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Report No: PCBASIC0171216

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT
ON A
PROPOSED LOAN

IN THE AMOUNT OF US$381 MILLION

AND A PROPOSED GUARANTEE

IN THE AMOUNT OF UP TO US$19 MILLION

TO

INDIA

FOR A

SECOND NATIONAL GANGA RIVER BASIN PROJECT

June 1, 2020

Water Global Practice
South Asia Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective April 2, 2020)

Currency Unit =	Indian Rupee (INR)
INR76.2 =	US$1
US$ 0.0131 =	INR 1

FISCAL YEAR
April 1 – March 31

Regional Vice President:	Hartwig Schafer
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ABBREVIATIONS AND ACRONYMS

AMRUT	Atal Mission for Rejuvenation and Urban Transformation	KMDA	Kolkata Metropolitan Development Authority
BOD	Biochemical Oxygen Demand	MLD	Million Liters per Day
BUIDCO	Bihar Urban Infrastructure Development Corporation	MoA	Memorandum of Agreement
CAPEX	Capital Expenditure	MoEF&CC	Ministry of Environment, Forest and Climate Change
CERC	Contingent Emergency Response Component	MoJS	Ministry of Jal Shakti
COVID-19	Coronavirus disease 2019	NGRBA	National Ganga River Basin Authority
CPCB	Central Pollution Control Board	NGRBP	National Ganga River Basin Project
CPS	Country Partnership Strategy	NMCG	National Mission for Clean Ganga
CWC	Central Water Commission	NPV	Net Present Value
DBOT	Design Build Operate Transfer	NUSP	National Urban Sanitation Policy
DEA	Department of Economic Affairs	O&M	Operations and Maintenance
DO	Dissolved Oxygen	OPEX	Operational Expenditures
DoWR, RD & GR	Department of Water Resources, River Development and Ganga Rejuvenation	PDO	Project Development Objective
DPR	Detailed Project Report	PPP	Public Private Partnership
EA	Executing Agency	PPSD	Project Procurement Strategy for Development
ESDDR	Environment and Social Due Diligence Report	RPF	Resettlement Policy Framework
ESIA	Environmental and Social Impact Assessment	SAWI	South Asia Water Initiative
ESMF	Environment and Social Management Framework	SMCG	State Mission for Clean Ganga
FY	Financial Year	SNGRBP	Second National Ganga River Basin Project
GAP	Ganga Action Plan	SPV	Special Purpose Vehicle
GDF	Gender Development Framework	STP	Sewage Treatment Plant
GDP	Gross Domestic Product	TA	Technical Assistance
GHG	Green House Gas	ULB	Urban Local Bodies
GKC	Ganga Knowledge Centre	UP	Uttar Pradesh
GoI	Government of India	WRIS	Water Resources Information System
GRM	Grievance Redress Mechanism		
HAM	Hybrid Annuity Model		
I&D	Interception and Diversion		
IBRD	International Bank for Reconstruction and Development		
IDA	International Development Association		
IUFR	Interim Unaudited Financial Report		
JUIDCO	Jharkhand Urban Infrastructure Development Corporation		

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DATASHEET

BASIC INFORMATION

Country(ies)	Project Name	
India	Second National Ganga River Basin Project	
Project ID	**Financing Instrument**	**Environmental Assessment Category**
P169111	Investment Project Financing	A-Full Assessment

Financing & Implementation Modalities

[ ] Multiphase Programmatic Approach (MPA)	[✓] Contingent Emergency Response Component (CERC)
[ ] Series of Projects (SOP)	[ ] Fragile State(s)
[ ] Performance-Based Conditions (PBCs)	[ ] Small State(s)
[ ] Financial Intermediaries (FI)	[ ] Fragile within a non-fragile Country
[✓] Project-Based Guarantee	[ ] Conflict
[ ] Deferred Drawdown	[ ] Responding to Natural or Man-made Disaster
[ ] Alternate Procurement Arrangements (APA)	

Expected Approval Date	Expected Closing Date	Expected Guarantee Expiration Date
25-Jun-2020	31-Dec-2026	30-Jun-2038

Bank/IFC Collaboration

No

Proposed Development Objective(s)

The objective of the Project is to reduce point-source pollution from targeted Urban Areas of the Ganga river basin and support the Central Ministry to strengthen the institutional framework for Ganga river basin management.

Components

Component Name	Cost (US$, millions)

Institutional Development	30.00
Infrastructure Development	1,045.00
IBRD Guarantee	19.00
Program Communications and Management	24.00
Contingent Emergency Response Component	0.00

Organizations

Borrower:	India
Implementing Agency:	National Mission for Clean Ganga, Ministry of Jal Shakti

PROJECT FINANCING DATA (US$, Millions)

SUMMARY

Total Project Cost	1,118.95
Total Financing	1,118.95
of which IBRD/IDA	381.00
Financing Gap	0.00

DETAILS

Private Sector Investors/Shareholders

Equity	Amount	Debt	Amount
Government Contribution	1,099.95		
Government Resources	718.95		
IBRD	381.00		
Total	**1,099.95**		**0.00**

Payment/Security Guarantee

Financed by Commercial Loans/LC and with IBRD Guarantee	19.00
Total	**19.00**

Expected Disbursements (in US$, Millions)

