bangalore, besides which drone surveys were reviewed to assess the levels of encroachments in the stormwater drain sub-project locations. Details on meetings/consultations held are provided in Chapter 6.

18. The following tasks were involved in shaping the report:

Figure 1: Methodology adopted for Environmental & Social Systems Assessment



19. Draft ESSA was disclosed before the program appraisal through state-wide stakeholder workshop — wherein views of interested members of the broader public were solicited and considered before all Program decisions were finalized. Also, the draft version of the ESSA was disclosed on the World Bank's portal. The final ESSA Report and recommended actions are to be completed before negotiations, and the final version will be disclosed accordingly.

3 POTENTIAL ENVIRONMENTAL AND SOCIAL EFFECTS OF THE PROGRAM

20. The following sub-sections discuss the Program activities planned under each of the results areas with corresponding potential environmental and social effects that could arise from each activity. The sections below summarize the environment and social risks, benefits and opportunities of the Program.

3.1 Environmental Risks, Benefits and Opportunities

21. Key risks categories of Program activities and possible measures to mitigate and manage these are presented here:

Program Activities/Inputs	Risks	Mitigation/Risk Management	Benefits/Opportunities				
Results Area 1: Improving infrastructure and services for enhanced water security and resilience							
Results Area 1: Improving Construction of new (173 km) and rehabilitation of (80km) existing storm water drain, which is fully integrated with adjacent lakes (50 lakes) and include modern flood management control measures such as sluice gates and remote sensing. Establishment and operationalization of nine STPs with a combined capacity of the stablishment combined capacity of the stablishment complement control measures such as sluice gates and remote sensing.	infrastructure and service Insufficient environmental screening during project planning, could overlook critical risks at the planning stage. Potential bypass & disposal of untreated or inadequately treated sewage and sludge. Lake rejuvenation can disturb legacy waste or sediments at the lake bottom, releasing pollutants such as heavy metals into the water, which are considered substantial environmental risks. The disturbance of sediments may release hazardous materials, such as heavy metals and pollutants, into the water, potentially	es for enhanced water secu Environmental screening of all potential risk prior to commencement of works. Establish an Environmental Monitoring Group to oversee all environmental activities, guide program implementation, and ensure the successful application of the water quality monitoring plan, sludge/sediment management and monitoring plan, strengthening compliance and performance. Conduct risk assessment to determine potential environmental and	rity and resilience rity and resilience Interventions will significantly improve water quality by increasing the reuse of treated wastewater, contribute to climate change mitigation through GHG reductions, and enhance disaster resilience through improved drainage and stormwater management. The integration of stormwater drains (SWDs) and lakes will enhance groundwater recharge and create green spaces, contributing to both flood management and environmental sustainability. Rejuvenation of lakes outside the BBMP area will enhance groundwater recharge, improving water availability for drinking, irrigation, and other uses. It will restore natural				
148 MLD and one advance water treatment plant.	harming aquatic ecosystems and human health. This can also degrade water quality by increasing turbidity and reducing oxygen levels, which can affect aquatic life. The removal of	human health impacts of heavy metals and pollutants in the sediments and implement the mitigation and management recommendations of the assessment during	it will restore natural water cycles, reduce drought-related water scarcity, and improve water quality by decreasing eutrophication and algae blooms. Additionally, increased stormwater storage				

Table 2: Key Environmental Risks and Impacts of Program Activities

Program Activities/Inputs	Risks	Mitigation/Risk Management	Benefits/Opportunities
Program Activities/Inputs Rejuvenation of lakes by MIGD, outside the BBMP area	Risks sediment may disrupt habitats for benthic species and shoreline vegetation, impacting local biodiversity. Additionally, improper disposal of sludge can lead to contamination of surrounding land or water sources. Disturbed sediments may release greenhouse gases like methane. Health and safety risks to workers, including exposure to contaminants, are also a concern. Moreover, improper desilting can lead to erosion and increased sedimentation downstream. Untreated or poorly treated sewage discharged into stormwater drains (SWDs) and lakes could result in pollution, ecosystem degradation, and health hazards for surrounding communities. Damaged sewage manholes and networks, especially at points where sewage lines intersect SWDs, may allow untreated sewage to mix with stormwater. This risk could lead to	Mitigation/Risk Management lake rejuvenation activities. Develop a sludge/sediments monitoring plan focusing on monitoring of sludge from STPs and sediments from lakes and SWDs. Sludge/sediments with hazardous contents shall be directed to available disposal facilities. Currently, Bengaluru has one Treatment Storage Disposal Facility (TSDF) with incinerator. It has handling Capacity of 8 lakh MT for 20 years @40,000 MTA. Additionally, one sanitary landfill of 3000 TPD capacity is operated by BBMP. Another TSDF with 3.0 lakh MT capacity is also located in neighboring district Ramanagara/ New Bengaluru. Develop and implement a comprehensive, program-specific water quality monitoring network focusing on raw and treated sewage at STP inlets and outlets, SWDs, and lake inflows and outflows, to monitor and improve water quality and support regulatory compliance	Benefits/Opportunities capacity will mitigate flood risks during heavy rains. These efforts enhance the region's resilience to climate variability and ensure long-term water security.
	sewage to mix with stormwater. This risk could lead to environmental contamination, posing	water quality and support regulatory compliance.	
	health hazards for local communities and threatening water sources.	BWSSB should carry out regular inspections of sewage manholes, especially where sewage lines intersect	
	Construction activities, if unregulated, could pose risks such as dust,	SWDs, to prevent untreated sewage from entering stormwater	

Program Activities/Inputs	Risks	Mitigation/Risk Management	Benefits/Opportunities
	noise pollution, traffic disruptions, and occupational safety hazards for workers and nearby communities.	systems; this includes timely repair and maintenance to maintain network integrity.	
	Lakes in rural areas often receive runoff containing fertilizers, pesticides, leading to eutrophication and degradation of water quality. Rejuvenation activities like dredging, desilting, or constructing embankments may disturb natural habitats and threaten local flora and fauna. Legacy waste/sediment and organic matter removed during rejuvenation may contain pollutants. Improper disposal can contaminate nearby lands or water bodies.	A Construction Zone Management Plan should be developed and enforced, covering Occupational Health & Safety (OHS) and community health and safety measures, with specific attention to traffic management, solid waste management including construction & demolition waste management, minimizing water, soil, air and noise pollution, and conducting regular inspections to address EHS risks proactively during construction activities. Implement soil conservation measures, afforestation, and check dams to prevent erosion and improve inflows in lakes. Promote organic farming and integrated pest management to reduce runoff pollution. Implement a legacy waste management plan for safe disposal of dredged material, ensuring no contamination of nearby areas. Collaborate with Gram Panchayats and local NGOs for better implementation and monitoring.	

Program Activities/Inputs	Risks	Mitigation/Risk Management	Benefits/Opportunities
Results Area 2: Strengther	ning Institutions and integ	rated planning	
Joint O&M plans and infrastructure quality control systems for SWDs Approval of 633 integrated sub- catchments flood management plans; NBS interventions in each of the eight zones. Greater Bengaluru water security plans and basin water audits Development of an industrial wastewater pollution monitoring and management system Implementation of DRM Reform Program Action Plan. Replacement of 100 km of pipeline through Performance Based Contracting for NRW reduction	Potential risks could emerge if integrated plans for wastewater management, river basins, and reservoirs do not adequately consider local environmental constraints, social dynamics, or community needs. Insufficient environmental and social risk screening in Detailed Project Reports (DPRs) could overlook critical risks at the planning stage, leading to non- compliance with the 'Avoid-Minimize- Mitigate-Offset' hierarchy and inadvertently creating negative impacts on both the environment and nearby communities. Specific risks arise if DPRs for lake rejuvenation neglect solid waste management, especially legacy waste, which could lead to issues such as leachate seepage, soil degradation, and health hazards for surrounding populations.	Robust screening and planning processes must be incorporated into DPRs to ensure that environmental and social concerns are systematically addressed at each stage of project development. Appointment of dedicated Environmental Officers is crucial to oversee the implementation of these screening processes and recommended mitigation measures. These officers will ensure effective coordination of environmental management activities, provide expertise in risk assessment, and facilitate compliance with regulatory standards, ultimately enhancing project sustainability and community well-being. Contractual agreements should include contractors' responsibilities and liabilities for managing environmental and social (E&S) risks and impacts, with a specific emphasis on legacy waste management during lake rejuvenation projects. resources of key institution	Institutional reforms and planning will strengthen water resource management, enhance climate resilience, and foster sustainable practices such as water reuse and energy efficiency in wastewater management.
Preparation of Medium- Term Fiscal Plan and adoption of long-term capital investment	Risks could arise from minor construction activities such as dust generation, waste	Construction zone management plan shall be developed that will include but not limited	Enhancing the financial capabilities and improved infrastructure of key institutions will ensure the

Program Activities/Inputs	Risks	Mitigation/Risk Management	Benefits/Opportunities
planning and assets management systems Implementation of Utility Financial Enhancement Program Action Plan. The action plan includes NRW, energy efficiency, PPP implementation, and revenue increase of BWSSB.	water discharge, solid waste generation, noise generation and traffic disruption, as well as due to the replacement of electronic devices and hardware, leading to generation of electronic wastes.	to, OHS management, Community health & safety management, traffic management, solid waste management including construction & demolition waste management, water, soil, air & noise pollution management, etc. E-	long-term sustainability of water and sanitation services. The program's emphasis on energy efficiency, reduced non- revenue water (NRW), and improved cost recovery will promote environmentally sustainable practices across urban water
Implementation of Disaster risk and climate adaptation financing capacity building program.		waste shall be disposed through approved e- waste recyclers and refurbishers. As on 31st March 2024 there are 37 approved e-waste recyclers in Karnataka, out of which, 19 recyclers are located in Bangalore. The focus on energy efficiency, smart bulk water meters, and public-private partnership (PPP) investments will help mitigate climate impacts and improve the sustainability of urban water services.	management systems.

3.2 Social Risks, Benefits and Opportunities

22. Key risks categories of Program activities and possible measures to mitigate and manage these are presented here:

able 5. Rey Social Misks and Impacts of Frogram Activities				
Program Activities/Inputs	Risks	Mitigation/Risk	Benefits/Opportunities	
		Management		
RA 1: Improving infrastruct	ure and services for enhance	ed water security and resilien	ce	
Construction of new (173	Land for the proposed	E&S screening of all	Increase availability of water	
km) and rehabilitation of	STPs and one WTP	potential risk prior to	to the city during droughts	
(80km) existing storm	identified by BWSSB are	commencement of works.	and help rejuvenate city lakes	
water drain, which is fully	government lands and	To the extent possible,	with the additional benefit of	
integrated with adjacent	are free from all	avoid any activity that	increased groundwater	
lakes (50 lakes) and	encumbrances. Similarly,	would require land	recharge.	
include modern flood	for SWDs land	acquisition or entail	Improve health and	
management control	demarcated are within	involuntary resettlement.	sanitation outcomes as well	

Table 3: Key	v Social Risks	and impacts of	F Program Activities
Tuble 3. Re		und impuets o	i i logiuni Activitics

Program Activities/Inputs	Risks	Mitigation/Risk	Benefits/Opportunities
		Management	
measures such as sluice	the RoW with no	Consult and provide prior	as lesser likelihood of
gates and remote sensing.	foreseeable land	notice to businesses and	outbreaks of water borne
Establishment and	acquisition.	individuals on potential	diseases on account of
operationalization of nine	Involuntary resettlement	impacts during	discharge of untreated
STPs with a combined	of non-titleholders,	construction. Build	sewage into surface water
capacity of 148 MLD and	particularly vulnerable	awareness on grievance	sources.
one advance water	groups (BPL, ST, SC)	redressal system.	People will benefit from
treatment plant.	occupying the existing		climate resilient
	'Right of Way' (or land	Ensure compliance of laws	infrastructures.
	within the Buffer zone of	and regulations related to	
Replacement of 100 km of	SWDs) to be used for	occupational health and	
pipeline through	upgradation of SWD	safety including workers'	
Performance Based	network.	welfare.	
Contracting for NRW			
reduction	Temporary adverse	Mitigate all potential risks	
	economic and / or	related to community	
	livelihood impacts on	health and safety	
	businesses and	including GBV related	
	individuals including	risks through provisions in	
	restriction on access	the contracts and	
	along the roads during	monitoring during	
	the nineline	construction phase	
	replacement	construction phase.	
	replacement.		
	Occupational health and		
	safety and labor wolfare		
	salety and labor weildre		
	relateu lisks [e.g.,		
	Source Eveloitetion and		
	Sexual Exploitation and		
	Abuse/ Sexual		
	Harassment (SEA/SH),		
	wage disparity,		
	uscrimination etc.] on		
	workers auring		
	construction and		
	operation phase.		
	Community health and		
	sofoty risks (discharge of		
	untroated water waste		
	disposal odor cosidort		
	uisposal, odor, accidents,		
	SEA/SH, etc.) auring		
	construction and		
Drenegad Life 1	operation phase.		Durante a la set
Proposed Lift 4-	ivinor land acquisition	E&S screening of all	Promotes long-term
Gopalpura Tank to fill 40	(approx. two acres) by	potential risk prior to	sustainability by reducing

Program Activities/Inputs	Risks	Mitigation/Risk	Benefits/Opportunities
		Management	
tanks with 773.44 Mcft	direct purchase through	commencement of works.	Bengaluru City's reliance on
capacity [works will entail	negotiated settlement	To the extent possible,	freshwater sources,
laying of underground	anticipated	avoid any activity that	decreasing the strain on
pipeline (1.2 m) along the		would entail involuntary	drainage systems, and
road, construction of	Possible eviction of	resettlement. Due process	providing a reliable source of
pump-house, inlet, sub-	informal occupants	of law must be followed to	water for surrounding districts
station, surge protection	(encroached mainly for	avoid forced eviction.	for drinking, irrigation, and
system including staff	cultivation) near the	Disseminate information	other domestic purposes.
quarter]	tanks, though very	on grievance redressal	
	unlikely	mechanism.	
	Temporary restriction on	Ensure compliance of laws	
	access due to laying of	and regulations related to	
	pipelines.	occupational health and	
		safety including workers'	
	Occupational health and	welfare.	
	safety and labor welfare		
	related risks [e.g.,	Mitigate all potential risks	
	accidents, injuries,	related to community	
	Sexual Exploitation and	health and safety	
	Abuse/ Sexual	including GBV related	
	Harassment (SEA/SH),	risks through provisions in	
	wage disparity,	the contracts and	
	discrimination etc.] on	monitoring during	
	workers during	construction and	
	construction and	operation phase.	
	operation phase.		
		Ensure signages related to	
	Community health and	grievance management,	
	safety risks (discharge of	potential safety hazards	
	untreated water, waste	are displayed at all sites.	
	disposal, odor, accidents,		
	SEA/SH, etc.) during		
	construction and		
	operation phase.		
RA 2: Strengthening Institu	tions and integrated planni	ng	
Joint O&M plans and	Exclusion of slums and	Extensive stakeholder	Program benefits extend to
infrastructure quality	de-notified areas in the	consultations in each zone	expanded areas of the city
control systems for SWDs	city from the program	needs to be built into the	where water supply, sewer,
Approval of 633	benefits, where poor and	plan preparation and	and storm water
integrated sub-	marginalized population	implementation process.	infrastructure and services
catchments flood	mostly live— is not	Transparency achieved	are still lacking.
management plans; NBS	anticipated.	through public disclosure	Program will inform any
interventions in each of		of plans and	future decisions around
the eight zones.		dissemination of	water allocations and

Program Activities/Inputs	Risks	Mitigation/Risk	Benefits/Opportunities
		Management	
Greater Bengaluru water	Inadequate stakeholder	benchmarking results of	investments, thereby
security plans and basin	engagement during the	monitoring system.	averting any future risks
water audits	preparation of the plans.	Ensure behavior change	related to water security and
Development of an	Impact of behavioural	campaign (BCC), training	DRM.
industrial wastewater	change programs are	sessions, community	Align citizen behavior and
pollution monitoring and	unknown and may result	engagement and	support for water security
management system	in non-sustainability of	educational materials are	and resilience.
Implementation of DRM	such programs.	provided to all target	
Reform Program Action		groups.	
Plan.			
Development and launch		Monitor and evaluate the	
of comprehensive		impact of public	
behavior change		awareness and behaviour	
campaign.		change campaigns carried	
		out.	
RA3: Enhancing financial ca	pabilities and resources of k	ey institutions	
Preparation of Medium	Lack of transparency and	Undertake public	
Term Fiscal Plan and	inadequate consultation	consultations with	
adoption of long-term	during development of	citizen's forums at the	
capital investment	fiscal and other action	time of budget	
planning and assets	plans.	preparation and	
management systems		finalization	
		Publication of Financial	
		Documents and Annual	
		Performance	
Implementation of Utility		-	People will benefit from
Financial Enhancement			increased financial system
Program Action Plan. The			resilience.
action plan includes NRW,			
energy efficiency, PPP			
implementation, and			
revenue increase of			
BWSSB.			
Implementation of		-	Improvement in service
Disaster risk and climate			delivery and financial
adaptation financing			sustainability resulting in a
capacity building			strategic and systematic
program.			response to water stress and
			climate shocks.

3.3 Summary of E&S effects

23. Overall, the program is expected to result in increased availability of water to the city during droughts and help rejuvenate city lakes with the additional benefit of increased groundwater recharge. The program will improve health and sanitation outcomes as well as lesser likelihood of outbreaks of water borne diseases on account of discharge of untreated sewage into surface water

sources. People will also benefit from climate resilient infrastructures and increased financial system resilience. Additionally, the tank filling scheme is expected to result in improved water availability for irrigation, and other uses due to enhanced groundwater recharge benefits. It is expected to result in reduced drought-related water scarcity, and improved water quality by decreasing eutrophication and algae blooms. Moreover, increased stormwater storage capacity is expected to mitigate flood risks during heavy rains. These efforts enhance the region's resilience to climate variability and ensure long-term water security.