WB Fiscal Year	2020	2021	2022	2023	2024	2025	2026	2027
Annual	0.00	15.00	35.00	50.00	60.00	90.00	90.00	41.00
Cumulative	0.00	15.00	50.00	100.00	160.00	250.00	340.00	381.00

INSTITUTIONAL DATA

Practice Area (Lead)

Water

Contributing Practice Areas

Climate Change and Disaster Screening

This operation has been screened for short and long-term climate change and disaster risks

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	Substantial
2. Macroeconomic	Moderate
3. Sector Strategies and Policies	Substantial
4. Technical Design of Project or Program	Substantial
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Moderate
7. Environment and Social	Substantial
8. Stakeholders	Substantial
9. Other	
10. Overall	Substantial

COMPLIANCE

Policy

Does the project depart from the CPF in content or in other significant respects?

[ ] Yes [✓] No

Does the project require any waivers of Bank policies?

[ ] Yes [✓] No

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	✓	
Performance Standards for Private Sector Activities OP/BP 4.03		✓
Natural Habitats OP/BP 4.04	✓	
Forests OP/BP 4.36		✓
Pest Management OP 4.09		✓
Physical Cultural Resources OP/BP 4.11	✓	
Indigenous Peoples OP/BP 4.10		✓
Involuntary Resettlement OP/BP 4.12	✓	
Safety of Dams OP/BP 4.37		✓
Projects on International Waterways OP/BP 7.50	✓	
Projects in Disputed Areas OP/BP 7.60		✓

Legal Covenants

Sections and Description

Institutional Arrangements:
The Borrower shall maintain the NMCG and the SMCGs with staff and resources adequate to implement the Project. (LA, Schedule 2, Section I.B.1)

Sections and Description

The Borrower shall, no later than six (6) months after the Effective Date, cause NMCG to recruit, on the basis of terms of reference, qualifications and experience satisfactory to the Bank: a Project Management Consultant, a financial management specialist, a procurement specialist, internal auditors in adequate numbers for the audit of NMCG, each SMCG and each EA participating in the implementation of the Project and for each priority investment under Part 2 of the Project under a HAM PPP approach, a transaction advisor and a Project engineer. (LA, Schedule

2, Section I.B.3)

Sections and Description

The Borrower shall, in carrying out the Project, implement the requirements related to Environmental and Social Safeguards as set forth in Section I.C of the Schedule 2 of the Loan Agreement, which includes compliance with Safeguard Instruments and minimum involuntary resettlement, Bank's agreement prior to modification or waiver of Safeguard Instruments, safeguard obligations reflected in bidding documents and contracts with contractors, supervising entity and supervisors, reporting, selection of priority investments, TA, cultural heritage and grievance redress mechanism. (LA, Schedule 2, Section I.C)

Sections and Description

The Borrower, through NMCG, shall, no later than one (1) month after the Effective Date and no later than January 15 of each year, beginning in 2021, prepare, with inputs from the SMCGs, and furnish to the Bank for review and comment a draft Annual Action Plan and Budget consistent with Section II.B of Schedule 2 of the Loan Agreement, and, no later than two (2) months after the Effective Date and no later than February 15 in each year beginning in 2021, by taking into account the Bank's comments, finalize and furnish to the Bank the Annual Action Plan and Budget, acceptable to the Bank. (LA, Schedule 2, Section II.B)

Conditions

Type	Description
Disbursement	Performance-based priority investments: The Borrower shall, through NMCG, no later than twelve (12) months after the Effective Date update the Namami Gange Program Framework (Project Operations Manual) to define the performance-based eligibility criteria for the selection of priority investments under Part 2.4 of the Project, drawing on the results of the activities performed under Part 1.3 of the Project. (LA, Schedule 2, Section III.B1(b) and Section I.E.1(b)(ii)).
Type	Description
Disbursement	Contingency Emergency Response (CERC): The Borrower shall undertake no activities under the Contingency Emergency Response Component of the Project or withdraw funds funds allocated to Category (3) (Contingency Emergency Response) unless and until the conditions set forth in Section I.D.2 of Schedule 2 of the Loan Agreement have been met in respect of said activities, including eligible crisis or emergency declared and agreed; Environmental and social instruments prepared and disclosed; CERC manual adopted; and implementation arrangements established. (LA, Schedule 2, Section III.B.1(c) and Section I.D.2)

I. STRATEGIC CONTEXT

A. Country Context

1. India's Gross Domestic Product (GDP) growth has slowed in the past three years, and the COVID-19 outbreak is expected to have a significant impact. Growth has moderated from an average of 7.4 percent during FY16-FY19 to an estimated 4.4 percent in FY19/20. The growth deceleration was due mostly to unresolved domestic issues (impaired balance sheets in the banking and corporate sectors), which were compounded by stress in the non-banking segment of the financial sector, and a marked decline in consumption on the back of weak rural income growth. The outbreak of COVID-19 and the public health responses adopted to counter it have significantly altered the growth trajectory of the economy, which is now expected to contract in FY20/21. On the fiscal side, the general government deficit is expected to widen significantly to over 10 percent of GDP in FY20/21, owing to weak activity and revenues as well as high spending needs. However, the current account balance is expected to improve over FY19/20-FY20/21, reflecting mostly a sizeable contraction in imports and a large decline in oil prices. Given this, in spite of recent portfolio capital outflows, India's foreign exchange reserves are expected to remain comfortable (equivalent to over 10 months of imports).