24. The key environmental effects of the program are summarized as follows: The main environmental risks are: (a) the substantial occupational safety and hazard risks for workers and communities due to numerous work fronts for construction of sewers, lining of SWDs within the densely populated urban settings, and potential traffic disruptions; (b) the residual pollution of SWDs discharging into lakes downstream if broken manholes of underlying sewers are not readily repaired as planned; (c) management of solid wastes in the SWDs to be fully integrated into Bengaluru's overall solid waste management program, which is being pursued in parallel; (d) ensuring of water quality during construction of SWDs and STPs; (e) minimization of tree-felling at STP sites; (f) management of usual construction-related pollution, dust, oil spills, noise, waste management and so on, and (g) reputational risks if the lake water quality continues to be poor due to constraints in sewage treatment considering that many current STPs cannot upgrade to tertiary treatment facilities, due to a shortage of land (h) The disturbance of sediments may release hazardous materials, such as heavy metals and pollutants, into the water, potentially harming aquatic ecosystems and human health and improper disposal of sludge/sediments can lead to contamination of surrounding land or water sources.

25. The key social effects of the program are summarized as follows: The key potential social risks are: (a) potential disruptions to and impacts on livelihoods of communities/vulnerable groups that have, at few locations, encroached upon the existing 'Right of Way' (or land within the Buffer zone of SWDs) and catchment area, that will be used for upgradation of SWD network and tank-filling through the V Valley Tank Filling Scheme; (b) risks of disruption, safety and GBV/SEA-SH risks to communities particularly in congested urban locations wherein construction activities (SWDs, pipelines, and nine STPs) are proposed on government lands that have already or in the process of being identified; (c) direct purchase of approx. two acres of private land through negotiated settlement in case of non-availability of government land for the proposed List 4- Gopalpura tank; (d) inadequate health and safety measures at construction sites on city roads that have led to accidents/fatalities in the past and which might occur in the future too; (e) inadequate information dissemination to communities on use of treated water, etc. and (f) inadequate community awareness in disaster situations.

4 ASSESSMENT OF ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEMS AND IMPLEMENTATION CAPACITY

4.1 Legal and Regulatory Systems & Framework

26. The Government of India and the state government have enacted a range of laws, regulations, and procedures relevant to managing the environmental and social effects of the proposed Program. Table 4 lists legal instruments that manage wastewater, infrastructure, labor, OHS, community/public health and safety, including land related aspects relevant to the Program results areas. Refer to **Annexure 2** on list of state regulations and guidelines (national and state) associated with sewerage and drainage projects.

SI.	Applicable Act/	Objective and Provisions	Relevance to the Program
Ν	Regulation/ Policy		
0.			
ENVI	Notional Matar Paliau	A due estes:	Mill analysis are seen as it
1.	National Water Policy 2012	 Advocates: Integrated management of water quality and quantity consistent with broader environmental management approaches; Improved water supply and sewerage facilities Due to environmental hazards of sludge disposal for treatment systems; Devolution of necessary authority to the lower tiers of government to deal with the local water situation Domestic water systems shall be collecting and publishing water accounts and water audit reports indicating leakages and pilferages Framing a National Legal Framework for water. 	Will apply to program as it deals with wastewater treatment, tank rejuvenation, and water supply
2.	Environment (Protection) -Act, 1986 (as amended in 1991) and Environment (Protection) Rules, 1986 (as amended in 2024)	 Lays down rules and regulations for Prevention, control and abatement of environmental pollution Permissible limits for emissions or discharge of environmental pollutants (including noise) Procedures for safeguarding Environment, Health, and Safety 	Will apply particularly to construction as well as O&M aspects of the program activities
3.	Water (Prevention and Control of Pollution) Act, 1974 (as amended in 2024) & Water (Prevention and Control of Pollution) Rules, 1975 (as amended in 2011)	 Mandates: Prevention, control and abatement of water pollution Maintaining or restoring of wholesomeness of water Monitoring by respective State Water Boards Contractors to obtain Consent to Establish and Consent to Operate for all civil works Prohibition of dumping of construction waste/debris into water bodies and streams 	Will apply as Program involve discharge/reuse of STP treated wastewater. CTE and CTO will be required from KSPCB

Table 4: E&S Policies and Laws applicable to the Program

SI. N	Applicable Act/ Regulation/ Policy	Objective and Provisions	Relevance to the Program
4.	Ground Water Legislation by Central Ground Water Authority (CGWA) as amended in March 2023	 Has been constituted under Section 3 (3) and Section 5 of the "Environment (Protection) Act, 1986" for the purpose of regulation and control of ground water development and management in the Country Defines critical/overexploited zones where extraction of groundwater is regulated (requires prior permission). Lays down the conditions for Environmental Compensation Charges to be levied in case of violation of guidelines. Empowers the CGWA as the regulator, which lays out guidelines/criteria for optimal ground water extraction 	Will apply to all borewells or tube wells constructed under the program
5.	Indian Forest Act 1927, Forest Conservation Act 1980 (as amended in 1988) and Forest Rights Act 2006	 Protecting the forests, preventing deforestation Preventing loss of biodiversity Preventing conversion of forests Prohibits State Govt. from issuing any orders on forest land Requires administrative approval from the Forest Department for clearing or converting designated forest land. For all civil works permitted on Forest land, compensatory afforestation and prior approval from authority for tree felling has to be obtained. 	Will apply if any proposed program infrastructure sites (STPs, SWDs, Tanks) situated near to or inside designated forest land
6.	Wildlife (Protection) Act 1972 (as amended in 2022)	 Lists out endangered species and other important faunal groups that need to be protected. Mandates permissions from competent authorities for working inside or diversion of national parks and sanctuaries 	Will apply if any proposed program infrastructure sites (borewells, pipelines, WTPs, OHTs, Tanks) are likely to adversely affect any endangered species or is located inside statutorily protected areas.
7.	Guidelines for declaration of Eco- sensitive Zones around National Parks and Wildlife Sanctuaries 2011	 Permitted / regulated activities in Eco- Sensitive Zones⁷ (ESZs). 	Will apply to any proposed program infrastructure sites (borewells, pipelines, WTPs, OHTs, Tanks) that may be located near to or inside eco-sensitive zones
8.	Central Electricity Authority Regulations 2010 read with the Electricity Act (2003)	 Amongst other things, these regulations define relevant electrical safety standards and measures to be complied with respect to design, construction and operation of electrical systems with total connected load 250 kW or more in a workplace, factory or residential buildings 	This act will apply to any electrical equipment purchased and installed under the program

⁷ Eco-sensitive Zones or ESZs could be areas specifically notified as ESZs or buffer zones around protected areas, such as Sanctuaries, National Parks, Marine Reserves, Community and Conservation Reserves

SI. N	Applicable Act/ Regulation/ Policy	Objective and Provisions	Relevance to the Program
9.	Air (Prevention and Control of Pollution) Act 1981 with latest amendment in 2019	• This Act provides for the prevention, control and abatement of air pollution. It is to control emissions of any air pollutant into the atmosphere when it exceeds the standards set under the Act and associated rules	This Act will be applicable particularly during construction activity in respect of aspects such as dust control, emissions from construction machinery, generators, etc. CTE and CTO will be required from KSPCB
10.	Noise Pollution (Regulation and Control) Rules 2000 (as amended in 2017)	 This act was bought into effect to regulate and control noise producing and generating sources with the objective of maintaining the ambient air quality standards in respect of noise Actual noise levels should not exceed the ambient noise standards by 10dB(A) or more. Complaints can be made if indeed noise levels exceed prescribed standards. Designated authority is authorized to take action against the violators in accordance with the provisions of these rules or other laws in force. 	Will apply to all excavation, civil construction, tank rejuvenation and pipe laying activities taken up under the project
11.	Construction and Demolition Waste Management Rules 2016	 The rules shall apply to every waste resulting from construction, re-modeling, repair and demolition of any civil structure of individual or organization or authority who generates construction and demolition waste such as building materials, debris, rubble. Mandates separate management of construction and demolition waste and its deposition with local authorities Littering not allowed and waste to be stored on premises till disposal 	Will apply to all civil construction, tank rejuvenation and pipe laying activities taken up under the project
12.	Solid Waste Management Rules 2016	These rules mandate source segregation of waste in order to facilitate recovery, reuse and recycle	Will apply to all solid waste generated by workers engaged in civil construction, tank rejuvenation and SWDs strengthening activities under the project
13.	Plastic Waste Management Rules 2016 (as amended till 2024)	 These rules came into force with focus on plastic waste minimization, source segregation, recycling, involving waste pickers, recyclers and waste processors in collection of plastic waste fraction either from households or any other source of its generation or intermediate material recovery facility and adopt polluter's pay principle for the sustainability of the waste management system. 	Will apply to plastic wastes generated during civil construction, equipment installation activities taken up under the project

SI.	Applicable Act/	Objective and Provisions	Relevance to the Program
N 0.	Regulation/ Policy		
		 Ensure segregation, collection, storage, transportation, processing and disposal of plastic waste in a manner that there is no damage is caused to the environment during this process 	
14.	The E-waste (Management) Rules 2022	 These rules shall apply to every manufacturer, producer refurbisher, dismantler and recycler involved in manufacture, sale, transfer, purchase, refurbishing, dismantling, recycling and processing of e-waste or electrical and electronic equipment listed in Schedule I, including their components, consumables, parts and spares which make the product operational 	Will apply to all electronic equipment and components procured under the project
Vulr	erable groups		
15.	The Scheduled Castes and the Scheduled Tribes (Prevention of Atrocities) Act, 1989, and Rules, 1995	Safeguards and guarantees Scheduled Castes and Scheduled Tribes enjoyment of rights and services accessed/ owned/ allotted/notified for them.	Relevant to the overall Program to ensure that SC and ST are not harmed or negatively impacted.
16.	The Rights of Persons with Disabilities (PwD) Act, 2016	The Act requires all establishments to frame and publish an Equal Opportunities Policy. Further, every Government establishment shall reserve, not less than four % of the total number of vacancies in the cadre strengthening each group of posts for persons with benchmark disabilities.	Relevant to the Program to ensure inclusion and participation of PwD
17.	Sexual Harassment of Women at Workplace Prevention, Prohibition, and Redressal Act 2013	An Act to provide protection against sexual harassment of women at workplace and for the prevention and redressal of complaints of sexual harassment and for matters connected therewith or incidental thereto.	Relevant to the Program to ensure safety and security of women at the workplace.
18.	Karnataka Scheduled Caste, Scheduled Tribes and Other Backward Classes (Reservation of Appointments, etc.) Act, 1990	Provides for reservation of appointments or posts in favor of the members of the ST, SC and OBC in the state civil services and establishments in the public sector.	Relevant in terms of employment opportunities under the program for vulnerable groups
19.	Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013	This Act deals with prohibition of employment as manual scavengers and rehabilitation of manual scavengers and their families. It protects the weaker sections, and, particularly, the Scheduled Castes and the Scheduled Tribes from social injustice and all forms of exploitation and from the dehumanizing practice of manual scavenging and a highly unequal caste system.	Applicable during the operation and maintenance of sewerage systems.
20.	Karnataka State Disaster Management	A plan published annually by Karnataka State Disaster Management Authority (KSDMA), incorporates a Chapter on Social Inclusion which focusses on ensuring that DRM is socially inclusive and to ensure participation of women,	Applicable for program activities focusing on DRM.

SI. N o.	Applicable Act/ Regulation/ Policy	Objective and Provisions	Relevance to the Program
		ST, SC, persons with disabilities (PwD) and other vulnerable groups to prevent, prepare, confront, and recover from disasters.	
Trar	sparency and Accountal	bility	-
21.	Karnataka Guarantee of Services to Citizens Act, 2011, also known as the Sakala Services Act	The Act guarantees that citizens have the right to receive services within the stipulated time limit. It also includes a two-tier appeal process for addressing any grievances. Notices of services to be displayed in all offices.	Applicable as some of the key services stipulated in the Act are water, sanitation and drainage.
22.	Act, 2005	information for citizens to secure access to information under the control of Public Authorities.	activities and agencies have appointed Public Information Officers and Citizens Charter.
23.	National Urban Sanitation Policy (NUSP) 2008	The policy covers institutional strengthening, awareness generation, behavioral changes, pro- poor approaches and cost-effective technologies under city sanitation plans that should lead to open defecation free cities, as well as sanitary and safe disposal of all human and liquid wastes.	Promote community led improvement in overall sanitation and cleanliness in urban areas.
Land	and Livelihood		
24.	RighttoFairCompensationandTransparency inLandAcquisition,andResettlement(KarnatakaAmendment)Act,2019300	Emphasizes social assessment and resettlement planning prior to issuance of the preliminary notification and provides for R&R benefits along with the compensation package.	State amendment to RFCTLARR Act exempts certain infrastructure projects, from undertaking social impact assessment prior to land acquisition. Further, there are no R&R provisions for non- titleholders impacted in government land. However, the Act recognizes the principle of replacement cost when land acquisition or physical relocation is required. It also provides allowances for transitional expenses to the affected families whose land has been acquired or those that are affected by such acquisition. Under this program, land requirement is mostly met through available government land. In case of non-availability of government land, GoK's policy on direct purchase through negotiated settlement applies.

SI.	Applicable Act/	Objective and Provisions	Relevance to the Program
о.	Regulation, Folicy		
25.	Land Purchase through Negotiated Settlement (Government Order no: RD 54 LAQ 2014)	Provides the process for purchase of land through private negotiations with the owners of the land.	Applicable if private land is purchased for project activities and/or if someone is displaced. The policy does not include R&R provisions for non- titleholders.
26.	Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014	This Act aims to regulate street vendors in public areas and protect their rights. The Act provides compensation for loss of assets, if any, that street vendors may incur. And that livelihood opportunities created by new infrastructure development projects accommodate displaced vendors.	Applicable in case street vendors are evicted from land allocated for proposed project activities. Act incorporates sufficient measures to ensure that affected vendors' living standards are improved, or at least restored to pre- evicted levels.
27.	Karnataka Land Revenue Act, 1964 Karnataka Tank Conservation and Development Authority (KTCDA), 2014 Writ Petition No. 38401/2014 Citizen Action Group vs. the State of Karnataka & Others	A GoK circular dated September 8, 2008 provide guidelines for vacating encroached government land. A show cause notice is given to the encroachers to file their objections within 15 days and if no objections are received, authorities are called upon to visit the spot, conduct a Mahazar (inspection) in the presence of the villagers, obtain their signatures and thereafter initiate criminal proceedings (as per Section 192a of the Land Revenue Act) if they are satisfied that there is encroachment. Till recently, BBMP in compliance to a Karnataka High Court order dated 01.08.2023 prepared an action plan for removal of encroachment on primary and secondary storm water drains.	Applicable in case of encroachment on government land allocated for proposed project activities.
28.	BBMP notification	Entitled person will receive financial assistance of not less than Rs. 25,000/- and maximum up to Rs. 50,000/	Applicable in case of encroachments on stormwater drains to be constructed/rehabilitated under the project
Wor	Kers' Weltare and Worki	ng Condition	Applicable during (1
29.	Bangalore Water Supply and Sewerage (Registration of Agencies for cleaning of manholes and STPs) Regulations, 2021	agencies abide by all labor laws including the Manual Scavengers and their Rehabilitation Act, 2013. It mandates the agency to provide adequate safety measures to its workers.	Applicable during the operation and maintenance of sewerage systems.

SI. N	Applicable Act/ Regulation/ Policy	Objective and Provisions	Relevance to the Program
о.	Standard operating	The SOPs provides measures to be taken to	Applicable during the
30.	Procedures of machine holes & sewer issued by BWSSB dated: 31.7.2012.	eliminate hazardous cleaning or at least to avoid accidents or risk of diseases due to improper practice of cleaning of sewers/ emptying of septic tanks, thereby, preventing human casualties.	operation and maintenance of sewerage systems.
	Standard Operating procedures for cleaning of sewer issued by Ministry of Housing & Urban affairs issued in 2018.		
31.	Maternity Benefit Act 1961	To regulate employers to provide paid maternity leave and offer on-site day care services	Relevant and applicable to employees and workers under the Program
32.	Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act19963.	To regulate the employment and conditions of service of building and other construction workers and to provide for their safety, health, and welfare measure and for other matter connected therewith or incidental.	Relevant and applicable to construction workers under the Program
	Building and Other Construction Workers' Welfare Cess Act,1996.	To constitute Welfare Boards in every State to provide and monitor social security schemes and welfare measures for the benefit of building and other construction workers	
33.	The Occupational Safety, Health and Working Conditions Code 2020	Defines employment conditions, facilities to be provided to industrial/construction workers, OHS provisions, documentation requirements and powers of competent authorities for inspection and penalization in case of default The following code seek to impart flexibility in adapting technological changes and dynamic factors, in the matters relating to health, safety, welfare and working conditions of Workers.	Applicable to all workers engaged under the program during construction and operation phase.
34.	Child Labour (Prohibition and Regulation) Act, 1986	To protect the interest of children below the of 14 so they are not employed in certain occupations. And to regulate the conditions of work of children in certain other employments.	Relevant and applicable to employees and workers under the Program
35.	Contract labour (Regulation and Abolition) Act, 1970	To regulate the employment of contract labor in certain establishments and to provide for its abolition in certain circumstances and regulating forced labor.	Relevant and applicable to employees and workers under the Program
	Bonded Labour System (Abolition) Act, 1976		
36.	Equal Remuneration Act, 1976	To provide for the payment of equal remuneration to men and women workers and for the prevention of discrimination, on the	Relevant and applicable to employees and workers under the Program

SI.	Applicable Act/ Regulation / Policy	Objective and Provisions	Relevance to the Program
0.	Regulation/ Policy		
		ground of sex, against women in the matter of employment.	
37.	Payment of Wages Act 1936	Ensures payment of regular wages to certain classes of workers.	Relevant and applicable to employees and workers under the Program
38.	Minimum Wages Act (1948)	Lays down the minimum wages that must be paid to skilled and unskilled workers.	Relevant and applicable to employees and workers under the Program
39.	Payment of Bonus Act 1965	To regulate employers to provide bonus.	Relevant and applicable to employees and workers under the Program
40.	Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979	To regulate the work of inter-state migrant workers and providing for their conditions of work- applies to establishment and labor contractors who employ five or more inter-state migrant workers.	Relevant and applicable to employees and workers under the Program
Cult	ural Heritage		
41.	Ancient Monuments and Archaeological Sites & Remains (Amendment and Validation) Act 2010	This Act is to ensure the preservation of ancient and historical monuments and archaeological sites and remains of national importance and for the regulation of archaeological excavations and the protection of sculptures, carvings, and other like objects. According to this Act, areas within the radii of 100m and 200m from the "protected property" are designated as "prohibited areas" and "regulated areas" respectively. No development activity is permitted in the "prohibited areas". Development activities are not permitted in the "regulated areas" without prior permission from the Archaeological Survey of India (ASI) if the site/ remains/ monuments are protected by ASI or the State Directorate of Archaeology.	If any program activity is proposed within regulated areas of protected monuments, prior permission will be required from ASI. Pertinent to state that the act does not allow the development of any facility within the limit of the Prohibited Area.
42.	Indian Treasure Trove Act, 1878	Whenever any treasure (anything of any value hidden in the soil, or anything affixed thereto) exceeding in amount or value ten rupees is found, the finder shall intimate District Collector in writing as soon as practicable.	The Act gives direction about the process to be followed in case of the chance finds.

4.2 Assessment of Core Principles

27. The ESSA analyzed the existing program systems and capacity of the implementing agencies to gauge its consistency with the *core principles* as outlined in the World Bank's Guidance on Environmental and Social Systems Assessment for PforR Operations. The ESSA concludes that the program systems are by and large consistent with the applicable core principles. The findings of the assessment are outlined in the following sub-sections.
Core Principle 1 – Environmental and Social Management

Program environmental and social management systems are designed to (a) avoid, minimize, or mitigate adverse impacts; (b) promote environmental and social sustainability in the program design; and (c) promote informed decision-making relating to a program's environmental and social effects.

Assessment of Program Systems:

- 28. The environmental assessment concludes the following:
- In India, MoEFCC is responsible to lead the activities on the Environment agenda, including planning, promotion, co-ordination, and implementation. Broadly, the role of the MoEFCC includes (i) Conservation and survey of flora, fauna, forests, and wildlife; (ii) Prevention and control of pollution; (iii) Afforestation and regeneration of degraded areas; (iv) Protection of the environment and (v) Ensuring the welfare of animals. The above responsibilities are effectively discharged with the support of a host of robust policies and legislations promulgated at the National level and aimed at conserving and protecting the environment. Besides, important policies such as the National Conservation Strategy and Policy Statement on Environment and Development, 1992; National Forest Policy, 1988; Policy Statement on Abatement of Pollution, 1992; and the National Environment Policy, 2006 also guide the MoEFCC's work. In the implementation or enforcement side, agencies such as the Central Pollution Control Board (CPCB), Forest Department, Department of Archeology, Coastal Regulation Zone (CRZ) Authorities, and others are the technical arms of the Ministry which carry out specific legal and regulatory functions. They provide permitting and clearance functions when required in projects/programs. Monitoring is undertaken directly through relevant agencies, or state counterparts. Separate committees are constituted for specific issues such as Forests and Biodiversity, and others, while a capacitated National Green Tribunal (NGT), a judicial body⁸ acts as the environmental watch dog setting stringent standards and monitoring the issues and non-compliances on the ground.

The above National-level regulatory and institutional systems are full-grown, in place and reasonably enforced across all sectors all over the country. Although individual states may also have promulgated state regulations on the same/similar themes, the National level regulations are the basic umbrella, under which the state-level regulations are created, and are expected to follow at the minimum. The State of Karnataka has robust regulatory mechanisms and manpower to ensure compliance with National and State level regulations. The GoK regulations and statutory provisions - environmental, forests, pollution control, groundwater, waste management, safety and labor related acts and regulations were assessed and found to be adequate to enable effective management of key environmental issues and implications. State level regulatory bodies such as the KSPCB, State Forest Department, Karnataka Tank Conservation & Development Authority, etc. were found to be effective in discharging their respective regulatory functions. Various environmental regulations at the National and State Levels and their applicability to the program are discussed in detail in Section 4.1 of the ESSA.

EIA: An assessment of program systems under the Core Principle 1 determined that Program is aimed at the provision of mainly Sewerage Infrastructure and facilities in the BBMP area, and other activities such as construction/strengthening of retaining walls and lining of SWDs and fortifying stone masonry storm water walls. Environmental Impact Assessment (EIA) or Environmental Clearance as under Environmental Impact Assessment Notification 2006 (as amended thereafter), is not a statutory requirement for Sewage Treatment Plants and their

⁸ A specialized judicial body equipped with expertise solely for the purpose of adjudicating environmental cases in the country. Karnataka Water Security and Resilience Program-ESSA

networks, or as construction/strengthening of retaining walls and lining of SWDs.

At Program level, the assessment indicated that the program agencies are strong on technical aspects and are designed to deliver technically sound sewage treatment infrastructure, compliant with the broader applicable statutory requirements such as statutory permissions, etc. However, they do not have adequate provisions to individually assess and address program-specific EHS/OHS issues or undertake scheme-specific community consultations/disclosure. Similarly, provisions for preparing and maintaining environment-specific documentation such as screening checklists, or ESMPs are also weak. The Program level systems for monitoring implementation progress are also weak on the aspect of Environmental monitoring. Further, currently the implementing agencies do not have dedicated manpower for leading the agenda on Environmental Management.

- Similarly, while environmental norms and guidelines exist to guide the construction activities undertaken by IAs, implementing ISO 14001 (Environmental Management System) and ISO 45001 (Occupational Health and Safety Management System) certifications as industry good practice, for activities such as constructing and upgrading STPs, SWDs and lake rejuvenation ensures that both environmental impacts and occupational health and safety risks are effectively managed, meeting both regulatory and organizational objectives.
- **Consent to Establish (CTE) and Consent to Operate (CTO):** STP projects of more than 100 KLD capacity are categorized as RED category by KSPCB considering their significant pollution potential and need CTE and CTO (under Air and Water Acts) from KSPCB and usually follow the most stringent among the rules, guidelines, and standards suggested by the MOEFCC, CPCB, NGT or other concerned agencies. Other program activities also shall follow applicable regulations by National and State agencies but do not require Consent from KSPCB except for specific work components/locations if applicable (such as Batching Plant).
- Discharge of Treated Sewage: There are policies and guidance at the Central / National level on discharge norms for treated sewage. However, as in the case of most other State regulatory agencies, KSPCB follows the standards recommended by MoEFCC/CPCB for the discharge of treated sewage which has stringent permissible limits for discharge from mega metropolitan cities and less stringent standards for metropolitan and other cities. and hence, monitoring by KSPCB also based on MoEFCC/CPCB standards. BWSSB have adopted the NGT recommended discharge standards for Mega & Metropolitan cities as per the NGT order dated 30.04.2019. The STP outlet parameters are being regularly monitored by BWSSB and KSPCB through online monitoring system. All the Wastewater Treatment Plants (WwTPs) have an in-house lab, wherein the parameters of treated water are checked and monitored on daily basis. However, to avoid conflict of interest, it is important to replace the current system of monitoring paid by the O&M contractors by third-party monitoring by certified monitoring laboratories. The overall monitoring system need to operate for the STPs integrated with the water quality monitoring system for the (inlets to the) lakes, and the overall storm water drainage network.
- **Recycling and Reuse:** As per AMRUT Jal Shakti Abhiyan, "In case, the city has got sewage treatment plants (STPs), ULB (in this case BBMP in collaboration with BWSSB) should ensure that treated wastewater is used for the following purposes: a. Recycling for use in agriculture/horticulture; b. Fire hydrants; c. Large scale construction activities; d. Made available to the industry if it consumes water in bulk; e. Supplied to power plants located within 50 Km of the city. As per directions of the Ministry of Power, Tariff Policy Circular dated 28 January 2016, it is mandatory that power plants within 50 km of STPs have to develop a system for the conveyance

and use of treated wastewater.⁹ Such environmental enhancement measures shall be part of the Program to improve environmental performance and circular economy, however, fully in line with regulations and guidance, including the quality of treated sewage supplied for agricultural use to confirm with guidelines for reuse of treated effluents for irrigation quality recommendations and consultation requirements with agriculturalists/end users). *Consent conditions are not suggestive of the standards and mechanisms for disposal of treated sewage for irrigation and standards for the reuse of treated sewage for groundwater recharge, industrial reuse, or irrigation. Hence treated sewage reused for irrigation may be of varied qualities, and might/might not be appropriate for particular crop types in the area of reuse. So, the Program shall guide the conditions, standards, and consultations required with communities in case treated sewage is reused for irrigation.*

- Collection, Treatment, Disposal of Wastes: Solid Waste Management (SWM) Rules, 2016 guides the segregated storage, collection, transport, treatment, and disposal of solid wastes. It suggests treating and reusing the wastes for beneficial use, and disposing of inerts and rejects in scientific landfills. It suggests standards for composts from biowastes in terms of metal content. Plastic Wastes are to be recycled as per Plastic Waste Management Rules (PWM) Rules, 2016 and its amendments and unusable fractions can be used for energy recovery. Construction and Demolition (C&D) Waste Management Rules, 2016 suggests recycling and reuse of building materials C&D wastes and some ULBs have C&D waste management facilities. Various Rules on Batteries, Chemical, E-waste, and Hazardous waste management guides the management of solar panels, batteries, chemicals, and other wastes from all Program activities. The Program shall send solid wastes, grit, plastics, screenings, C&D wastes, solar panels, Electronic and electrical items, and hazardous wastes (as in used asbestos, sludge with hazardous content, etc.) to available facilities and plan to reuse upcycled wastes as much as possible. These rules apply to all Program activities.
- Disposal of Sludge: At the National level, AMRUT Program's Faecal Sludge and Septage Management (FSSM) Policy Report¹⁰ suggests sludge from STPs to be composted and disposed of after attaining Compost Quality standards prescribed in SWM Rules, 2016. The compost quality standards in SWM Rules 2016 are about solid wastes, and are silent about Fecal Coliforms, Salmonella or Helminth Ova which are observable in sludge, as against biodegradable solid waste. CPHEEO also guides the metal content in sewage sludge but is silent on the limits for Faecal Coliforms, helminth ova, salmonella, etc. appropriate for disposal. CPHEEO Advisory Note on Septage Management suggests that for the use of dewatered sludge as fertilizer in agriculture applications, it should satisfy the criteria of USEPA Class A Biosolids.¹¹ NIUA also suggests sludge be treated to USEPA Class A Biosolids standards.¹². Fertilizer Control Order 1985 is yet to recognize fertilizer from Faecal sludge. However, FCO City Compost requires 'Nil' value for Pathogens, fecal coliforms, salmonella and helminth ova. KSPCB has no guidance/standard on sludge from STPs, (minimal from), or its monitoring. In the case of STPs. In the case of STPs, the quality of sludge including the concentration of hazardous chemicals, metals, fecal coliforms, and other aspects are concerns for the health and safety of the operators/users. The absence of standards for the disposal of sludge is a policy gap at the National and State level, and most STP Projects either freely distributes sludge to farmers or follows the dumping of sludge in available low-lying areas, farmlands, or at existing SW dumping yards, while on the other hand, dumping of wastes is

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⁹http://amrut.gov.in/upload/newsrelease/5db809d263e6e5db80878c8e305d25b2c7e90c7GuidelinesforUrbanWaterconse rvationJalShaktiAbhiyan.pdf

¹⁰ http://amrut.gov.in/upload/newsrelease/5a5dc55188eb0FSSM_Policy_Report_23Feb.pdf, p. 29

¹¹http://cpheeo.gov.in/upload/uploadfiles/files/Advisory%20Note%20on%20Septage%20Management%20in%20Urban%2 OIndia.pdf

¹² Vedidantla etal 2020. Background Note to Quality in Faecal Sludge Management, WASH Institute.

prohibited by SWM Rules, 2016. While the acceptable international standards for the use of sludge in agriculture recommended by various advisories is the USEPA Class A Biosolids standards, the cost factor involved is unacceptable to the client agencies. Hence the usual guidance is to convert sludge into manure using composting/vermicomposting. Other uses of dried sludge include brick making, use as landfill cover etc, while options such as injecting the sludge deep into the ground or disposing of in monofils are not particularly suitable in Indian conditions considering the climatic factors, high gas emission, high density of population, risk of fire, groundwater pollution, etc. Disposal of sludge in landfills is not an option for its high methane/other gas generation potential and safety aspects, and the SWM rules prohibit anything other than rejects/inerts from SW into landfills. Use of USEPA Class B Biosolids is also not a practical solution in this project considering that the fields where sludge will be used are not within the program area where sludge is generated and transportation and usage need strict health & safety considerations for the workers, farmers, and communities, the need to store sludge for more time (in the range of 30 days) for pathogen reduction, prohibition on movement of men and animals on site for many days when applied, sensitivities of usage locations/farms that are outside ULBs where sludge is generated etc. Mechanisms to reach USEPA Class A Standards Include Gamma Irradiation by Cobalt 60 as in Ahmedabad Municipal Corporation (BARC supported), solar/thermal drying while composting or co-composting with municipal solid wastes after sufficient drying etc. In KWSRP, it is proposed – (i) incorporation of a sludge digester with biogas generation into the treatment train, complete with biogas-based power generation at a STP with 20 MLD capacity -This would demonstrate biogas generation as a cost-efficient at small and medium-sized STPs; (ii) Solar sludge drying in a greenhouse, in order to improve the sludge's hygienic characteristics, reduce the total sludge volume, and rendering the sludge fit both for agricultural use but also for use as a renewable fuel e.g., in cement kilns. These components are generally considered as demonstration sites but have high potential for wider roll-out in future as such approaches have become mainstream outside India. The proposed innovations are to reduce life-cycle cost (reduced OPEX), reduced carbon footprint, and improved resilience against climate change. Feasibility/viability of adopting these options for sludge management shall also be evaluated during Design (in DPR) considering the quantity, quality, and various available facilities.

The social assessment concludes the following:

- Adequacy of E&S Laws & Policies: The national and state laws that govern the management of social risks that are relevant to the program are by and large adequate. In addition to the Street-Vendors Act, 2014, BBMP recently introduced provisions to address impacts on vulnerable¹³ informal occupiers (squatters, street dwellers, encroachers) on government land suffering permanent or temporary adverse economic or livelihood impacts on account of project activities. (Refer to Core Principle 4 for further details)
- Staffing and capacities for social risk management Of the four implementing agencies BWSSB, BBMP, MIGD and KSDMA (KSNDMC is a project executive entity under KSDMA), the BWSBB and MIGD has prior experience of working with donor organizations such as JICA and World Bank, therefore has a degree of familiarity with E&S requirements. All agencies to a varying extent, have the necessary legal and/or regulatory authority to commit resources and implement actions necessary for effective assessment and management of social impacts and risks related to land procurement, encroachment, labor management, social inclusion, grievance management, and citizen engagement including IEC activities. For instance, BBMP has Special Commissioners designated for revenue and estate, welfare (street-vendors and livelihood), and disaster

¹³ Belonging to the Scheduled Tribe (ST), Scheduled Caste (SC) and/or Below Poverty Line (BPL) category.

management (IEC activities) respectively. In previous externally funded projects under BWSSB, an Environment specialist position was included in the scope of the Project Management Consultancy (PMC). Further, BWSSB, MIGD and BBMP also have a Public Relations Office (PRO) Cell and well-developed 24*7 call-centers for grievance management. For DRM, KSNDMC has a Human Resource Manager responsible for capacity building and public awareness activities. Whereas, KSDMA have hired qualified consultants at district level to manage E&S risks. Additionally, Project Management Consultants (PMCs) to be onboarded for the PforR require environmental and social specialists to be included.

- Alternative Analysis: Implementing institutions such as BBMP and BWSSB are factoring in strategic, technical and site alternatives with respect to mitigation of social risks. Discussions with staff, consultants and DPRs reveal that for upgradation of SWDs and construction of STPs, despite significant constraints in identifying government land in dense urban settings, the sites have been carefully chosen to largely avoid habitation areas and thereby objections from the communities.¹⁴
- **Stakeholder Engagement** While opportunities to engage with stakeholders are provided within the scope of this Program, the implementing agencies also consult with stakeholders on various aspects for their day-to-day operations:
 - While initiating certain works relating to sewer networks, etc. **BWSSB** engages with stakeholders such as BBMP, PWD, resident welfare associations, etc. as per the Bangalore Water Supply and Sewerage Act, 1964 and additionally holds meetings whenever required. They issue letters and call for meetings with departments and other community/welfare association/apartment associations etc. However, no minutes of meetings are recorded and kept. Information on major aspects such as revision to water tariff and other policy changes are posted in the media. A Gazette Notification is taken out and objections are received within a 30-day period. Feedback received is appropriately incorporated, following which the same is formally notified in Gazette. BWSSB has also developed an AI chatbot to enable easy communication with the public and to provide timely information about the status of water supply and disruption. The chatbot also enables BWSSB to reach more consumers at any given point of time.

Further, BWSSB has a whole range of customer and community focused initiatives aimed amongst consumers/citizens, feedback and to increase awareness seek incentivize/reward consumers. Some key initiatives undertaken over the years include: BWSSB Payment APP and Sajala app for billing services, Theme-park that provides details on rainwater harvesting, green star rating for apartments that are implementing rainwater harvesting, Jalarushi Puruskar (award) scheme in which households are rewarded for their work on conservation of water, advertisements in the newspapers on usage/installation of Aerators with a proviso for fines up to Rs 5000/- fine for noncompliance and reduction in 30% water supply, deployment of 1700 Sintex Tankers (8000/10000 ltrs) in key areas, particularly in low-income neighborhoods and slums during water scarce months, seminars on Eco-restoration and Water Conservation, street plays, stickers/ posters in public areas, training programs for plumbers/sanitary workers, architects, engineers, contractors on rainwater harvesting techniques, deployment of public volunteers such as Jalamitras (8000 nos.), Jalasenani and Jalasnehi for water conservation, public awareness on prohibition of manual scavenging through display boards as well as street dramas and distribution of flyers/pamphlets etc. A short

¹⁴ Lands identified for proposed STPs and WTP are existing government lands and based on site visits undertaken by the World Bank, were found to be largely free from encumbrances (squatters, encroachers and/or disputes).

documentary film was recently produced by CWWM zone for awareness building on treated wastewater. In addition, *Parisara Jalasnhe App* was launched in June 2024 for monitoring treated sewage from STPs which can be used by the public for purposes other than drinking. However, extensive behavior change campaigns (BCCs) on re-use of wastewater are yet to be initiated.