2. Since the 2000s, India has made remarkable progress in reducing absolute poverty. Between FY11/12 and 2015, poverty declined from 21.6 percent to an estimated 13.4 percent at the international poverty line (US$1.90 per person per day in 2011 Purchasing Power Parity (PPP), continuing the earlier trend of rapid poverty reduction. Owing to robust economic growth, more than 90 million people escaped extreme poverty and improved their living standards during this period. Despite this success, poverty remains widespread. In 2015, 176 million Indians were living in extreme poverty, while 659 million—half the population—were below the higher poverty line commonly used for lower middle-income countries (US$3.20 per person per day in 2011). With the recent growth slowdown, the pace of poverty reduction may have moderated.

3. Water security is key to India's economic and human development and public health, especially in the context of infectious disease outbreaks. An estimated 80 percent of the country's surface water is consumed by agriculture and the use of water in agriculture is inefficient. As demand for surface water has outstripped its availability, in recent years India has become the largest global consumer of groundwater, which now meets two-thirds of its irrigation needs and 80 percent of its domestic water needs. In many areas, this has led to unsustainable abstraction of groundwater. Relatively little water is required to meet the country's needs for drinking water and sanitation, but these vital services are often not provided due to the absence of treatment capacity and network infrastructure. About 70 percent of India's urban population and 16 percent of rural households have access to piped water supply; but no city receives continuous water supply. Rainfall is highly variable over space and time; it occurs mainly in intense and unpredictable downpours within a short monsoon season. This variability can lead to floods and droughts which are already major sources of human and economic losses for India. Water quality is a particularly pressing challenge. India ranked 120 among 122 countries on water quality in 2018, with nearly 70 per cent of its water resources contaminated[1]. Nearly 80 percent of sewage generated in urban

[1] NITI Aayog, Government of India. 2018. *Composite Water Management Index*

areas was let out untreated[2], severely impacting public health and the environment. A World Bank study estimated that India loses US$80 billion annually due to environmental degradation, including water pollution, equivalent to 5.7 percent of GDP[3]. The brunt of these losses is borne by children, women and the poor[4].

4. Climate change will exacerbate challenges to India's water security[5]. Temperature in the region is projected to increase by 1 to 3 degrees by 2050[6] which will cause significant changes in rainfall patterns that will impact flows in the Ganga. Studies show that more extreme droughts and floods may occur as a result. Changing rainfall patterns are also expected to increase the nutrient loading in rivers, further impacting water quality[7]. Increased flooding will not only cause direct damage but is also likely to raise water contamination due to a higher volume of untreated wastewater being carried into water bodies, which in turn will increase the risk of exposure for local communities to water-borne pathogens and algal toxins. Increased droughts, heat waves or other water availability shocks will raise the demand for clean and secure water supplies, putting pressure on already exploited freshwater resources. Further, water pollution and lower water flows induced by climate change will negatively impact riverine biodiversity. For example, a study indicates that changes in river flow and depth will adversely affect the distribution and survival of the endangered Gangetic dolphin which depends on echolocation to find its food[8].

B. Sectoral and Institutional Context

5. The need for improving water security is most acute in densely populated river basins like the Ganga. The Ganga basin includes 11 States[9] and covers a quarter of India's landmass. It is home to over 40 percent of India's population (520 million) and two thirds of the country's poor. The Ganga basin is one of the most densely populated areas in the world with an average population density of 520 persons per square kilometer. It provides over one third of India's surface water[10] and includes the country's largest irrigated area. Over 40 percent of India's GDP is generated in the basin. In addition to being a critical economic resource, the Ganga carries immense religious significance in India. The river is worshipped as a living goddess by Hindus who comprise about 80 percent of India's population. Many of Hinduism's most important pilgrimage sites are located along the Ganga. This includes sites of the *Kumbh Mela* festival

[2] Source: Census 2011
[3] World Bank. 2014. Greening India's Growth: Costs, Valuations and Trade-offs.
[4] It is estimated that 1.5 million children under 5 years die each year due to water and sanitation related diseases in India. 200 million person-days of work are lost each year; the time burden is largely borne by women who are often responsible for looking after sick family members. Inadequate sanitation also differentially impacts the poor who are more likely to be unserved by sanitary infrastructure and services.
[5] Khan S *et al*. 2018. Flows and sediment dynamics in the Ganga River under present and future climate scenarios
[6] 1°C to 2°C under the climate-sensitive scenario and 1.5°C to 3°C under the carbon-intensive scenario. Mani M *et al.* 2018.
[7] South Asia's Hotspots: The Impact of Temperature and Precipitation Changes on Living Standards.
[8] Jain CK and Singh S. 2018. Impact of climate change on the hydrological dynamics of River Ganga, India. Journal of Water and Climate Change.
[9] There are five main stem states – Uttarakhand, Uttar Pradesh, Bihar, Jharkhand and West Bengal. The remaining six states are Himachal Pradesh, Delhi, Haryana, Rajasthan, Madhya Pradesh and Chattisgarh.
[10] Bons CA (Ed.). 2018. *Ganga River Basin Planning Assessment Report.* Main volume and Appendices. Deltares with AECOM and FutureWater for the World Bank and the Government of India

during which millions of pilgrims immerse themselves in the Ganga in a ritual that is believed to lead to salvation[11].

6. Despite being revered, the Ganga is at risk. The water quality and flows of the Ganga face several pressures, including: (i) abstraction of around 90 per cent of its water[12], primarily for irrigation, industrial and domestic consumption; (ii) discharge of untreated municipal sewage and industrial effluents; (iii) over-exploitation of groundwater; (iv) dumping of solid waste; and (v) loss of floodplains. These pressures, compounded by growing demands for water, may place parts of the Ganga basin at or below the threshold level of water scarcity by 2025[13]. Water stress in the basin is further aggravated by widespread pollution. The National Mission for Clean Ganga (NMCG) of the Government of India (GoI) estimates that 3 billion liters of wastewater is generated daily primarily from 97 cities with over 50,000 inhabitants located along the main stem of the Ganga. NMCG also indicates that this comprises over 80 percent of the pollution load from point sources in the Ganga and the remainder is from industrial effluent[14]. This situation is likely to worsen as population and economic growth increase pressure on the river and groundwater resources. As a result, water quality of the Ganga has been assessed as unfit for many essential uses (refer Annex 2).

7. Municipal wastewater treatment is the intervention with the greatest potential to improve the Ganga's water quality and may help to reduce transmission of infectious diseases such as COVID-19. A strategic basin planning exercise undertaken by the World Bank in partnership with the GoI in 2018 concluded that while no single intervention can address the multiple pressures on the health of the Ganga, the greatest potential benefits are offered by improved municipal wastewater treatment[15]. This would improve downstream water quality and ecosystem services, as well as reduce water-related illnesses and deaths. Appropriate wastewater treatment may also reduce transmission of pathogens such as COVID-19 as emerging research shows that the virus may remain viable in the environment for days, which could lead to fecal–oral transmission[16]. The presence of COVID-19 in sewage has also been reported in sewage samples of eight cities in the Netherlands[17].

8. Although urban sanitation is a State responsibility, the Central government wields considerable influence in this area. Sanitation is a State responsibility under the Indian Constitution. While Central government has a limited explicit role in urban sanitation in the legislative framework, it wields considerable influence over the planning process by financing wastewater treatment investments and imposing conditions on States and cities for use of funds under centrally funded programs. In 1992, the 74th Constitutional Amendment Act devolved powers and responsibilities for water and sanitation to Urban Local Bodies (ULBs), India's municipal governments. However, ULBs continue to lack functional autonomy and are financially near-completely dependent on the State government. Infrastructure is often developed and maintained by a State department or parastatal (typically an engineering-centric agency

[11] *Kumbh Mela* means Festival of the Sacred Pitcher. An estimated 240 million people participated in the 2019 *Kumbh Mela* at Prayagraj <*https://bit.ly/HindustanTimesKumbhMela*> Accessed April 7, 2020.
[12] Ibid Bons CA (2018)
[13] Hosterman HN *et al* (2009). Water, Climate Change, and Adaptation […] Ganges Basin; *www.nicholas.duke.edu/institute*
[14] NMCG <https://nmcg.nic.in/pollution.aspx> Accessed April 10, 2020. The contribution of cities with less than 50,000 population and non-point sources to the pollution load has not been systematically studied.
[15] Ibid Bons CA, 2018.
[16] Lancet Gastroenterol Hepatol 2020. Published online on March 19, 2020 (*https://www.thelancet.com/action/showPdf?pii=S2468-1253%2820%2930083-2*)
[17] *https://www.medrxiv.org/content/10.1101/2020.03.29.20045880v1*

that builds and sometimes operates infrastructure). Multiple State-level agencies dominate urban service provision and often lack coordination. The various organizations, especially ULBs, are often under-staffed, and lack capacity to plan, implement and manage services. Households primarily finance the construction and maintenance of toilets and on-site containment systems, but the designs of these systems are sub-optimal. There are also several small, informal private players operating in the septage emptying and transport space. Due to the need and push for an increased role for the private sector, greater involvement of large private developers in sewerage and sewage treatment plants (STPs) has started in recent years.

9. The urban sanitation policy landscape in India has evolved since 2008 and has been complemented by national flagship programs. The National Urban Sanitation Policy (NUSP, 2008) accorded priority to safe management of human excreta and a need to look at the full cycle of sanitation. More recently, the National Fecal Sludge and Septage Management Policy (2017) provides guidance for cities dependent on on-site sanitation. These policies are complemented by four main types of national programs/investments: (i) the *Swachh Bharat* (Clean India) Mission Urban (SBMU), launched in 2014, focuses on providing household, community and public toilets to eliminate open defecation; (ii) the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) provides dedicated funding to urban infrastructure and services delivery in India's larger cities[18], especially for water supply, sewerage and septage management, storm-water drainage, etc.; (iii) the Smart Cities Program also potentially provides for resources to be invested in waste management systems; and (iv) urban wastewater collection and treatment activities carried out as part of river cleaning programs, which started with the Ganga Action Plan in the 1980s[19] and which are the focus of the proposed Project.