- BBMP has a 'Citizen Zone' web portal for availing certain public services as per the Karnataka Guarantee of Services to Citizens Act, 2011 (bbmp.gov.in), also known as the Sakala Services Act, which is handled by the BBMP's Information Technology Department. All project details related to BBMP are disclosed on the Citizen Zone web portal. The PRO department is responsible for preparing the press release and social media content (Facebook, Twitter, Instagram, WhatsApp channel, LinkedIn, YouTube) for promoting dayto-day development activities of BBMP. Any activity organized zone wise or at the head office, including national festivals, Kempe Gowda Fest, skywalk, construction and maintenance related activities are highlighted on social media. Instructions are provided from respective departments organizing these events. Further, circulars, notices and relevant information (such as access to welfare scheme, eviction of street-vendors, etc.) undertaken by BBMP are disseminated through different modes such as social media, residential welfare associations, community mobilizers, press releases, etc.
- KSDMA, KSNDMC, and DDMAs have partnered with Karnataka State Fire and Emergency 0 Services, National Disaster Response Force (NDRF), State Disaster Response Force (SDRF), Civil Defense, National Cadet Corps, Yuva Kendra Sangathan, , National Service Scheme, Bharat Scouts/Guides, Indian Red Cross Society, schools, health institutes, local governance bodies (urban and rural), international (e.g., UNICEF) and local Non-Governmental Organizations (NGOs) to empower the community and generate awareness on DRM, in accordance with the Karnataka State Disaster Management Policy. Information dissemination through their web portal is also carried out. Further, disaster management plans and hazard-wise action plans (for lightening, thunderstorm, heatwave, flood risk management, earthquake, landslides, etc.) are prepared by KSNDMC in consultation with various stakeholders and community members. On awareness generation, the plans also document the resources needed and number of IEC activities, mock drills and trainings to be carried out. Gram Panchayat Disaster Management Committees with representatives from all social groups are formed at the ground level to implement the plans. 3411 Aapda Mitra Volunteers at 11 most disaster-prone districts have also been notified (as per the guidelines of NDMA) and trained at the state- level to support district administration in rescue, relief and rehabilitation activities.
- **Grievance Management** Each implementing agency has a robust grievance management system, which have been detailed below:

BWSSB: Citizens have been provided with multiple options through which they can register their grievances/complaints:

- 24x7 Helpline nos.: 1916 or 14420 (for Septic Tanks / Sewers). The Helpline nos. currently run in three shifts (7.30 am to 2.30 pm; 2.30 pm to 10.30 pm and 10.30 pm to 7.30 am). In addition, there is a general shift from 9.30 am to 5.30 pm. The backend system of the Helpline is managed by a 24-member team including 2 Team leaders.
- Emails to <u>bwssbcallcenter@gmail.com</u> or <u>bwssbcms@gmail.com</u>

- WhatsApp number (8762228888). Users can also send pictures of overflowing manholes, and water leakage.
- Phone-in program wherein they can get in touch with the Chairman of BWSSB every Friday, between 9.30 a.m. and 10.30 a.m., in the months of April and May to discuss their water woes. The number to call is 080-22945119.¹⁵
- Physical meetings with consumers at service station levels once every month. Each subdivision has three or four service stations in their jurisdictions and there are 26 subdivisions across Bangalore. The dates for the redressal meetings are announced two days prior.
- Water Adalat that is held at the sub-division levels every Thursday for a duration of 1.5 hours. The Adalat is headed by the Executive Engineer (EE) and AO at the sub-division.



• AI chatbot developed by BWSSB.

Janaspandana – Integrated PGRS, Govt. of Karnataka (L) and Sajala billing services app (R)

KSDMA: Grievances can be registered through Helpline no. 1070, or through a phone call (no. 080-22253707) or an email to the State Emergency Operation Centre (Email ID: <u>secy.dm@gmail.com</u>).**MIGD:** Grievances can be registered directly with the Assistant Engineer at the sub-divisional level, exclusively assigned for that project. Monthly review meetings are

¹⁵ Phone in program has been undertaken in the last 5 years and also during the water scarcity periods.

also organized at the departmental level to assess and address any grievances. MIGD has also designated Assistant Executive Engineer / Executive Engineer (Head of the Jurisdictional Office) as the Public Information Authority (PIA). The Assistant Engineer/Officer-in-charge and Junior Engineers/Officer Assistants have been nominated as Public Information Officer (PIO) and Assistant Public Information Officer (APIO) respectively— to respond to RTI applications. The Executive Engineer/Superintending Engineer who is the Appellate Authority (AA) is responsible for hearing and deciding appeals and resolving disputes.

In addition to the above BWSSB, KSDMA and MIGD mechanisms, citizens/complainants can also register their complaints:

- by clicking the link provided on their website or dialing either 1902 or 1070 both of which lead to Janaspandana Integrated Public Grievance Redressal System (IPGRS) <u>http://ipgrs.karnataka.gov.in</u> OR
- through the Janaspandana Mobile App

All complaints registered on BWSSB, KSDMA and MIGD grievance mechanisms and IPGRS are provided with identification number. Both GRMs are linked so that there is no duplication of complaints.

KSNDMC: For disseminating Agro-meteorological information, forecast and advisories directly to the farmers and to seek their feedback, a 24x7 Interactive Help Desk "Varuna Mitra" (no. 9243345433) is functional at KSNDMC since 2011. The Helpdesk is used for disseminating information on rainfall, temperature, humidity, cloud cover, wind speed and weather forecast at gram panchayat level. Alerts on extreme weather events, information on reservoir status, stream flow etc., are also made available to the users.

BBMP: The Integrated Command and Control Centre (ICCC) under the Smart City program is current managed by the Disaster Management and IT Department, BBMP. The ICCC is responsible for emergency and disaster management including incident/grievance management through an integrated response from all relevant departments involved in civic management (BBMP, BESCOM, BWSSB, BMTC, BMRCL, BMRDA and BDA). ICCC includes a unified application- Namma Bengaluru (Sahaaya 2.0) which is supported by a Toll-free no. 1533 specifically for BBMP. There are a total 25 executives working in three different shifts (6 am- 2 pm/ 2 pm- 10 pm/ 10 pm- 6 am) who attend to grievances received through the APP and the Toll-free no. Each department has a different response time depending on the nature of complaint as stipulated in the service level agreement (SLA).¹⁶ On receiving a complaint, a ticket no. is generated, and the complaint is referred to the first level officer (AE or AEE) of the concerned department. Feedback is sought from the complainant wherein a link is sent through SMS, or an outbound call is made to the complainant— to either confirm that the complaint is resolved or to reopen if the resolution is not satisfactory. If the complaint is not resolved within the stipulated time, it is escalated to the second level officer (EE) and if required, further escalated to the next level officer (CE and above). Wide publication of the APP and the toll-free no. was done during its launch in 2020. Complaints related to BBMP can also be registered through WhatsApp- 9480685700 and Helpline no. 080-22660000, which is also being managed by the call centre responsible for operating 1533. The grievance related data is analyzed periodically to identify bottlenecks and improve the efficiency of the system.

¹⁶ E.g. Electrical Department has 8 working hours of SLA for street lights, BBMP has 72 working hours of SLA for potholes.

From 1st August 2024 till 21st October 2024, a total of 22,190 complaints were received by BBMP, out of which 21,041 complaints were resolved and 1149 complaints are still pending.

Overall, grievance management systems across all implementing agencies were found to be robust and accessible with established procedures for submission of grievances.

Gaps in Existing Systems:

- Lack of dedicated environmental and social management capacity Implementing agencies lack dedicated personnel for leading and managing environmental, health, and safety (EHS) and occupational health and safety (OHS) issues, resulting in inadequate focus on environmental and social management.
- Weak Environmental and Social (E&S) Management and Monitoring Systems The systems for management of E&S issues and monitoring is inadequate, particularly with respect to ensuring compliance with environmental performance indicators and safety norms during program implementation. *Current monitoring systems for water quality, including treated sewage, are paid for and managed by O&M contractors, leading to potential conflicts of interest. Independent, third-party monitoring is not consistently applied, reducing accountability.*
- Limited Guidance on Sludge and Solid Waste Management While regulatory frameworks exist, there are policy gaps concerning the management and disposal of sludge and solid wastes having faecal coliforms and pathogens. The lack of standards for the reuse of treated sludge in agriculture poses health and environmental risks.
- Limited Citizen Engagement during Project Preparation: During the DPR preparation, there are no structured system to engage with affected persons and citizens on a regular basis. Even if interactions are held, they are held more with the view to disseminate information about projects to citizens rather than to seek their views or opinions on project design or operations. Addressing this aspect is very crucial given that the program activities are to be undertaken in densely populated areas within Bengaluru.
- Limited analysis of IEC and BCC outcomes: The program has proposed a launch of a comprehensive behavior change campaign for water security and resilience (Results Area 2). However, there are no systems in place for tracking and evidence-based reporting on IEC and BCC activities and its outcomes.

Recommendations:

Based on the gaps identified through the assessment, the ESSA recommends:

- The program should assign dedicated E&S personnel responsible for overseeing E&S and OHS management, including the preparation and implementation of construction zone management plan including but not limited to, OHS management, community health & safety management, traffic management, solid waste management including construction & demolition waste management, water, soil, air & noise pollution management, etc.
- There is a need for environment and social screening process to be conducted during detailed project preparation for early determination of impacts and alternative analysis.
- Institutional and Technical Capacity Building Invest in capacity-building programs to ensure that all regulatory bodies and program agencies are equipped to uniformly enforce social and environmental legal frameworks.
- ToRs for development of integrated plans (Results Area 2) must embed the need for undertaking E&S screening and stakeholder consultations during the planning phase for informed decisionmaking.

Environmental

- Strengthen Water and Sludge/Sediment Quality Monitoring System Develop a comprehensive Water Quality Monitoring Network and Implement Independent Third-Party Monitoring, as well as self-monitoring using inhouse labs at STPs and mobile vans for raw sewage as well as treated sewage discharge at inlets & outlets of STPs and Lakes. Develop a sludge/sediments monitoring plan focusing on monitoring of sludge from STPs and sediments from lakes and SWDs. Sludge/sediments with hazardous contents shall be directed to available disposal facilities.
- Ensure that all program activities involving construction/strengthening of sewerage infrastructure and facilities, retaining walls and lining of SWDs, and building construction shall develop a construction zone management plan.
- Strengthen Sludge and Waste Management Protocols Introduce guidelines for the treatment and reuse of sludge, including pathogen reduction standards based on USEPA Class A Biosolids, and ensure that composting processes meet national and international health and safety standards. Waste management practices should align with solid waste management (SWM) rules, and the program should explore recycling and reuse options for C&D waste.
- Ensure that bid documents include contractor E&S qualification criteria, such as ISO 14001 (Environmental Management System) and ISO 45001 (OHS Management System) certifications. Additionally, IAs shall ensure that, requirement for environmental and social specialists, OHS specialists, are included in bid documents for engaging Project Management Consultants and, contractors to have adequate resources provisioned for managing identified E&S and OHS risks, aligning their responsibilities with program objectives. Clearly outline contractors' responsibilities and liabilities regarding E&S risk and impact management such as legacy waste management (in lake rejuvenation and SWD works), within contractual agreements.

Social

- To address the legislative gap pertaining to non-titleholders, appropriate measures could be considered –(a) screening of all planned activities to estimate the social risk, (b) to the extent possible, excluding any or all project activity (ies) that might necessitate involuntary resettlement of non-titleholders, and lastly, where unavoidable (c) processes to implement the provisions for required compensation and other remedies to project affected people— particularly those belonging to the vulnerable group.
- Monitoring and feedback tool needs to be developed to assess the impact of IEC and BCC activities, which can be included in the ToR for proposed BCC under the program (Results Area 2).
- Undertake stakeholder consultations throughout the program life-cycle to improve the E&S sustainability of the program activities and to enhance their acceptance among the stakeholders.

Core Principle 2 – Natural Habitats and Physical Cultural Resources

Program environmental and social management systems are designed to avoid, minimize, and mitigate adverse impacts on natural habitats and physical cultural resources resulting from the program. Program activities that involve the significant conversion or degradation of critical natural habitats or critical physical cultural heritage are not eligible for PforR financing.

Proposed program activities will be implemented in existing or new sites in BBMP area, with possible risks on natural habitats, such as Bannerghatta National Park (BNP), and physical cultural resources (PCR). BNP is located in Bengaluru Urban and Ramanagara Districts of Karnataka. It is located southern part of the Bangaluru Urban district, spanning an area of 260.51 sq km., it was established in 1970 and declared a national park in 1974. The park was created to preserve the local flora and fauna and it boasts of a Lion and

Tiger Safari, with enclosures that recreate their natural habitat. A location map of the National Park is provided in below **figure 2**.

Program activities such as construction and upgradation of STPs, SWDs, lake rejuvenation may pose risk to these natural habitats and PCRs. Key concerns include flow of untreated sewage into BNP, improper disposal of sludge/sediments, treated wastewater, and waste from program facilities, which could contaminate ecosystems and harm biodiversity. Additionally, construction activities may lead to increased noise, vibration, and air & water pollutant emissions, potentially impacting air, water, land, and biodiversity. These risks, particularly during the construction phase, necessitate robust assessment and mitigation measures to protect these critical resources.

This core principle applies only to those program activities which may impact such habitats or resources located near them, or possibly impacting such regional resources, which will be identified by ESIA/EIA (For example, works or activities in the banks of water bodies, water bodies, city lakes, hazard-prone areas, notified eco-sensitive zones, near forest areas, or in heritage buildings or premises used for any purpose or are valued by the communities; or discharge of waste, waste water or sludge).



Figure 2: Location map of Bannerghatta National Park

Assessment of Program Systems:

• National and State level laws and regulations exist for the regulation of activities in/near natural habitats, critical natural habitats, in the proximity of protected monuments, and for the

management of chance finds. For conservation, maintenance, and rehabilitation of natural habitats, avoid conversion or degradation, and mitigating environmental risks and impacts, there exists various National, State, and local level laws and regulations. These include the Forest Conservation Act 1980 (as amended thereafter) which regulates the use of forest land for nonforest purposes including the construction of buildings; the Wildlife (Protection) Act 1972 (as amended in 2022) which prohibits activities that are harmful to protected species and areas; Eco-Sensitive Zone Notifications under Environment Protection Act 1986, that regulate up-gradation/ development activities in ecologically sensitive areas around existing protected areas; Wetland (Conservation and Management) Rules 2017 that regulate activities in notified wetland areas; Karnataka Tank Conservation & Development Authority Act – 2014 and Karnataka Tank Conservation & Development Authority and certain other Law (Amendment) Act - 2018 that relate to the conservation and development of tanks, lakes, and ponds; Karnataka Preservation of Trees Act 1976, that regulate the cutting of trees and provide for compensatory afforestation. Also, there are multiple notifications, rules, and permit/license requirements, and guidelines to prevent impacts of new developments, wastes and wastewater management, and discharge/disposal of rejects, treated sewage. There are certain aspects of Program activities that might impact these sensitive resources which could be avoided by following siting guidelines, regulations, and permit conditions. Some aspects need more due diligence and guidance, such as in disposal of treated sewage, its reuse for agriculture, sludge management, etc. Clear exclusion criteria and guidance on these shall be built by the program before initiating the program activities.

Assessment of Program Capacities:

 Awareness and capacities at the Regional and program implementing agencies level on existing legal/regulatory regimes or the need to follow National/State/Local regulations are moderate. However, there is no dedicated expertise/responsibility at BBMP and BWSSB levels to ensure that requisite E&S permits/licenses are arranged as required for the works/facilities before start of works or to periodically update such licenses and follow license/permit conditions which will improve overall environmental effects, especially for natural habitats and physical cultural resources. Under AMRUT, "no projects should be included, and no project work order should be issued if all clearances from all the departments have not been received by that time." This guidance under the Government program would ensure all permits and licenses before work. It is important to improve capacities and awareness of regulations and clearance procedures before initiating any activity.

Gaps in Existing Systems:

- There is a risk of adverse impacts on natural habitats such as the Bannerghatta National Park and PCRs due to program activities, such as the disposal of sludge and treated wastewater, as well as construction-related impacts like dust, noise and vibrations.
- Although awareness of national and state regulations exists at the regional and implementing
 agency levels. There is no dedicated capacity at the BBMP and BWSSB levels to ensure compliance
 with the required E&S permits and licenses. This gap could lead to non-compliance with relevant
 laws and an increase in adverse environmental effects. Both BBMP and BWSSB lack dedicated E&S
 personnel responsible for ensuring that all E&S permits and licenses are in place before project
 work begins, and there is no mechanism for regularly updating these licenses or ensuring
 compliance with permit conditions. This gap results in missed opportunities to mitigate
 environmental impacts, particularly in relation to sensitive resources.

Recommendations:

- There is a need to improve awareness and understanding of the applicable national, state, and local regulatory frameworks among the implementing agencies (BBMP, BWSSB and MIGD). Regular training programs on regulatory compliance and environmental permitting processes should be conducted to equip staff with the necessary knowledge.
- Adopt the AMRUT Model for Permit and License Management The program should adopt a similar approach to AMRUT by mandating that no project work orders be issued unless all relevant environmental clearances and permits are obtained. This will ensure that projects comply with regulatory standards from the outset, reducing the risk of adverse impacts on natural habitats and PCRs.
- Conduct an E&S assessment for subproject activities located within the boundaries of Bannerghatta National Park (BNP) or its Eco-Sensitive Zone (ESZ). This assessment should identify potential adverse impacts and recommend appropriate mitigation and management measures to ensure sustainable project implementation.
- In line with ESZ notification of BNP, (a) discharge of untreated effluents in natural water bodies or land area in the ESZ of BNP is prohibited and; (b) the discharge of treated wastewater or effluents shall be avoided to enter into the water bodies and efforts shall be made for recycle and reuse of treated wastewater. Otherwise, the discharge of treated wastewater or effluent shall be regulated as per the applicable laws. Upstream sewage that flows into the national park through existing streams/drains shall be treated in STP including tertiary treatment to ensure high-quality wastewater treatment. The treated water shall be directed downstream to the national park and efforts shall be made for recycle and reuse, maintaining ecological balance and minimizing environmental risks. No water from BNP or its ESZ, should be sold even after tertiary treatment.
- Enhanced due diligence and additional technical guidance are needed for high-risk activities such as the disposal of treated sewage, reuse for agriculture, sludge management and disposal of legacy waste generated from lake rejuvenation. This should include stricter monitoring and evaluation of these activities to ensure they meet environmental safety standards and do not pose risks to natural habitats or physical cultural resources.
- Regular Monitoring and Updating of Permits Implement a systematic process for regularly reviewing and updating environmental permits and licenses to account for any changes in project scope or regulations. This will help ensure continuous compliance throughout the project lifecycle.