10. The Ganga Action Plan (GAP), launched in 1985, was the first in a series of national flagship programs to clean the Ganga and focused largely on municipal wastewater treatment. The objective of the GAP was to restore river water quality to 'bathing class' (refer Annex 2). While the Central government financed the construction of STPs under the GAP, their operation and maintenance (O&M) was the responsibility of State governments and ULBs. In practice, ULBs lacked resources to maintain STPs and O&M was under-funded by State governments, resulting in neglect and breakdown of STPs. Hence, this was one of the key reasons for the failure of the GAP. Other reasons included improper planning, insufficient funding, weak monitoring and limited public involvement.

11. In 2009, the GoI created the National Ganga River Basin Authority (NGRBA) with a comprehensive mandate. In 2011, the World Bank approved the ongoing National Ganga River Basin Project (NGRBP)[20] to support the cleaning of the Ganga under the NGRBA with US$1 billion in financing. The National Mission Clean Ganga (NMCG) was set up to implement the NGRBA's mandate and to function as the National Program Management Group for the NGRBP. In its initial years, the NMCG was hamstrung by skeletal staff and a highly centralized governance structure that led to prolonged delays in implementation. The NGRBA also continued to be dogged by the challenges faced by the GAP, notably weak capacity and ownership of ULBs and inadequate counterpart funding from the States (equivalent to 30 percent of the cost of investments with the balance 70 percent being financed by the Central

[18] AMRUT caters to 500 cities whereas Smart Cities Mission targets 100 cities. A budgetary allocation of Rs. 1 Trillion (about US$14 billion) has been made for the two missions.
[19] Wankhade K. 2015. Urban sanitation in India: key shifts in the national policy frame. IIED. Vol 27(2): 555–572.
[20] P119085

government). A 2013 assessment of 51 STPs financed under the GAP and NGRBA in the Ganga basin found capacity utilization of about 60 percent; 27 percent failed to meet effluent discharge standards and 20 percent were not operational. (Refer to Box 1)

12. The launch of the *Namami Gange* Program in 2015 has revitalized the GoI's efforts to clean the Ganga and sets the current context for the proposed Project. The cleaning of the Ganga was an election promise made by the current Prime Minister of India in 2014 and the *Namami Gange* (Homage to Ganga) Program was approved by the GoI in 2015. The NGRBA was dissolved and the management responsibility for the *Namami Gange* Program was transferred from the Ministry of Environment, Forests and Climate Change (MoEF&CC) to the Ministry of Water Resources and River Development (MoWR&RD), partly due to its stronger orientation towards program execution. To signal the priority that GoI accords to the Ganga clean-up, the name of the Ministry was changed to Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR, RD&GR). Following the 2019 general elections, this Ministry was made into a Department of the newly created Ministry of Jal Shakti (MoJS)[21].

13. The *Namami Gange* Program outlines a comprehensive and long-term vision for the Ganga. The GoI's vision is to achieve the 'wholesomeness of the Ganga'. The *Namami Gange* Program recognizes the importance of pollution abatement, but takes a comprehensive approach which comprises four building blocks:

(i) *aviral dhara*[22] *(*continuous flow): the flow of the Ganga is to be continuous and adequate over its entire length and throughout the year;

(ii) *nirmal dhara* (unpolluted flow): the Ganga river is to be free of pollution;

(iii) *geological entity:* protecting the geological foundation of the river basin from anthropogenic damage; and

(iv) *ecological entity:* to restore the ecological balance of the river for endemic flora, fauna and micro-organisms to thrive.

14. The approach of the *Namami Gange* Program has been informed by global experience. Global experience shows that river clean-ups are lengthy and costly, e.g. the clean-up of the Thames in the United Kingdom started in the 1860s and spanned several decades. Learning from global experience, the *Namami Gange* Program has been organized around three phases in recognition that certain aspects of its vision require a long-term horizon whereas others can be addressed sooner. The first phase (three to five years, 2015 onwards) was intended to launch the program with 'quick wins' for immediate, visible impact such as solid waste collection and riverfront development. This was accompanied by a medium-term (up to ten years, 2018 onwards) focus on *nirmal dhara* (unpolluted flow) through municipal and industrial pollution load reduction, afforestation, biodiversity conservation and water quality monitoring improvements. In the long term (over ten years, 2028 onwards), the government plans to ensure *aviral dhara* (continuous flows) through determination of ecological flows, increased water use efficiency and maintenance of the geological and ecological integrity of the river. In view of the scale and complexity of the Ganga, an initial

[21] The MoJS was created by the GoI in 2019 to manage water-related issues in an integrated manner, bringing together the erstwhile Ministry of WR, RD&GR and the Ministry of Drinking Water and Sanitation as departments of the new MoJS.
[22] *Nirmal dhara* and *aviral dhara* are important terms at the center of the national discourse over the Ganga, in particular over the development of hydropower in the upper reaches of the Ganga and its tributaries

budget of Rs 200 billion (US$3 billion) was allocated for the *Namami Gange* Program over five years (2015-20)[23]. By contrast, the GAP spent US$250 million over 23 years.

15. The design of the *Namami Gange* Program learns from the challenges faced by prior public programs to clean the Ganga. The design of the *Namami Gange* Program departs from its predecessors in the following ways:

(i) The implementation arrangements for Program implementation have been strengthened. A four-tier implementation structure – Central, State, District, City – has been put in place by the GoI to manage the Ganga basin (refer Section III A. Institutional and Implementation Arrangements). The national tier, particularly NMCG, which is the implementing agency for the proposed project, has been significantly strengthened since 2015 (refer Box 1) and capacities are developing at sub-national tiers.

(ii) To address the weak capacity of ULBs and under-funding of O&M by State governments, the Central Government increased its funding from 70 percent to 100 percent of capital costs as well as 10 to 15 years of O&M expenses.

(iii) The *Namami Gange* Program introduces a paradigm shift in the wastewater sector, from a construction-oriented approach to an outcome-based one. From 2011 onwards, investments were largely awarded through Design, Build, Operate, Transfer (DBOT) contracts including 10 years of O&M. Under the DBOT, financing of the investment is borne by the government and a private operator is paid based on achievement of contract milestones. To further strengthen the focus on sustaining infrastructure, the Hybrid Annuity Model (HAM) of Public Private Partnership (PPP) was introduced by the NMCG in 2016, with technical support from the World Bank and the International Finance Corporation (IFC). Under the HAM PPP model, the GoI pays a private operator 40 percent of the capital costs to build a STP during the construction period, the remaining 60 percent is paid out in quarterly annuities, on top of O&M annuities, over the 15 years of O&M, with payments of both capital cost and O&M annuities linked to the continued performance of the STP as per agreed parameters. This arrangement provides positive incentives for both government and private operators to invest in the success of the investment and incentivizes proper O&M of the plants for at least

Box 1: Institutional Transformation of NMCG

The NMCG has overcome initial challenges to grow into an effective national program management agency for the Ganga clean-up program. Until 2014, NMCG had fewer than 10 staff. As of March 2020, NMCG, supported by the ongoing NGRBP financed by the World Bank, employs 167 professionals. This remarkable institutional transformation was made possible by a renewed effort following the launch of the *Namami Gange* Program in 2015. In 2016, a Government Authorities Order empowered the NMCG to take all decisions related to the effective 'abatement of pollution, rejuvenation, protection and management of the River Ganga and its tributaries', including sanction of projects up to Rs 10 billion (US$143 million). Further, the NMCG is designated as an Authority under the Environment (Protection) Act, 1986, which gives it regulatory and enforcement powers. In 2019, in acknowledgement of its remarkable transformation into an effective program implementation agency, the NMCG received the Global Water Awards Distinction for Public Water Agency of the Year for its efforts to rejuvenate the Ganga[1].

[1] https://globalwaterawards.com/2019-public-water-agency-of-the-year/

15 years. (Refer Section III. A Technical Analysis for details on PPP HAM; Refer Section II. G for additional details on Lessons Learnt)

16. The implementation experience of the ongoing NGRBP offers valuable lessons for the design of the proposed Project (detailed below in G. Lessons Learned and reflected in the Project Design)**.**

- *The ongoing NGRBP experienced a slow start:* The ongoing NGRBP was approved in May 2011 in the amount of US$1 billion (US$199 million IDA credit and US$801 million IBRD loan) with the twin objectives of building institutional capacity for long-term clean-up and financing investments for reducing pollution load. Concomitant with the slow pick-up of the NGRBA and the weak capacity of the project implementing agencies in the early years, the NGRBP experienced a slow start. The original governance structure was overly complex and became a significant impediment to program implementation. In 2012, a little more than a year after Board approval in May 2011, the ongoing NGRBP fell into problem status, and remained there until October 2019.

- *The NGRBP picked up momentum with the launch of the Namami Gange Program in 2015 and the upswing has accelerated since 2016:* The promulgation of the Government Authorities Order in 2016 empowered the NMCG to assume the role of a national program management agency and greatly accelerated decision-making. In step with this, the ongoing NGRBP made rapid progress in unlocking implementation bottlenecks and committing funds under contracts in support of the Project objective. Building on this momentum, the NGRBP supported NMCG and the States to adopt several innovations, including the HAM PPP approach to attract long-term private financing and to ensure sustainability of investments; network and non-network solutions to achieve universal sanitation coverage at city level; co-treatment of septage at existing STPs; house connections to the sewer in network coverage areas, including for low-income communities; and introduction of a "one-city, one operator"[24] approach, which is a step forward towards unified management of wastewater management at city-level. As of April 2020, the ongoing NGRBP's investments account for approximately 51 percent of the wastewater treatment capacity (construction and rehabilitation of STPs) and 70 percent of the wastewater network being implemented under *Namami Gange* Program on the mainstem of the river Ganga. The adoption of the innovative HAM PPP approach under the *Namami Gange Program* has won several accolades, including the World Bank Sustainable Development Vice President's Award in 2018.