Core Principle 3 – Public and Worker Safety

Program procedures ensure adequate measures to protect public and worker safety against the potential risks associated with (a) the construction and/or operation of facilities or other operational practices under the program; (b) exposure to toxic chemicals, hazardous wastes, and otherwise dangerous materials under the program; and (c) reconstruction or rehabilitation of infrastructure located in areas prone to natural hazards.

Assessment of Program Systems:

The works include the construction of STPs, sewer network lines, retaining walls and lining of SWDs, KSDMA building (to be located within the KSNDMC premises), and activities related to Lift 4-Gopalpura Tank [laying of underground pipeline (1.2 m) along the road, construction of pump-house, inlet, sub-station, surge protection system including staff quarter]. Some works among these are likely to have risks or impacts on health and safety unless managed well. There could be construction and/or operations and maintenance (O&M) stage risks emerging from poor design, construction, and O&M practices; mainly health and safety risks to host communities, road users, construction workers,

workers who carry out O&M, and other staff, pollution due to smoke/noise/dust during construction and maintenance activities and pollution of water sources nearby due to discharge of solid and liquid wastes. There are also chances of disaster risks and impacts mainly due to climate/hazard proneness of some areas (such as floods in Bangalore due to overflowing of lakes and draughts).

The assessment concludes the following:

Legal framework to address public and workforce safety and safety of individuals and communities - The existing national and state laws, regulations and policies covering workers' welfare and workplace safety including sexual exploitation and abuse/ sexual harassment (SEA/SH), child and forced labour, wage parity, non-discrimination and equal opportunities at the workplace, including occupational and community health and safety are quite robust. Additionally, for cleaning and desilting of sewers and manholes, standard operating procedures to ensure health and safety of sanitation workers have been put in place. The Bangalore Water Supply and Sewerage (Registration of Agencies for cleaning of manholes and STPs) Regulations, 2021 also requires all cleaning agencies to register and provide adequate safety measures to its workers. Additionally, guidelines are in place for managing hazardous materials and preventing exposure to toxic chemicals and wastes. However, while these frameworks exist, there is a need for their more robust application and integration into specific program activities. Program activities such as the construction of sewage treatment plants (STPs), sewer networks, and stormwater drains can pose significant risks to public and worker safety. Effective implementation of E&S systems requires adherence to design and operational best practices, ensuring regular monitoring and maintenance of infrastructure to avoid health, safety, and environmental hazards.

The system also includes disaster risk reduction protocols, but their enforcement, particularly in areas prone to natural hazards like floods or droughts, remains a concern. The resilience of infrastructure to climate-related disasters, especially in vulnerable areas like Bangalore, requires further strengthening to protect both public safety and the integrity of critical infrastructure.

- Community health and safety related issues include general work site hazards due to poor housekeeping or barricading (with reflectors, especially during situations when light is less, and during emergencies), poor work site lighting, traffic and pedestrian conflicts with work while laying sewer networks, type of works, machinery, and materials on-site, labor camps, temporary disturbance to existing water/sewerage systems in case of upgradation works, increased incidence of communicable and vector-borne diseases and traffic safety. It is very important to close (permanently or safely but temporarily, if work remains for next day) the opened pits and trenches however small or big they may be when workers move out of the pit or trench; with lighting awareness boards and watch and ward. This is also applicable to trenchless network laying. In case of an outbreak of communicable disease such as COVID 19 type pandemic-related risks, the interaction of workers/workspace with communities need good attention. Likewise, while MIGD displays caution boards that caution communities from drinking, fishing or washing water from these lakes, more such boards are required at multiple locations.
- Capacity of implementing agencies like BBMP, BWSSB, MIGD and KSDMA/KSNDMC to manage health and safety risks is moderate. While there is basic awareness of E&S standards and legal compliance requirements, the specialized expertise needed to handle complex risks—such as exposure to toxic chemicals, hazardous wastes, or disaster-prone infrastructure—appears to be limited. The lack of technical staff specifically trained in worker safety, hazardous material handling, and disaster risk management poses challenges to effectively mitigating the associated risks of program activities.
- In terms of capacity for disaster preparedness, there are early warning systems and disaster

management plans in place at the regional level. However, these systems need to be integrated more fully into the construction and O&M processes of the program. The implementing agencies have limited experience in systematically addressing climate-induced risks, which are becoming increasingly frequent in Bangalore, notably flooding due to overflowing lakes. Training and capacity-building efforts for staff in hazard-prone areas need to be improved.

Monitoring and Reporting: While extensive legal provisions are in place, implementing agencies do not currently have adequate resources to monitor compliance with these regulations and procedures. The DPRs and bid documents reviewed during the assessment highlight the need for mandatory compliance with labour laws and regulations by the contractors. To an extent, on-site monitoring of OHS and CHS parameters is also being carried out at construction sites by the Assistant Engineer of the concerned division/sub-division and Project Management Consultants —particularly in BWSSB's externally aided projects. BWSSB has also adopted a Management Information System (MIS) for online monitoring of construction site/ activities/ documentation—it is to be seen if the MIS includes parameters to monitor labour standard compliance. However, in the case of BBMP, MIGD and KSNDMC, contractor's reporting requirements are limited to physical progress and does not specifically require reporting on E&S issues, labour aspects or any other issues/grievances experienced during construction and operation phase.

Construction related grievances, if any, are mostly dealt by the concerned contractor at their level and on occasions, these are resolved with support from the Assistant Engineer of the concerned division/ sub-division. Current practices of BWSSB include installation of signboards whenever construction begins by the contractor/BWSSB to inform anyone of works to guide traffic movements etc. However, this is done once the construction commences and not informed prior to commencement of works.

- Measures to help protect individuals and/or communities from violence, intimidation, and harassment at the workplace- The implementing agencies are mandated by law to setup an Internal Complaints Committee (ICCs) as per the requirements of the Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013. Moreover, Karnataka Service rules also prohibit against sexual harassment at the workplace. Thus, notifications have been issued wherein ICCs have been setup under each of these agencies, but regular trainings and re-constitution of committees after every three years needs to be carried out as prescribed.
- Avoid the use of child and forced labour in the implementation of Program activities The national and state legislations on child and forced labour are quite comprehensive and prohibit the use of child or forced labour. Additionally, manual scavenging is prohibited by law. These provisions are specified in the contract documents as well. The IAs ensure that contractors comply with these regulations through site inspections and monitoring.

Gaps in Existing Systems

- Insufficient Integration of OHS standards in program activities While there are national and statelevel regulations for worker safety, their integration into the day-to-day operations of program activities is inadequate. Current E&S management systems lack comprehensive guidelines specific to the health and safety of workers and nearby communities during both construction and operational phases. This increases the risk of accidents, exposure to hazardous materials, and pollution due to poor construction or O&M practices.
- Although legal frameworks exist, there is insufficient monitoring and enforcement of OHS regulations at the program level. The lack of periodic safety audits, regular inspections, and the enforcement of safety protocols during construction and O&M stages may led to an increased risk

of accidents, pollution, and safety violations. Inadequate supervision of contractor activities may further exacerbate these risks.

Recommendations

Based on the gaps identified through the assessment, the ESSA recommends these:

- The program should establish a construction zone management plan and a comprehensive OHS guidelines specific to the construction and O&M of STPs, sewer networks, and stormwater drains, building construction, tank filling activities, etc. These guidelines should include detailed procedures for risk identification, accident prevention, and worker safety protocols, traffic management, among others. Regular training sessions should be conducted for contractors, supervisors, and workers on best safety practices, especially when working in high-risk areas.
- Specific protocols for handling, storing, and disposing of hazardous materials should be developed and enforced across all program activities. These protocols should ensure that hazardous materials are handled safely to prevent exposure to workers and nearby communities, and that waste is properly treated and disposed of, particularly in areas near water bodies. Regular inspections should be carried out to ensure compliance with these guidelines.
- The program should enhance its capacity to manage disaster risks, particularly in flood-prone regions. Infrastructure design should incorporate climate resilience measures to withstand extreme weather events, and regular risk assessments should be conducted. Staff and workers should be trained in emergency preparedness and response procedures, including evacuation plans and the use of early warning systems.
- To ensure that safety protocols are effectively implemented, the program should introduce regular safety audits and inspections during both construction and O&M stages. Dedicated safety officers should be appointed to monitor compliance, and penalties for non-compliance should be strictly enforced. Additionally, periodic reviews of contractor performance should include safety assessments to minimize the risk of accidents.
- The Program shall ensure through design that the need for manual scavenging shall not arise by ensuring machine holes and employing mechanical means. Usage of banned chemicals, pesticides, and exotic species needs to be curtailed; and monitored.
- Establish Community Safety and Awareness Programs The program should implement community safety awareness programs in areas affected by construction and O&M activities. These programs should inform local communities about potential health and safety risks, emergency response measures, and how they can minimize their exposure to hazards like air and water pollution. Display of safety signages and information on grievance mechanisms at construction sites, and clear communication channels should also be established to allow communities to report safety concerns or environmental incidents.
- Operations of sewers and adding of new STPs and networks may result in 'manual scavenging' without appropriate safety considerations. Further, as sanitation workers are often informal workers employed by registered agencies, they are likely to be subjected to discriminatory practices. During a survey carried out by BBMP in 2020-21, a total of 1625 manual scavengers

were identified within the BBMP limits.¹⁷ While there are appropriate regulations and SOPs in place, this Program should provide opportunities to ensure strict adherence to the legal and regulatory provisions, and further enhance awareness and capacity of the project staff and registered agencies to implement these.

- A robust system for monitoring labor standard compliance and workplace conditions needs to be established during construction and O&M phase wherein clear roles of supervision and reporting are laid out for the staff, PMC and contractors/registered agencies. This needs to be integrated with the existing MIS system.
- ToRs and contract documents for all civil works financed under the program needs to be updated to focus on compliance with labor laws including OHS, CHS and SEA/SH prevention.
- Protocols related to accidents/incidents management should be in place— wherein any such incidents are reported within 24 hours, and the implementing agencies should investigate the cause and adopt prevention/control mechanisms in all sites immediately.
- Training and capacity building needs to be undertaken on workers' rights including SEA/SH prevention and response with program staff, consultants, and contractors in accordance with applicable laws including the Sexual Harassment at the Workplace Act, 2013.

Core Principle 4 – Management of Land Acquisition, Loss of Access to Natural Resources, Involuntary Resettlement

System and capacity assessment: Avoid or minimize land acquisition and related adverse impacts: Avoid or minimize displacement, and assist the affected people in improving, or at the minimum restoring, their livelihoods and living standards.

Assessment of Program Systems

The assessment concludes the following:

Avoidance or minimization of land acquisition – Most planned activities will be undertaken on existing government lands (existing RoW or land within the buffer zone of SWDs); thus, no private land acquisition is foreseen for SWD and STP construction activities. For the proposed Gopalapura lift scheme, underground pipelines for supply of treated wastewater will be laid along the road using the existing ROW. Also, proposed activities will not require any removal of encroachments. For the construction of the pump-house, inlet, sub-station, and surge protection system including staff quarter, a maximum of two acres of private land will be procured through direct purchase (willing buyer-willing seller) due to non-availability of government land. Based on site visit undertaken by the World Bank, the proposed location was found to be free from encumbrances (squatters, encroachers and/or disputes). The legal process of private land acquisition and direct purchase is robust, participative, and transparent.

Process for Direct Purchase through Negotiated Settlement:

- Sub-division office of MIGD will prepare a land acquisition proposal outlining the extent of land requirement, location details, Survey No. and sketch, land ownership details and initial consent letters from landowners.

¹⁷ https://site.bbmp.gov.in/departmentwebsites/welfare/PDF/Consolidated%20Report%20of%20Manual%20Scavengers.pdf

- Initial requisition proposal from MIGD will be submitted to the Office of the District Collector to initiate the process of direct purchase.
- Office of the District Collector will obtain reports from the ADLR, Sub-Registrar, Tahsildar, Horticulture and Agriculture Departments including the Social Impact Assessment (SIA) report.
- District Collector's office will submit these reports to the regional office for seeking approval for direct purchase.
- On approval from the regional office, the Office of the District Collector will intimate the MIGD for deposit of minimum of 50% of land acquisition cost along with the procedure costs & Stamp duty costs.
- Based on approvals from MIGD, Office of the District Collector will initiate the price fixation meeting with the landowners and concerned departments.
- If the price is agreed by the landowners, MIGD shall immediately deposit the total amount of land acquisition.
- Once the complete amount is paid to the landowners, Sub-Registrar will initiate the land transfer process.

Process for land acquisition through RFCTLARR Act:

- MIGD will prepare a land acquisition (LA) proposal outlining the extent of land requirement, location details, Survey No. and sketch, land ownership details, including the Record of Rights, Tenancy, and Crops (RTC).
- Proposal will be submitted to the Office of the District Collector by the Chief Engineer, MIGD.
- Preliminary notification [Section 11(1) of RFCTLARR Act] will be issued by the District Collector, which will be published in the official gazette and two daily newspapers.
- Joint Measurement Survey (JMC) will be conducted by the Special Land Acquisition Officer (SLAO) along with representatives from MIGD, Forest Department, Agriculture Department, Horticulture Department and other Department, if needed.
- Based on the JMC report, SLAO will issue a notice to the concerned landowners detailing the extent of land, crops and trees to be acquired, and landowners will be given a period of time to raise their objection.
- After hearing of objections, Additional Director of Land Records (ADLR) and Tahsildar will jointly conduct a meeting on price fixation (based on the reports obtained from Sub-Registrar) for land compensation and R&R assistance. Based on this, proposal will be prepared and same will be submitted to the District Collector's Office. After verifying the proposal, Office of the District Collector will then issue the award of rates for landowners.
- Compensation amount between INR 0 2.0 Crore will be disbursed by the Office of the District Collector; Between INR 2.0 -5.0 Crore: by the Office of the Regional Commissioner; Above 5.0 Cr: by the State Government / Cabinet.
- Avoidance of Forced Eviction- BBMP has detailed processes backed by law to deal with encroachments arounds lakes and over stormwater drains. In case of stormwater drains, the land¹⁸ belongs to the Revenue Department as per Section 67 of the Karnataka Land Revenue Act. Hence in accordance with the Act and Karnataka High Court directive, Executive Engineer of the Division is the complaining authority and whose duty is to protect the boundaries of the drains and report

¹⁸ Buffer zones prescribed by the National Green Tribunal are 15 meters (tertiary SWD), 25 meters (secondary SWD) and 50 meters (primary SWD)

every encroachment to the jurisdictional Tahsildar (Revenue department official). The Jurisdictional Tahsildar is the authority specified to receive complaints, conduct enquiry, and pass necessary orders. The Tahsildar directs the Assistant Director of Land Records & Survey Settlement (ADLR) of the concerned Taluk to conduct the survey along with markings and provide details of the encroachments. On passing of orders under Section 104 of the Karnataka land Revenue Act, by jurisdictional Tahsildar, the Zonal executive engineer is specified as the authority to remove these encroachments and he ensures presence of surveyors during the removal process. The jurisdictional Tahsildar is also responsible for filing complaints before the Land Grabbing Prohibition courts.

S.No.	Step/Action	Timelines
1	EE of the SWD division to identify encroachments	20 days
2	Filing of complaint before the jurisdictional Tahsildar, from the date of notice	5 days
	or information received by EE of the SWD division	
3	Jurisdictional Tahsildar to direct the concerned ADLR for conducting the	5 days
	survey and to mark encroachments	
4	ADLR to conduct survey and mark encroachments	50 days
5	Submission of drawings of the survey and preparation of sketch	10 days
6	Issuance of notice to the encroachers by the jurisdictional Tahsildar	10 days
7	Timeline provided for reply to the notice issued by the Jurisdictional	7 days
	Tahsildar	
8	Issuance of final order by Jurisdictional Tahsildar	10 days
9	Time provided for appeal by the encroacher	30 days
10	Removal of encroachments by arranging necessary men and machinery	15 days
11	Jurisdictional Tahsildar to file complaint before the LGP Court	10 days
		172 days

Table 5: Process for Removal of Encroachment from Government Land

Further, any person can find out if his/her property is an encroachment on the lakes/stormwater drains by using "Dishaank" – an app¹⁹ developed by Revenue Department, that lets user know the survey number of his current location within Karnataka. It also allows surveyor to give feedback on survey number details and get to know their land details like owner details and area of their land. It also helps any user to understand, explore and know (and not for legal purposes) if the parcel is on any lake, forest of *Rajakaluve*²⁰ land. Another option is to check the survey number of the land parcel on the website www.rajakaluve.org²¹.

Likewise, in case of lakes/tanks, Karnataka Tank Conservation and Development Authority (KTCDA), 2014 provides the legal framework for removal of encroachments. Under Section 13 -22 of the Act, it authorizes such officers/authorities to take such measures as necessary to remove encroachments and unauthorized occupation of such tanks and prevent its recurrence, including seizure and confiscation of such property, but only after providing a reasonable opportunity to be heard. Every such order of eviction is sent to the unauthorized occupant in writing and delivered in person; through registered post; by pasting at a prominent location on the property or through a newspaper advertisement. Trees and/or structures need to be removed within 30 days of serving of such notice and cost of removal/shifting of such assets is to be borne by the encroacher/unauthorized occupant.

¹⁹ An iOS and android app

²⁰ Rajakaluve is the local word for stormwater drains.

²¹ The Real Estate Research Initiative of Indian Institute of Management Bangalore (IIMB-RERI), with support from the Bruhat Bengaluru Mahanagara Palike (BBMP), has launched a web-based portal – www.rajakaluve.org to enable Bangaloreans to know if their property is situated on a storm water drain or 'raja kaluve'

Provision of supplemental livelihood improvement or restoration measures if taking of land causes loss of income-generating opportunity (e.g., loss of crop production or employment)- the Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014 spells out remedies such as compensation for loss of assets, livelihood opportunities created by the project or relocation to improve their living standards, or at least to restore them to pre-evicted levels. Towards this, BBMP in June 2024 has published a Standard Operating Procedure (SOP) for allocation of vending zones, census survey, relocation and certification of street vendors. The SOP lays down preferences for allocation of certificate of vending to marginalised groups such as Scheduled Caste (SC), Scheduled Tribe (ST), Backward Classes (BC), women, persons with disabilities (PwD) and gender minorities— in case of shortage of vending space. Additionally, BBMP has recently introduced provisions wherein supplemental payments for loss of livelihood opportunities to informal users or occupiers that are particularly vulnerable (belonging to the Below Poverty Line, ST and SC category) will be provided— in accordance with the requirements of this Core Principle. The entitled person will receive financial assistance of not less than Rs. 25,000/- and maximum up to Rs. 50,000/-.