- *The NGRBP was restructured in October 2019 which made it possible to bring the Project out of seven years of problem status:* The NGRBP was restructured to: (i) cancel US$400 million, that is, resizing the project amount to US$600 million; (ii) extend its closing date by two years till December 30, 2021, and (iii) revise the Results Framework. The World Bank also agreed to consider the GoI's request for a new Project to support longer-term initiatives to manage the Ganga river basin in a sustainable manner. A time extension of two years for the NGRBP was agreed with the client to ensure sufficient overlap of the two projects allowing for a seamless carry-forward of selected investments from the NGRBP to the proposed Project. As of February 2020, the total value of World Bank financing is fully committed under the ongoing NGRBP. There is a total of 34 investments under the NGRBP, of which 33 are being implemented and 1 is under bidding. Of the 33 investments under implementation, 11

[24] Under the 'one city, one operator' approach, a single operator is responsible for the entire sewage infrastructure of a city/zone, during construction and O&M phases.

are completed, 8 report physical progress of over 75 percent, 5 report physical progress over 50 percent, 4 report physical progress over 35 percent and five are recently awarded. The Project is 63 percent disbursed as of March 2020 and was on track to fully disburse by its closing date of December 30, 2021, prior to the COVID-19 pandemic. The duration and severity of the impacts of COVID-19 on the NGRBP cannot be assessed at this point.

- *Key lessons learnt:* The key lessons learnt from the ongoing NGRBP are that the project was over-sized relative to client absorptive capacity, the preparation time was unduly short for such a complex undertaking, the responsible Central Ministry at the time (MoEF&CC) was not an appropriate institutional home (as that Ministry has a focus on regulatory affairs and policy, with relatively less emphasis on program implementation), and the mandate outstripped the execution capabilities of the newly created Program Management Groups at national level and State levels (which became the NMCG and SMCG respectively).

17. The proposed SNGRBP builds on and extends the ongoing World Bank engagement with the GoI on cleaning the Ganga. The proposed Project learns from the uneven implementation experience of the ongoing NGRBP to balance ambition with realism. It has an implementation timeline of 6.5 years (June 2020-December 2026). The proposed SNGRBP will continue to finance investments in pollution abatement that will work towards demonstrating sustainable mechanisms for financing O&M, building on the innovative and successful HAM PPP approach. The SNGRBP has an extended scope, covering selected tributaries in addition to the mainstem of the river in five basin States[25]. Its investments focus on treating all wastewater from large point-source pollution cities on selected tributaries and on completing investments started under the ongoing NGRBP which will increase treatment capacity over 50 percent in Kolkata, the capital city of the State of West Bengal and will develop full network coverage and treatment in Patna, the capital city of the State of Bihar, and in three smaller cities in Bihar. The proposed Project will also introduce the first-ever IBRD guarantee for wastewater treatment and the first IBRD Guarantee in the water and sanitation sector in India. The proposed IBRD Guarantee will backstop the payment obligations of the NMCG under three HAM PPP contracts and will help mobilize private investments. The proposed Guarantee will significantly reduce the cost of payment security currently provided by the NMCG. This is complemented by technical assistance to States and ULBs to strengthen and incentivize planning and management of wastewater treatment investments. Hence, the proposed Project directly contributes to the *Namami Gange* Program's medium-term focus on *nirmal dhara* (unpolluted flow, 2018-28).

18. The proposed SNGRBP extends Bank support to India to help it achieve its longer-term goal of a clean and healthy Ganga. The World Bank's experience in Argentina (Matanza-Riachuelo Riachuelo Sustainable Development Project[26]) and Colombia (Rio Bogota Environmental Recuperation and Flood Control Project[27]), among others, confirms the importance of establishing long term engagements in support of countries undertaking river cleanup projects. The efforts to clean the Ganga are expected to extend much beyond 2020 as the *Namami Gange* Program graduates from a medium-term (2018-28) focus on unpolluted flow (*nirmal dhara*) to ensuring continuous flow *(aviral dhara)* over the long term. The proposed Project supports the GoI's holistic approach to river basin management through technical assistance for strengthening the institutional framework for river basin management. It also provides

[25] Refer footnote 9.
[26] P105680
[27] P111479

support for strengthening the capabilities of Central agencies to monitor river flows and water quality and introduction of state-of-the-art tools to support these objectives. Hence, it lays the groundwork to support the subsequent phases of GoI's long-term vision for a clean and healthy Ganga.

C. Relevance to Higher Level Objectives

19. The proposed Project is consistent with the current Country Partnership Strategy (CPS) FY18-22 for India discussed by the Board on September 20, 2018 (Report 126667-IN). The CPS identifies resource efficient growth as one of three focus areas. The proposed Project directly contributes to this focus area by laying the foundation for more efficient use of water in the Ganga basin by addressing wastewater collection and treatment and exploring the potential for wastewater re-use. It also contributes to the objective of livable and sustainable cities through investments in improving urban wastewater management services in urban centers on the main stem and tributaries of the Ganga.

20. The proposed Project also contributes to two levers (the 'hows') identified by the CPF to achieve resource efficient growth: engaging a federal India at different levels and leveraging private finance. The Project will support the operational agencies of the *Namami Gange* Program to address capacity gaps, improve service delivery, strengthen citizen engagement and adopt gender-sensitive human resource policies. It will also engage with State and municipal governments to identify options for strengthening urban governance and institutional arrangements for the delivery of sanitation services. The Project will leverage private financing and operational efficiencies for the construction and maintenance of wastewater collection and treatment infrastructure.