Assessment indicates that safeguards are in place to ensure that there is no forced eviction of encroachers/squatters— as there is sufficient time provided to the encroacher/unauthorized occupant (affected person) to submit his/her reply and also to appeal against order.

Gaps in Existing Systems

- While legal provisions are in place for providing compensation and R&R assistance, there is a need for a process to screen and identify those vulnerable persons/households who might experience physical and/or economic displacement during the construction/rehabilitation of SWDs and compensate them as per these provisions.
- Further, identification of all informal occupants (mainly for cultivation) likely to be impacted during the tank-filling activities is pertinent to understand the magnitude of impact and to ensure that affected families are provided with sufficient time to harvest their crops.

Recommendations

Based on the gaps identified through the assessment, the ESSA recommends these:

- All planned activities need to be screened to determine whether these may involve involuntary taking of land, relocation of residences or businesses or restriction on access to natural resources and other significant impacts. The screening must consider the whole range of possible impacts on various property regimes, especially covering people who lack titles or recognizable claims.
- Procedures related to land acquisition under the relevant national and state laws include requirements for the informed participation of affected people. However, since the RFCTLARR Act is not applicable in case of informal settlers and occupiers in government land, there is a need to embed the process of identification and consultation with affected persons during the DPR preparation and prior to construction phase to seek their feedback on the project design and implementation.
- Develop a set of procedures to identify informal users or occupiers that are particularly vulnerable (ST, SC, BPL) within the program and implement provision for supplemental payments for loss of livelihood opportunities including their enrollment into ongoing government schemes. Appropriate procedure and institutional arrangements for the execution of themeasures will be laid down in the Program Operational Manual (POM).

Core Principle 5 – Cultural Appropriateness, Equitable Access to Program Benefits, Special Attention to Rights and Interests of Indigenous Peoples & Historically Underserved Communities

System and capacity assessment: Give due consideration to the cultural appropriateness of, and equitable access to, program benefits, giving special attention to the rights and interests of Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities and to the needs or concerns of Vulnerable Groups.

Assessment of Program Systems

The assessment concludes the following:

- The program will have a statewide footprint with a focus on Bengaluru. Program related IEC and behavioral change activities will be carried out across the state including in tribal areas. Whereas physical investments will be limited to Bengaluru. The population across all 8 Zones in Bengaluru is heterogeneous. However, there are vulnerable groups such as women headed households, PwD, ST/SC and BPL families that may be physically and economically displaced during the implementation of planned activities. Exclusion of slums and de-notified areas in the city, where poor and marginalized population mostly live will be avoided as the Program benefits mainly extend to expanded areas of the city where water supply, sewer, and storm water infrastructure and services are still lacking.
- At 43 percent, Karnataka's female labor force participation rate is 6 percentage points above the national average.²² The Program conducted a gender assessment and found that this percentage holds true for the three IAs across job roles. Currently, there are a total 80 staff²³ employed in KSNDMC, of which 33 are female employees. Under BWSSB, there are a total of 166 women employees holding managerial/senior positions (Group A and B officials), 33 females out of 106 employees in notified technical posts, and 86 females out of 281 employees in notified non-technical posts.

Gaps in Existing Systems

- Procedures for identification and execution of the supplemental payment provision to vulnerable informal occupants are not in place. (Refer to Core Principle 4)
- Analysis of India's time use survey shows that having children under the age of six increases women's time spent on care work by 95 minutes a day. While women are a large part of the workforce in the implementing agencies, they do not have access to childcare provisioning near the workplace. This leads to women spending more hours working on unpaid care work as it is unevenly distributed within households burdening women more.

Recommendations

Based on the gaps identified through the assessment, the ESSA recommends these:

• Processes to implement the provisions to manage the physical & economic displacement impacts of civil works on 'vulnerable' encroachers/unauthorized occupants in relation to the activities under the World Bank-financed Program. (Refer to Core Principle 4)

²² Periodic Labour Force Survey, Government of India, 2022-23.

²³ Total no. of personnel involved in taking up KSNDMC activities and other Programmes under REWARD and 24x7 Varuna Mitra Help Desk under KSNDMC.

- To ensure inclusive participation and decision-making, the program proposes the need for extensive stakeholder consultations in each zone to be built into the integrated planning and implementation process (Results Area 2).
- To help address this disparity which disproportionately affects working women, the Program will
 provide formalized childcare provisioning in BBMP and BWSSB such as designating space in the
 main office building to run a childcare center. Additionally, the Program will ensure that early
 warning systems being designed under the Program will account for women's specific needs and
 Emergency Operation System Units being set up under KSDMA in the Program will hire a minimum
 of 33 percent women.

Core Principle 6 – Avoidance of Social Conflict

System and capacity assessment: Avoid exacerbating social conflict, especially in fragile states, post-conflict areas, or areas subject to territorial disputes.

The assessment concludes the following this principle as not relevant as the Program is not being implemented in areas of recognized fragility or in post-conflict zones.

5 ENVIRONMENTAL AND SOCIAL INPUTS TO THE PROGRAM ACTION PLAN

1. The ESSA concludes that the Program has a **substantial** environmental and social risks. Based on the assessment of the environmental and social management system applicable to the proposed Program, certain key areas require strengthening of institutional set up and capacity systems. As discussed in the previous chapter, there remain certain gaps from the perspective of actual implementation of such systems identified through this ESSA, based on which the following recommendations are proposed to Program Action Plan and the Results Framework.

5.1 Proposed Actions to Improve Environmental and Social Systems and Capacities

29. *Screening and Exclusion of High-Risk Activities:* The following activities will be excluded from the program to avoid high environmental and social risks:

- Any construction, waste disposal, or operational activity leading to the conversion, degradation, or encroachment of critical natural habitats, such as Bannerghatta National Park or its Eco-Sensitive Zone (ESZ), and any cultural heritage sites.
- Activities that discharge untreated or inadequately treated wastewater into natural water bodies, dispose of sludge in forests or natural habitats, or contaminate air, water, or soil, resulting in adverse impacts on the health and safety of individuals, communities, or ecosystems.
- Any activity wherein workplace conditions expose workers to significant risks to health and personal safety without appropriate safety measures in place.
- Any activity generating significant greenhouse gas (GHG) emissions or causing widespread environmental or social impacts beyond the immediate project area, including cross-border effects.
- Any activity leading to significant cumulative, induced, or indirect impacts.
- Any activity involving land acquisition and/or resettlement of a scale or nature that will have significant adverse impacts on affected people.
- Any activity that may result in forced eviction (without prior notice as stipulated by law) will be screened out from the Program boundary.

30. A separate DLR 1.1 for BBMP on Institutional Enhancement of Social & Environmental Management has been considered under the Program. US\$2,500,000 will be disbursed per zone on achieving the following criteria (i) development of a system to manage impacts related to physical and livelihood impacts in World Bank financed investments including enrollment of vulnerable project affected person into ongoing government schemes; (ii) development and adoption of a Construction Zone Management Plan for EHS, OHS management, community health and safety, including traffic management associated with construction activities; (iii) inclusion of E&S provisions in bid and contract documents and development and adoption of templates to monitor compliance of E&S provisions and (iv) appointment of dedicated Environmental and Social Officers within BBMP at the zonal level.

31. Based on the ESSA findings, the following Program Action Plan and additional recommendations presented in *Table 6 (1) and 6 (2)* have been proposed for consideration:

Action Description	Source	DLI #	Responsibil ity	Timing		Completion Measurement
Institutional Enhancement for Social & Environmental	Environm ental and Social Systems	NA	RD, BWSSB, KSDMA, KSNDMC, MIGD	Other	Before the commencem ent of sub-	Staff contracted and joined duties.

Table 6 (1): Recommended Social & Environmental Actions for Program Action Plan

Management: (i) Hiring at PMU State-Level: Social Specialist and Environment Specialist; (ii) Appointing dedicated Environmental Officers within each implementing agency.					project activities	
Develop and enforce a Construction Zone Management Plan to mitigate E&S risks pertaining to occupational and community health and safety including traffic management.	Environm ental and Social Systems	NA	BWSSB, MIGD, KSDMA	Other	Throughout construction period.	CZM Plan developed and enforced through regular inspections and corrective actions to address any identified risks effectively.
Development and Implementation of Program Specific Comprehensive Water Quality Monitoring Network and Plan: Design and implement a comprehensive, program-specific water quality monitoring network for raw and treated sewage at STPs, SWDs and lakes.	Environm ental and Social Systems	NA	BBMP and BWSSB	Other	Develop the Plan within 6 months of program effectiveness; Implement within 2 years of program effectiveness.	Water quality monitoring network and plan, Implementation report.
Receipt of IAs' monitoring reports to comply with E&S provisions included in contract agreements of PforR investments— during construction and O&M phase.	Environm ental and Social Systems	ΝΑ	BWSSB, MIGD and KSDMA	Recurre nt	Semi- annually during construction and O&M	Monitoring template for semi-annual reporting. Semi-annual E&S monitoring reports submitted till completion of works.

Sr	Additional Recommendations	Perpensibility	Timeline
No.		Responsibility	Timenne
1	Enhance capacity of staff of PMU and other implementing entities (BBMP, BWSSB, MIGD and KSDMA) on E&S risks management and application of revised implementation procedures. Formulate and implement a comprehensive capacity-building/training plan to improve knowledge and skills related to environmental and social risk management. Training will cover topics such as risk screening, regulatory compliance, EHS management, monitoring and reporting. Plan will include dedicated training sessions, practical site visits, and peer-to-peer learning to foster hands-on experience and inter-agency knowledge sharing.	BBMP, BWSSB, MIGD and KSDMA	Yearly
2	Promote Citizen Engagement in Addressing Solid Waste Issues: To encourage community participation in managing solid waste in lakes, SWDs, and sewage networks, a targeted outreach program should educate residents on the environmental and social impacts of improper waste disposal. Educational campaigns should target local neighbourhoods, schools, and public forums, emphasizing how improper waste disposal contributes to pollution and degradation of natural water bodies and drainage systems. Engage community leaders, environmental groups, and resident welfare associations to organize initiatives such as lake and SWD clean-up drives, waste reduction workshops, and local monitoring programs to encourage active participation and foster a shared sense of responsibility. Disseminate information on grievance redressal system for citizens to report on waste-related concerns in their local water bodies and drainage systems. Incentivize community involvement through recognition and rewards.	BBMP and MIGD	Throughout program implementation period
3	Stakeholder Consultation and Engagement: To ensure effective and inclusive program implementation, a structured stakeholder consultation and engagement process is essential. A stakeholder consultation plan needs to be developed. This will involve identifying key stakeholders, including local communities, government departments such as KSPCB, civil society organizations, and other relevant entities, to incorporate their perspectives and address their concerns proactively. Regular consultations will be conducted throughout the program lifecycle, from planning and design to implementation and monitoring. The engagement process will prioritize transparency and open communication, with particular emphasis on water quality and waste management aspects. Feedback mechanisms will be established to capture stakeholder input, address grievances, and adapt program actions as needed.	Revenue Department	Within 3 months of program effectiveness
Δ	Formation of Environmental Monitoring Group [As part of	Revenue	6 months after
	<u>DLI 3 (program-wide) and DLI 4 (Zone-wise)</u>]: Establish an Environmental Monitoring Group responsible for guiding	Department BBMP	program effectiveness

	and overseeing environmental activities across all program initiatives. This group will also ensure and oversee effective implementation of the water quality and sludge/sediment monitoring plan and support environmental compliance and performance improvements.	BWSSB MIGD KSDMA KSNDMC			
5.	Integration of E&S Risk Screening in DPRs: Ensure that all Detailed Project Reports (DPRs) incorporate E&S risk identification using a standardized screening checklist, as provided in Annexure-III of the Environmental and Social Systems Assessment (ESSA). Require DPRs to follow the 'Avoid-Minimize-Mitigate-Offset' risk mitigation hierarchy specifically to address waste management issues in lakes and SWDs.	All program implementing agencies	Before DPR	tendering	for
6.	Inclusion of E&S Criteria in Bid Documents and Specification of E&S Responsibilities in Contracts: Ensure that bid documents include contractor E&S qualification criteria, such as ISO 14001 (Environmental Management System) and ISO 45001 (OHS Management System) certifications. Additionally, IAs shall ensure that, requirement for environmental and social specialists, OHS specialists, are included in bid documents for engaging Project Management Consultants and, contractors to have adequate resources provisioned for managing identified E&S and OHS risks, aligning their responsibilities with program objectives. Clearly outline contractors' responsibilities and liabilities regarding E&S risk and impact management such as legacy waste management (in lake rejuvenation and SWD works), within contractual agreements.	All program implementing agencies	Before Works	tendering	for
7.	Screening and identification of possible encroachment of informal occupants near the 40 tanks considered for filling under the PforR. Ensure that due process of law is followed prior to evacuation and in case of cultivated land, sufficient	MIGD	Before Works	tendering	for
	time is provided to affected persons to narvest their crops.				

32. ESSA inputs to Implementation Support Plan

The World Bank's implementation support will focus on building capacity of implementing agencies on environmental and social risk management of program activities. This would include the following:

- (a) Reviewing implementation progress and achievement of Program results on environment and social risk management through the periodic IVA reports, implementation support missions and any other E&S progress reports submitted by the PMU.
- (b) Assisting the implementing agencies in setting up systems and procedures to screen, manage and monitor environment and social risks/impacts. Procedures will be detailed out in the Program Operational Manual.
- (c) Support institutional capacity building on environment and social risk management on a periodic basis.
- (d) Guide the implementing agencies in integrating E&S requirements and procedures in Terms of References (ToRs), contracts and bid documents of all planned activities under the Program.
- (e) Monitoring the performance of Program systems, including the implementation of agreed environment and social systems strengthening measures as included in the PAP and Results Framework.

- (f) Monitoring changes in Program risks related to E&S as well as compliance with the provisions of the legal covenants; and
- (g) In collaboration with the Borrower, adapting E&S risk management practices in a manner consistent with PforR principles as necessary to improve program implementation or to respond to unanticipated implementation challenges.

6 CONSULTATION AND DISCLOSURE

6.1 Summary of discussion held during preparation of the ESSA

A State level consultation workshop was organized on December 20, 2024, to disclose the draft ESSA. The Executive Summary of the ESSA was translated into local language (Kannada) and distributed to all invited stakeholders before the workshop. The feedback obtained during the workshop was used to further refine and finalize the ESSA. The key inputs received during the consultation workshop is included in Annexure 5.

The draft and the revised/final ESSA report has been disclosed on the World Bank portal, before and after incorporating comments and suggestions.

6.2 Stakeholder Consultations on ESSA

33. Stakeholder consultations were an integral part of the ESSA process and were carried out consistent with applicable World Bank principles. Site visits to potential sites for development of STPs, SWDs, and Gopalpura Lift considered under the PforR, including existing infrastructures and discussions with various stakeholders started in June 2024 during the identification mission and continued till end February 2025. Consultations were carried out with relevant institutions and government departments/agencies, consultants, contractors, academia and beneficiary communities (residential associations, CSOs/NGOs) for identification and assessment of environmental and social effects, and to recommend measures to improve environmental and social management capacity based on their comments and suggestions.

34. The *Table 9* below outlines the various stakeholders who were consulted during the preparation of the ESSA.

SI. No.	Stakeholder	Officials Consulted
1.	Revenue Department	Senior Social Specialist Environment Specialist & Consultant
2.	KSDMA	Commissioner
3.	KSDMC	Chief Commissioner Scientific Officers
4.	BBMP	Chief Commissioner Special Commissioner, Finance Special Commissioner, SWDM Special Commissioner, Revenue Special Commissioner, Welfare Engineer in Chief, and Designated Chief Engineer, Storm Water Drain Chief Engineer, Bengaluru Solid Waste Management Limited Chief Engineer, Lakes, BBMP Superintending Engineer & Executive Engineer, Mahadevapura Zone Storm Water Drain Executive Engineer, Yelahanka & East Zone Executive Engineer, West Zone Executive Engineer, South & Koramangala Zone Executive Engineer, R R Nagara Zone Executive Engineer, Bommanahalli Zone Executive Engineer, Dasarahalli Zone Executive Engineer, East Zone, Lakes Executive Engineer, Mahadevapura Zone, Lakes
5.	BWSSB	Chairman Chief Engineer (Project)

Table 8: Stakeholders consulted during preparation.

Karnataka Water Security and Resilience Program- ESSA

SI. No.	Stakeholder	Officials Consulted
		Addl. Chief Engineer (Project)-1
		Addl. Chief Engineer (Project)-2
		Addi. Chief Engineer (Cstr & DCW)
		Executive Engineer (Project)-1
		Executive Engineer (Project)-2
-	Bengaluru Solid Waste	Chief Engineer
6.	Management Limited	C C
7	Minor Irrigation Department	Secretary, MIGD
/.		Deputy Secretary, MIGD
		Chief Engineer
		Superintending Engineer
		Assistant Executive Engineers
		Consultants
0	Zonal level officials	Superintending Engineer & Executive Engineer, Mahadevapura Zone
0.		Storm Water Drain
		Executive Engineer, Yelahanka & East Zone
		Executive Engineer, West Zone
		Executive Engineer, South & Koramangala Zone
		Executive Engineer, Bommanahalli Zone
		Executive Engineer, Dasarahalli Zone
		Executive Engineer, East Zone, Lakes
		Executive Engineer, Mahadevapura Zone, Lakes
9.	Other Departments	Secretary, Forest, Environment and Climate Change
		Pollution Control Board
		India Meteorological Department
		Geological Survey of India
10	Consulting Firms	DPR Consultants for SWDs (BBMP)
10.		Project Management Consultant for Externally Aided Project (BWSSB)
		Paradigm Environmental Strategies Limited
		TCE
11.	Contractors	L& I, etc. contractors of existing works on STPs
42	CSO	Mahadevapura Task Force – Environment
12.		WELL LABS
		CDD India
		Biome Trust
		B PAC
		Waste Samaritan
12	Residential Associations	Bangalore Apartments' Federation (BAF)
13.		Bangalore Resident Welfare Association
		Federation of Bengaluru's Lakes
		South Avenue Layout Residential Association
		Friends of Lakes Federation of Bengaluru Lakes
		Maniunatha Nagar
	Research Institutes	Advanced Centre for Integrated Water Resources Management
14.		(ACIWRM), IFMR
		ATREE

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SI. No.	Stakeholder	Officials Consulted
		CSIR – Fourth Paradigm Institute (CSIR-4PI)
		AquaMAP- IIT Madras
15.	Academia	Bangalore University
		Indian Institute of Science, Bengaluru
		National Law School of India University
		Sri Krishna Institute of Technology
		School of Climate Change and Sustainability, Ajim Premji University

35. During the consultations and stakeholder workshop, the stakeholders provided inputs on the institutional arrangement for the proposed program, management of environmental and social aspects such as issues of encroachments in the RoW/ buffer zone, involvement of communities, civil society organisations and relevant stakeholders such as KSPCB throughout the project period, IEC activities, complaint redressal, occupational and community health and safety during construction, gender inclusion and community inclusive approach to tackle wastewater, rainwater harvesting etc., access to welfare schemes by vulnerable or marginalized groups, need for nature based solutions, improvement of water quality monitoring, among others.

ANNEXURES

Annexure 1: List of Documents Reviewed

- Relevant national laws, regulations and policies such as Environment (Protection) Act 1986, Air (Prevention and Control of Pollution) Act 1981, Water (Prevention and Control of Pollution) Act 1974, Noise Pollution (Regulation and Control) Rules 2000, Construction and Demolition Waste Management Rules 2016, Solid Waste Management Rules 2016, National Water Policy 2012; Minimum Wages Act, 1948; Child Labor (Prohibition and Regulation) Act 1986; Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (RFCTLARR) Act, 2013; National Policy on Tribal Development, 1999; Right to Information Act, 2005; The Sexual Harassment of Women at Workplace Prevention, Prohibition, and Redressal Act 2013; The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Central Rules, 1998; Inter-State Migrant Workers Act 1979, among others.
- Relevant state laws, regulations and policies such as Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Karnataka Amendment) Act, 2019; Land Purchase through Negotiated Settlement (Government Order no: RD 54 LAQ 2014); Karnataka Land Revenue Act, 1964; and The Karnataka Scheduled Caste, Scheduled Tribes and Other Backward Classes (Reservation of Appointments, etc.) Act, 1990. Karnataka Ground Water (Regulation and Control of Development and Management) Act, 2011, Karnataka Ground Water (Regulation and Control of Development and Management) Rules, 2012, The Karnataka Groundwater (Regulation for Protection of Sources of Drinking Water) Act, 1999, Karnataka State Policy on Integrated Waste Management, The Karnataka Panchayat Raj (Management of Solid Waste) Model Bye-laws, 2020, Karnataka Ancient and Historical Monuments and Archaeological Sites and Remains Act, 1961, Karnataka Ancient and Historical Monuments and Archaeological Sites and Remains Act, 1966, and Karnataka Act No. 50 Of 2020: Lakkundi Heritage Area Development Authority Act, 2020, among others.
- Standard Operating Procedures for Manholes and Sewer lines in BBMP
- Standard Operating Procedures for Cleaning of Sewers and Septic Tanks, Ministry of Housing and Urban Affairs
- Government notifications, orders and circulars
- Revision of Water and Sanitary Tariff in 2014, BWSSB
- Websites of BBMP, BWSSB, and KSNDMC
- Quarterly Environmental Monitoring reports submitted by PMC (Oriental Consultants Global Company Ltd.)
- Program-for-Results Financing Environmental and Social Systems Assessment Bank Guidance, July 2019
- School Disaster Management Plans, KSNDMC
- Report on Water Crisis Management Initiatives, BWSSB
- Report on 91st Training Program on Rain Water Harvesting for Architects, Engineers and Plumbing Contractors
- Template for Gram Panchayat Level Disaster Management Plan, KSNDMC
- School Disaster Management Plan- Comprehensive School Safety Program
- Community- level assessment of drought in Karnataka 2023- A case study of 31 Gram Panchayats
- Jakkur AWTP (Advanced Water Treatment Plant) for 5 MLD- Note of key bullets raised during discussion with Technical Committee
- Karnataka High Court Writ Petition No.38401 of 2014 (GM RES)
- National Green Tribunal Original Application No. 1069/2018 Nitin Shankar Deshpande vs. Union of India and Ors.

Annexure 2: List of Relevant Guidelines and State Regulations on Sewerage and Drainage

Technical Guidelines on Sewerage and Drainage at National Level

Central Government agencies have issued various guidelines for various aspects and associated aspects of sewerage and drainage projects. The most important guidance applicable to this project is listed herewith a description of the guidelines presented.

- Central Public Health and Environmental Engineering Organisation (CPHEEO), Ministry of Urban Development (MoUD)
- Manual on Sewerage and Sewage Treatment Systems, 2013
- Manual on Storm Water Drainage Systems, 2019
- Manual on Operation and Maintenance of Water Supply System, 2005
- Manual on Solid Waste Management (applicable to screenings, sludge, grit, and other wastes from premises)
- Manual on Municipal Solid Waste Management 2000
- Manual on Water Supply and Treatment -1999

Guidelines and Advisories

- Guidelines for Decentralized Wastewater Management
- Standard Operating Procedure (SOP) for Cleaning of Sewers and Septic Tanks
- Advisory note on Septage Management in Urban India
- National Policy on Faecal Sludge and Septage Management
- Advisory on Public and Community Toilets
- Advisory on Tariff for Water supply and Sewerage
- Recent Trends in Technologies in Sewerage System.

Central Pollution Control Board

- Guidelines for Management of Sanitary Waste, 2018
- Guidelines on Environmental Management of Construction & Demolition (C & D) Wastes
- Guidelines for management of health care waste as per BMW management Rules,2016

State-Level Regulations

Name of law/policy	Relevant provisions of the Act/ Policy	Relevance for Environmental Management
Karnataka State Water Policy 2022	 Aims to provide water @ 55 lpcd to rural and @ 70 lpcd to urban areas Also aims to provide water for irrigation and harness hydropower Envisages a host of measures such as preservation and recharge of groundwater, coastal management, catchment area treatment, restructuring of Water Resources Department, etc. amongst many The revised policy shifts focus from water supply infrastructure creation to managing resources within available budget Also promotes groundwater management 	Will apply to Project interventions
Karnataka Ground Water (Regulation and Control of Development and Management) Act 2011	 Provides for regulation of groundwater extraction. Prescribes procedures for notification of areas where groundwater development needs to be regulated Mandates special permits from competent authority for groundwater extraction in such notified areas Stipulates procedures for registration of users, denotification, registration of drilling agencies, etc. Mandates groundwater recharge Stresses upon efforts for identifying and rejuvenating groundwater recharge zones, rejuvenation of village 	Will apply to all schemes where the water source is a borewell or a tube-well. In notified areas, borewells can be drilled only after obtaining due permission from competent authority.

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Name of law/policy	Relevant provisions of the Act/ Policy	Relevance for Environmental Management
	 tanks, community-based groundwater recharge, rain water harvesting and other watershed development measures Proposes incentives/concessions to small and medium enterprises for rainwater harvesting, wastewater recycling and zero discharge processes. 	Tank rejuvenation component of the project is in line with this act.
Karnataka Ground Water (Regulation and Control of Development and Management) Rules 2012	 Define procedures for notification or denotification of areas for regulated groundwater access Make registration of users and drilling agencies in notified areas compulsory Define criteria for limiting use of groundwater for commercial purposes 	Drilling of borewells in notified areas would have to be undertaken only by registered drillers
The Karnataka Groundwater (Regulation for Protection of Sources of Drinking Water) Act 1999	 This act regulates the exploitation of groundwater for the protection f the public sources of drinking water. The Act Mandates the following: Permission from competent authority for drilling borewells Provides for declaring water scarcity areas and over-exploited watersheds Prohibition of extraction of water from certain borewells under water scarcity conditions Ordering of borewell closure under certain conditions Empowerment of officials to visit any borewell for obtaining information 	In notified areas, borewells can be drilled only after obtaining due permission from competent authority. The departμεντ will cooperate with officials from competent authority and provide them with all required information in respect of borewells constructed under this project.
The Karnataka Forest Act 1963	 This is a very comprehensive legislation that covers all aspects of forests in the state, including district and local forests. It: Provides guidance on notifying forest lands Defines roles of Government, Local bodies and Community vis-à-vis Forest protection Defines permissible and non-permissible activities Regulates mining and extraction of forest produce Empowers Forest Department Officials to take appropriate action to prevent or stop illegal activities Stipulates penalties for contravention 	Permission from Competent Authority will have to be sought for any project activities in any kind of forests defined in this Act
Karnataka Forest Rules, 1969	These rules are based on the Karnataka Forest Act, 1963 and provide detailed guidance on aspects such as constitution of forests, management of forests (including private forests), removal/felling of trees in forests, preventing/managing forest fires, timber extraction, cattle movement, etc. The rules detail how to manage village forests, district forests, and private forests.	Any infrastructure creation activities on forest land will have to comply with these rules
The Karnataka Preservation of Trees Act 1976 (as amended in 2016)	 Moots establishment of Karnataka Tree Authority Provides guidance on tree felling from obtaining permission to disposing tree waste and associated penalties It regulates the planting or cultivation of trees in such areas of such species which are detrimental to environment 	Relevant permissions and compliance to rules are mandatory for any activity requiring felling of trees in the project
Karnataka State Policy on Integrated Waste Management	 Envisions a solid waste management regime in the state that is effective and sustainable 	All waste management activities in the project should be in alignment with this policy

Name of law/policy	Relevant provisions of the Act/ Policy	Relevance for Environmental Management
The Karnataka	 Sets the backdrop for formulation of Solid Waste Management Rules, roles of local bodies, and tasks to be undertaken Also sets the normative standards and procedure for collection, storage and transportation of municipal solid waste. Moots establishment of Village Water and Sanitation 	Will apply to solid wastes
Panchayat Raj (Management of Solid Waste) Model Bye-laws 2020	 Moots establishment of vinige water and sumation Committees and prescribes procedures for their functioning Describes manner in which solid wastes are to be segregated, collected, transported and disposed safely 	generated as a consequence of the number of workers deployed at the project sites
Karnataka Ancient and Historical Monuments and Archaeological Sites and Remains Act 1961	 Gives Government the power to declare any monument as a protected monument Defines procedures and modalities for protection of the monuments and penalties for non-compliance Restricts access to protected monuments 	Will apply to any project situation where excavation, construction or any other development activity is to take place within the protected area or buffer zone of a protected monument
Karnataka Ancient and Historical Monuments and Archaeological Sites and Remains Rules 1965	 Amongst other things, these rules mandate that prior permission should be applied for at least three (3) months before planned start date of any construction activity in a protected monument area. No construction/development activity should start unless permission is granted by Competent Authority 	Will apply to any project situation where excavation, construction or any other development activity is to take place within the protected area or buffer zone of a protected monument
Bangalore Water Supply and Sewerage (Registration of Agencies for cleaning of manholes and STPs) Regulations 2021	It lays down the condition for every owner or manager of private drainage system to undertake the cleaning of the manhole and sewage treatment plants in his premises in every quarter, through registered cleaning agency.	It will apply to the drainage/ sewerage system falling under the jurisdiction of the project premises.
The Bangalore Water Supply & Sewerage Act & Regulation 1964	An Act to make provision for water supply, sewerage and sewage disposal in Bangalore Metropolitan area and for matters connected therewith. It provides for the maintenance of water supply and sewerage system in Bangalore. It also sets condition for formation of the respective board.	Applicable
Karnataka Tank Conservation & Development Authority Act – 2014 and Karnataka Tank Conservation & Development Authority and certain other Law	 This act aims: to protect, conserve, reclaim, regenerate and restore lakes to facilitate recharge of depleting ground water. to prepare a plan for integrated development of lakes and to improve and also to create habitat of wetland for aquatic biodiversity, water birds and aquatic plants controlling pollution of lakes from sewage and other industrial effluents. to encourage participation of communities and voluntary agencies for conservation, preservation and protection of lakes. 	It will apply to all the lakes in the Karnataka State located within the limits of all Municipal Corporations and BBMP area or any other water bodies or lakes notified by the Government from time to time.

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Name of law/policy	Relevant provisions of the Act/ Policy	Relevance Environmental Management	for
(Amendment) Act - 2018			

Annexure 3: Environmental and Social System Assessment- Checklist

S no.	Questionnaire	
1.	Any relevant E&S laws, regulations and procedures (SOP,	Copy of such laws, regulations, SOP,
	guidelines, policies, notifications, etc.) that are applicable to	guidelines, policies, notifications,
	the Program activities and associated impacts and risks24?	etc.
2.	Do Implementing Agencies (IAs) conduct screening and	Sample screening and assessment
	assessments to help identify and evaluate E&S impacts in their	report/DPR with E&S section, if any.
	projects? For instance, are E&S screening and assessment	
	process embedded in- DBO Contracts for STPs or carried out	
	during DPR preparation for lake rejuvenation?	
	Are strategic, technical, and site-selection alternatives	
	considered to avoid or minimize E&S risks and impacts?	
	Do such screening/assessments culminate to E&S	Sample ESMP, if available.
	management plans to guide effective implementation of the	
	projects? Do they have clear targets and clear assignment of	
	responsibilities for implementation and for	
	monitoring/oversight?	
3.	Current institutional arrangement of IAs	Organogram
	Do IAs allocate human and financial resources or reliable	
	alternatives (e.g. use of qualified consulting services) to	
	implement environmental and/or social management	
	procedures or plans?	
4.	What mechanisms do IAs use to ensure that stakeholders are	
	identified and that their views, concerns, and suggestions are	
11	Systematically considered?	
4.1.	Does IA consult with stakeholders and community	
	members on various aspects of Program design and	
	operation? If yes, when are these consultations carried	
	out?	
	- Do consultations include a representative cross-section of	
	arouns affected by the Program (including women	
	ST/SC/OBC BPL or other groups that might be	
	underrenresented)?	
	- What other mechanisms have been adopted to seek	
	feedback from key stakeholders?	
	- Does IA disclose information about the program design	
	and operation in public domain? If ves. where and how is	
	the information disclosed.	
	- What steps were undertaken during the previous water	
	tariff adjustments to garner public/users' support?	
4.2.	Grievance redressal Mechanism in IAs	Manual/SOPs on GRM (if available)
	- Uptake Channels: How are grievances received?	, , ,

²⁴ e.g., land and livelihood impact, workers' health and safety, community health and safety, public participation, inclusion, etc.
	- Are there established routines and standards for	Current staff capacity to manage
	 Processing Systems: How are grievances categorized, 	GRIM
	logged and prioritized? Who are they referred to? How are	GRM records for last one year (no.
	they addressed? - Acknowledgement and Follow-up: Are complainants	of complaints received and closed, type of complaints, response time.
	provided receipt, how are they provided progress	no. of cases escalated)
	updates?	
	 Timeframes and Service Standards: Standard timelines for resolution and timeframes for acknowledgement? 	Impact Assessment Reports (if any)
	- Appeal: How are grievances escalated to higher levels?	
	- Communication Initiatives: How are stakeholders and	
	community informed about the mechanism?	
	 Does the system include mechanisms for independent oversight and monitoring where appropriate? 	
4.3.	Awareness building	Sample annual plan/calendar, if any
	- Are IEC and BCC activities carried out by IA?	
	- If yes, what topics are covered?	Implementation report, if any
	- Who are the target audience? Any specific IEC and BCC activities undertaken with	Third Party Evaluation Report to
	vulnerable groups (women, ST/SC/OBC, BPL, or other	monitor effectiveness of IEC
	groups that might be underrepresented)?	activities, if any
	- Is there an annual plan or calendar prepared for such	
	activities? - Is hudget allocated for such activities?	
	 Who prepares the material/content and carries out these 	
	activities within the IA (staff, consulting firm, etc.)?	
	- Are these activities monitored? By whom and how?	
5.	Labor Management - What is the quantum of labor involved in construction of	Contract/Bid document
	STP, SWD and lake rejuvenation works.	Gender disaggregated data of the
	- How is labor at site monitored? What is the reporting	workforce in IA.
	requirement and what are the parameters?	UD Delieu if enu of 14
	and facility operators to operate equipment and facilities	HR Policy, IJ uliy OJ IA
	in a manner that protects individuals and communities?	Sexual Harassment at the
	- Does the IA have specific laws or regulations to avoid the	Workplace Policy and Notification
	use of child and forced labor in the implementation of Program activities?	of Internal Complaints Committee in
	What are the contract elevene currently with respect to	
	- what are the contract clauses currently with respect to	
	aspects such as occupational, health and safety, labour conditions and welfare?	Reservation policy or notification
	 What are the contract clauses currently with respect to aspects such as occupational, health and safety, labour conditions and welfare? What are the prevalent OHS issues faced during 	Reservation policy or notification
	 What are the contract clauses currently with respect to aspects such as occupational, health and safety, labour conditions and welfare? What are the prevalent OHS issues faced during construction and O&M? How are these OHS issues addressed and exercise and the set of the	Reservation policy or notification
	 What are the contract clauses currently with respect to aspects such as occupational, health and safety, labour conditions and welfare? What are the prevalent OHS issues faced during construction and O&M? How are these OHS issues addressed and monitored on site? What are the prevalent Community Health & Safety (CHS) 	Reservation policy or notification
	 What are the contract clauses currently with respect to aspects such as occupational, health and safety, labour conditions and welfare? What are the prevalent OHS issues faced during construction and O&M? How are these OHS issues addressed and monitored on site? What are the prevalent Community Health & Safety (CHS) issues faced during construction and O&M? How are these 	Reservation policy or notification
	 What are the contract clauses currently with respect to aspects such as occupational, health and safety, labour conditions and welfare? What are the prevalent OHS issues faced during construction and O&M? How are these OHS issues addressed and monitored on site? What are the prevalent Community Health & Safety (CHS) issues faced during construction and O&M? How are these CHS issues addressed and monitored on site? 	Reservation policy or notification
	 What are the contract clauses currently with respect to aspects such as occupational, health and safety, labour conditions and welfare? What are the prevalent OHS issues faced during construction and O&M? How are these OHS issues addressed and monitored on site? What are the prevalent Community Health & Safety (CHS) issues faced during construction and O&M? How are these CHS issues addressed and monitored on site? How are construction-related grievances addressed? 	Reservation policy or notification
	 What are the contract clauses currently with respect to aspects such as occupational, health and safety, labour conditions and welfare? What are the prevalent OHS issues faced during construction and O&M? How are these OHS issues addressed and monitored on site? What are the prevalent Community Health & Safety (CHS) issues faced during construction and O&M? How are these CHS issues addressed and monitored on site? How are construction-related grievances addressed? 	Reservation policy or notification
	 What are the contract clauses currently with respect to aspects such as occupational, health and safety, labour conditions and welfare? What are the prevalent OHS issues faced during construction and O&M? How are these OHS issues addressed and monitored on site? What are the prevalent Community Health & Safety (CHS) issues faced during construction and O&M? How are these CHS issues addressed and monitored on site? How are construction-related grievances addressed? Social Inclusion Representation of women. ST, SC, BPL, Persons with 	Reservation policy or notification
	 What are the contract clauses currently with respect to aspects such as occupational, health and safety, labour conditions and welfare? What are the prevalent OHS issues faced during construction and O&M? How are these OHS issues addressed and monitored on site? What are the prevalent Community Health & Safety (CHS) issues faced during construction and O&M? How are these CHS issues addressed and monitored on site? How are construction-related grievances addressed? Social Inclusion Representation of women. ST, SC, BPL, Persons with Disabilities in staffing within the IA at all administrative lavel 	Reservation policy or notification

	· · · · ·	
	Sexual Exploitation and Abuse/ Sexual Harassment (SEA/SH) prevention	
	 Presence of sexual harassment prevention measures (e.g., Internal Complaints Committee) within the IA as per the Sexual Harassment Act? 	
6.	 Land and Livelihood Impacts What is the quantum of land likely to be required for construction of STPs? What is the current RoW required for laying of SWD. Any additional land required for lake rejuvenation and sluice gates? What is the current process of identification and procurement of land (government, private acquisition, direct purchase) for STPs, SWDs and lake rejuvenation? Share notifications, if any. Does the system adequately protect individuals and communities against "forced evictions"? If yes, provide details. What steps are taken for identification and mitigation of all significant impacts affecting informal occupiers of land (street vendors, encroachers, squatters, etc.)? Are there any measures or steps adopted for livelihood restoration? Are affected persons consulted during land procurement and eviction addressed? 	Copy of any law, regulation, government policy, and/or notification on land procurement process (government land transfer, land purchase, donation, acquisition, etc.). Copy of the notice revenue department issues to encroachers.
7.	(National Policies, such as related to EIA, etc., or the national norms such as CPHEEO guidelines and codes are already known)	
8.	What are needed: of: (i) State Policies and Guidelines or Directives, (ii) additional guidance or directions from High Court, Supreme Court, or NGT – with respect to environmental and social issues (such as protection/ conservation/ improvement of water quality, conservation of lakes, protection of forests, national parks, etc.)	
9.	BBMP's own:	
	Policies and norms for environment management (such as lake conservation, decarbonization, etc.)	
	Policies and norms for managing social issues (such as for disruption during construction)	
	Policies and norms for occupational safety of workers (employees, contractors) and for preventing third-party accidents, incidents and injuries	
10.	Lake Conservation / Restoration Plan and Programs	
	Traffic Management during construction of storm water drains	
	Water Quality and Sludge/Sediment Monitoring Plan	

Annexure 4: Conceptual Water Quality Monitoring Network and Plan

A conceptual water quality monitoring network has been developed for across Bangalore under the Karnataka Water Security and Resilience Program (KWSRP), focusing exclusively on the water quality of raw sewage and treated sewage at Sewage Treatment Plants (STPs), stormwater drains (SWDs), and lakes.

1. Objectives of the Water Quality Monitoring Network under KWSRP

The water quality monitoring network's primary goal is to:

- Improve water quality by monitoring raw and treated sewage at STP inlets and outlets, inlet and outlet points of lakes, and integrated SWDs, ensuring compliance with regulatory standards and suitability for reuse and environmental discharge.
- Enhance flood resilience and groundwater recharge by maintaining and monitoring water quality in key water bodies (lakes and reservoirs) that contribute to stormwater management and retention.
- **Support integrated water resource management** by coordinating efforts between BWSSB and BBMP to monitor water quality at multiple critical points across the Bangalore city.

2. Key Components of the Monitoring Network

- Self-Monitoring by STPs and Mobile Vans for Lakes and SWDs:
 - In-House Labs at STPs:
 - 1. **Frequency:** Daily monitoring at raw sewage inlets, treated sewage outlets, and additional intermediary stages if required.
 - 2. **Parameters:** Basic water quality parameters including pH, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Suspended Solids (TSS), Dissolved Oxygen (DO), nitrates, phosphates, and E. coli.
 - 3. **Objective:** To ensure continuous compliance with discharge standards and track the effectiveness of sewage treatment processes.
 - \circ $\,$ Mobile Vans for Lakes, SWDs, and Climate-Resilient Balancing Reservoirs:
 - 1. **Frequency:** Daily/weekly sampling at critical water bodies, including lakes and stormwater drains receiving treated or raw sewage inflows.
 - 2. **Parameters:** BOD, COD, DO, microbial load (E. coli), nutrient levels (nitrates and phosphates), and other indicators of water quality that affect ecosystem health and flood resilience.
 - 3. **Objective:** Assess the impact of treated sewage discharges and untreated inflows, if any, on natural water bodies, particularly in flood-prone areas.
- Independent Third-Party Monitoring (through NABL Accredited Laboratories):
 - **Frequency:** Monthly for STPs and quarterly for lakes and SWDs.
 - **Scope:** Third-party agencies (NABL Accredited Laboratories) will monitor water quality at STP inlets and outlets, and at lakes and stormwater channels.
 - **Parameters:** Comprehensive analysis of water quality, with a focus on confirming self-monitoring results for BOD, COD, DO, TSS, E. coli, and nutrient levels.
 - **Objective:** To provide independent validation of treatment efficacy, support compliance, and inform KWSRP on long-term trends in water quality across the city's water bodies.

• Surprise Sampling by KWSRP Environmental Monitoring Group:

- **Frequency:** Unscheduled, random inspections of selected STPs, lakes, and SWDs.
- **Role:** To ensure adherence to monitoring protocols, confirm data accuracy, and identify any gaps in compliance or operational practices.
- **Data Quality Assurance:** Independent samples to cross-check in-house and third-party data, ensuring rigorous monitoring and immediate corrective action where discrepancies are found.

3. Proposed Network Structure for Water Quality Management

A. STP-Based Monitoring Nodes:

- **Purpose:** To continuously monitor the quality of raw sewage inflow and treated sewage outflow, ensuring compliance with regulatory standards and reducing pollution loads to receiving water bodies.
- **Technology:** In-house lab setups at each STP for daily sampling and testing, with data integrated into BWSSB's centralized monitoring system.
- **Outcome:** Consistent treatment quality and early detection of any deviations from water quality standards.

B. Integrated Lake and SWD Monitoring Nodes:

- **Purpose:** To monitor the quality of treated and untreated discharges entering lakes and SWDs, assessing their impact on water bodies that are essential for flood management, groundwater recharge, and ecological health.
- **Coverage:** Lakes and SWDs receiving treated sewage and areas prone to flooding, which play a critical role in climate resilience.
- **Technology:** Mobile labs and water quality sensors at strategic locations such as major lakes, providing realtime data on water quality across priority sites.

C. Climate-Resilient Balancing Reservoirs:

- **Purpose:** To monitor water quality in balancing reservoirs that dynamically manage stormwater, helping assess their suitability for groundwater recharge and recreation.
- Coverage: Reservoirs identified based on flooding risks and contribution to stormwater retention.
- Monitoring Strategy: Regular sampling to ensure that water quality remains within acceptable standards for recharge and ecosystem health.

D. Lake and SWD Monitoring Nodes:

- **Purpose:** To monitor water quality of lakes located outside BBMP area, to check soil and groundwater contamination.
- **Coverage:** Lakes proposed for rejuvenation, outside BBMP area.
- **Monitoring Strategy:** Regular sampling to ensure that water quality remains within acceptable standards for recharge and irrigation purpose.

4. Data Management and Reporting System

- Centralized Database and Reporting:
 - All data from STPs, lakes, SWDs, and reservoirs will be uploaded to a central platform managed by BWSSB and BBMP, providing real-time monitoring and monthly/quarterly reporting capabilities.
 - **KWSRP Integration:** The central database will support KWSRP's objective of improving water quality infrastructure, with accessible reporting and trend analysis.
 - Early Warning and Quality Compliance Alerts:
 - Automated alerts for non-compliance with water quality standards at STPs and discharge points to trigger prompt corrective action.
 - **Flood Resilience Support:** Water level and quality alerts at reservoirs and SWDs, enabling disaster management teams to make informed decisions during high-rainfall events.
- Stakeholder Transparency:
 - Public dashboards to provide regular updates on water quality at STPs, lakes, and SWDs, promoting public engagement and awareness about water security and quality.

5. Roles and Responsibilities Under KWSRP

- BWSSB (Bangalore Water Supply and Sewerage Board):
 - Manage STP operations, monitor quality at raw sewage inlets and treated sewage outlets, and ensure data integration with the centralized reporting system.
 - BBMP (Bruhat Bengaluru Mahanagara Palike):
 - Oversee water quality monitoring in lakes and SWDs, especially where they interact with treated sewage discharge points, and coordinate with BWSSB on integrated stormwater and lake management.
 - MID (Minor Irrigation Department):
 - Oversee water quality monitoring in lakes and rejuvenation of lakes outside BBMP area.
 - Independent Third-Party Agencies (NABL Accredited Laboratories):
 - Conduct monthly/quarterly monitoring at STPs, lakes, and SWDs, focusing on confirming water quality compliance and providing unbiased data for KWSRP reporting.
 - KWSRP Environmental Monitoring Group:
 - Conduct surprise inspections to verify adherence to monitoring standards, ensuring high data quality and accountability in water management practices.

6. Reporting Frequency and Responsibilities

S. No.	Monitoring Type	Frequency	Responsible Entity
1	Self-Monitoring (STP In-House)	Daily	BWSSB STP Operators

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2	Self-Monitoring (Mobile Vans)	Daily	Mobile Lab Teams under BBMP
3	Third-Party Monitoring	Monthly/Quarterly	BWSSB, BBMP and MID through Independent Monitoring Agencies (NABL Accredited Laboratories)
4	Surprise Monitoring	Random	KWSRP Environmental Monitoring Group

Annexure 5: Details of State Level Stakeholder Workshop

Karnataka Water Security and Resilience Program

Minutes of the Stakeholder Consultation Workshop on Environmental and Social Systems Assessment

(ESSA)

Date: 20th December 2024

Time: 10:00 AM- 2:00 PM

Purpose of the Consultation: The purpose of the consultation workshop was to share the key findings and recommendations of the Environment and Social Systems Assessment (ESSA) undertaken by the World Bank and to solicit suggestions from various stakeholders.

Participants: The participants included representation from the Revenue Department, KSDMA, KSDMC, BBMP, BWSSB, Minor Irrigation Department, Bengaluru Solid Waste Management Limited, India Meteorological Department, Central Ground Water Board, Geological Survey of India, consulting firms, contractors, civil society organisations, residential associations, various research institutes and academia. The list of participants is included at the end.

The World Bank (WB) team included – Mr. Kristoffer Welsien (Task Team Leader - TTL), Mr. Mariappa Kullappa (Senior Water Supply and Sanitation Specialist), Ms. Neha Vyas (Senior Environmental Specialist), Mr. G. Srihari (Senior Social Development Specialist), Ms. Philarisa Sarma Nongpiur (Social Development Specialist, Consultant), Mr. Atul Kansal (Environmental Specialist, Consultant) and Kumar Sivaramakrishnan (Program Assistant).

Summary of Discussions:

Introduction

- The meeting began with Mr. Mariappa Kullappa, World Bank welcoming the participants and providing a brief overview on the program's objective, components and the purpose of the consultation workshop. The World Bank's obligation on consulting and involving the stakeholder was highlighted.
- Ms. V. Rashmi Mahesh, Principal Secretary to Government, Revenue Department provided opening remarks highlighting the time and efforts put in by various agencies in preparation of the program and the need for the program in the state of Karnataka, particularly in Bengaluru— which is grappling with the issue of climate change resulting in extreme weather conditions, impacting the economy and welfare of the people.

Presentation on Government Program

Mr. Tushar Giri Nath, Chief Commissioner, BBMP, Dr V. Ram Prasanth Manohar, Chairman, BWSSB, Mr. Raghavan, Secretary to Government, Minor Irrigation Department, Mr. Nitesh Patil, Commissioner, KSDMA, Mr. Bhoyar Harshal Narayanrao, Director, KSNDMC provided insight on the mandate of their respective institutions and several government programs that are currently being implemented. They emphasized on the need to enhance key infrastructure and services in Bengaluru—water, sanitation, drainage— that have not kept pace with Bengaluru's rapid expansion and has exacerbated water stress. GoK officials listed measures being taken as well as challenges in this regard. These included:

- Construction, rehabilitation and fortification of 859.90 kms of storm water drain network with retaining walls.
- Based on the sanitation requirements (i) 10,356 kms of sewers in the core and 8 ULB areas (ii) 1,538 km in 110 villages have been laid with house service connection to collect and convey the sewage to treatment plants.

- On completion & commissioning of ongoing WTPs, the total capacity of WTPs capacity will be increased to 1858.5 MLD (about 24 TMC)
- Implementation of V Valley including K.C. Valley/ H.N. Valley/ Anekal taluk Tank Filling projects to augment ground water in Kolar, Chikkaballapura, Bengaluru Urban and Rural Districts.
- Establishment of a robust disaster risk financing strategy for Karnataka, including setting up of KSNDMC as a Centre of Excellence (CoE) for extreme climates and establishing Karnataka Climate and Multi-Hazard Risk Information System (KCHRIS).

Lastly, they highlighted that the initiatives that are being proposed by the Karnataka government under the World Bank funded Karnataka Water Security and Resilience Program is pivotal for tackling floods, droughts, and other climate-related challenges.

Presentation on ESSA

- Mr. Kristoffer Welsien provided a brief overview of the World Bank funded Karnataka Water Security and Resilience Program which covered the program's objective, loan amount and disbursement mechanism, timeline for implementation, results areas and proposed activities under the program.
- Ms. Neha Vyas, World Bank initiated the presentation highlighting the World Bank's commitment on environmental and social risk management in PforR programs, the core principles and the approach. She further explained the process and key aspects of the assessment. The key findings of the Environmental Systems Assessment and recommendations were explained in detail which included – exclusion of activities with adverse impacts, key risks, gap areas and recommendations.
- Mr. G. Srihari, World Bank presented the key findings of the Social Systems Assessment, detailing the key risks, gaps and recommendations. The recommendations for the Program Action Plan (PAP) were explained in detail followed by the implementation support to be provided by the World Bank.

Discussion

Followed by the presentations from the government and world bank officials, the forum was opened for the discussions.

- Participants raised concerns about whether the infrastructures (STPs) proposed for treatment of wastewater is sufficient to cater to the increasing flow of water entering the city or extracted from within the city (rain, Cauvery River water and groundwater). BWSSB stated that in addition to the program initiatives, there are regulations mandating that residential apartments over specified areas install decentralized sewage treatment plants (DSTPs) and re-use the treated water within the fence. These need to be stringently monitored by the Karnataka Pollution Control Board.
- Participants spoke of challenges related to meeting program implementation timelines. They
 highlighted the need for micro-planning that will have an impact on the program such as land
 acquisition and training of the contractors as extended arm of the agencies to address residents'
 concerns and ensuring workers' health and safety. The Bank and the implementing agencies
 acknowledged that while the guidelines are in place for unsafe working conditions, civil work
 contractors do not abide by the requirements. They reassured that these issues would be
 considered under the program and that robust mechanisms would be put in place to build capacity
 and monitor the implementation of program activities.
- The participants also highlighted the need for redefining the standards for lake water quality and continuously engaging with community members to manage their expectations and to mitigate their concerns.
- Another participant stated the need for online monitoring system for monitoring the treated water for residual contaminants and pollutants— before filling the lakes for recharging. While the

program is centered around domestic sewage, similar initiatives are needed for industrial sewage for integrated approach.

- One of the participants also stated the need to treat other wastes such as Fat oil and grease (FOG) which results in jamming of sewer lines.
- Participants reiterated the need for engaging with residential associations and civil society organisations, including coordinating with key stakeholders such as the Karnataka Pollution Control Board and the regulatory authority under the Karnataka Tank Conservation and Development Authority Act— throughout the program implementation. The Bank responded stakeholder engagement is vital to this program, thus DLI 4 focusses on ensuring that at the ward and zonal level there are monthly coordination meetings and quarterly meetings with communities, so that the planning and execution is socially inclusive and informed.
- In response to why a separate monitoring system has been proposed under the program, the Bank stated that while KSPCB will continue to be the regulator, an environmental monitoring group has been proposed to specifically guide and oversee environmental activities proposed under the Program.
- Further, a participant highlighted the need to monitor certain parameters like presence of cadmium, lead, arsenic, which is very high in Karnataka water. Participants also expressed that water quality monitoring on real-time basis is a big challenge, and that sensors cost a lot and their maintenance is high. Implementing agencies and the Bank responded that a series of technical workshops will be undertaken on water quality monitoring, nature-based solutions (NBS), lake rejuvenation, etc. to understand the key challenges and address these gaps through knowledge sharing.

Conclusion

The meeting was concluded by Mr. Kullappa by thanking the participants and once again emphasizing the World Bank's obligation of consulting with the stakeholders, and that there will be continued engagement with the participants throughout the program cycle.

Timing	Session Description	Speaker
09.45 to 10.30 am	Registration	
10.30 to 10.35 am	Opening Remarks	Principal Secretary, Revenue
		Department
10.50 to 11.00 am	Brief Overview	Chief Commissioner, BBMP
		Chairperson, BWSSB
		Commissioner, KSDMA
		Director, KSNDMC
		Secretary, Minor Irrigation Department
11.00 to 11.15 am	ESSA: Overview and Process	World Bank
11.15 to 11.30 am	ESSA: Finding & Recommendation-	Environment Specialist, World Bank
	Environment	
11.30 to 11.45 am	ESSA: Finding & Recommendation- Social	Social Development Specialist, World
		Bank
11.45 to 12.45 pm	Discussions	Moderated by World Bank
12.45 to 1.00 pm	Closing Remarks	Revenue Department (DM)

Agenda of the Workshop