21. The proposed Project is aligned with the World Bank's twin goals of ending extreme poverty and boosting shared prosperity. While India has made remarkable progress in reducing poverty, it remains home to one-third of the global poor. The Ganga basin is home to 520 million persons, including two-thirds of the country's poor. The Project will contribute to efforts to end extreme poverty through improved sanitation access, which is key to improving health, and to boost shared prosperity through improving city-wide sanitation coverage, including in low-income areas, to ensure equitable access.

22. The proposed Project is expected to help in mitigating the impacts of infectious diseases, including the COVID-19 pandemic. By expanding sewage collection and treatment, the proposed SNGRBP will reduce contamination of surface and and groundwater, which is a common cause of outbreaks of water-borne diseases. The Project design includes activities reinforcing the ongoing COVID-19 response of the GoI such as emergency preparedness plans (Sub-component 1.4); tools and protocols to improve the resilience of service delivery and to support service providers in responding to a crisis or shock; communication activities to promote handwashing with soap (Subcomponent 4.1) and a Contingent Emergency Response Component (Component 5). The infrastructure investments financed by the Project will also contribute to the effort to stimulate economic activity and job-creation, with an expected positive impact on the social and economic recovery from the COVID-19 pandemic.

23. The Project aims to address gender gaps related to wastewater management in line with the Country Gender Action Brief (2016-23) and the World Bank Gender Strategy (2016-23). Globally, women are under-represented in water and wastewater sector[28]. The reasons for this include relatively fewer

[28] A global study of 28 countries found that on average, 18 percent of employees in utilities are women. World Bank, 2019, Women in Water Utilities: Breaking Barriers https://www.worldbank.org/en/news/feature/2019/08/27/breaking-barriers

women graduates in Science, Technology, Engineering and Mathematics (STEM) courses, biases in recruitment, issues with retention, and challenges with promotion. In India, women students constitute only 26 percent of enrolled students in engineering courses[29] and their transition to technical roles in traditionally male-dominated sectors such as water and sanitation is low. A gender gap analysis of Project implementing agencies shows that the share of women in leadership and technical roles is low. For example, currently, there are no women in management roles at NMCG and only 12 women in technical roles (engineers and planners) compared with 56 men. As detailed below, the Project will finance an array of measures to improve the presence and prospects of women in the sector, particularly in the institutions and works of the Project.

II. PROJECT DESCRIPTION

A. Project Development Objective

PDO Statement

24. The objective of the Project is to reduce point-source pollution from targeted Urban Areas of the Ganga river basin and support the Central Ministry to strengthen the institutional framework for Ganga river basin management.

PDO Level Indicators

25. The achievement of the PDO will be measured through four indicators:

(i) Amount of Biochemical Oxygen Demand (BOD) pollution reduced due to Project interventions;

(ii) Number of sewage treatment plants (STPs) constructed or rehabilitated under the Project which meet the national discharge standards at least 95 percent of the time;

(iii) Adopted recommendations of the study on institutional framework for Ganga river basin management are being implemented;

(iv) A public online system for continuous monitoring of water quality and flow in the Ganga and selected tributaries is functional.

B. Project Components[30]

A detailed Project description is available in Annex 3.

Component 1: Institutional Development (US$30 million, of which IBRD US$19 million)

26. ***Sub-component 1.1 – Strengthening of the institutional framework for Ganga basin management (IBRD US$2 million):*** Providing technical and analytical support for the carrying out of a comprehensive analysis of: (a) the functions and mandates of institutions involved with aspects of Ganga river basin management at central, state and sub-state levels; (b) the relevant laws and regulations; and

[29] All India Council for Technical Education (2015-2016)
[30] Refer Annex 3: Detailed Project Description

(c) possible options for NMCG to operationalize its mandate, all taking into account climate change and gender gaps;

27. ***Sub-component 1.2 – Development and application of tools to monitor and inform decision-making for river basin management (IBRD US$9 million):*** Providing technical and analytical support for: (a) establishing critical tools to improve river basin management and inform decision-making, including a program to develop additional real-time water quality monitoring stations at strategic locations, and a system to monitor water withdrawal/consumption by major users; (b) carrying out a detailed evidence-based, participatory investigation of environmental flow options, for all river reaches across the Ganga basin where substantial flow regime modification has occurred; and (c) strengthening institutional capacity to collate, manage and share data and information on the Ganga basin, including gender disaggregated data, and to implement strategic communications and outreach.

28. ***Sub-component 1.3 – Support to strengthen Project States governments' and ULBs' capacity for wastewater service delivery and river management (IBRD US$7 million):*** (a) Strengthening the capacity of selected States in studying possible options, roles and responsibility sharing between the parastatal EA and participating ULBs for O&M arrangements of wastewater service delivery with the aim of ensuring long-term sustainability of service delivery; (b) designing (i) a roadmap for sustained O&M of sanitation assets and policies; (ii) a State-level sanitation strategy; and (iii) sewer connection strategy for households; and (c) on a demand basis, strengthening ULBs' planning, institutional, technical and financial capacity to manage wastewater and benchmarking ULBs to determine which are eligible for additional support.

29. ***Sub-component 1.4 – Namami Gange Program emergency response preparedness (IBRD US$1 million).*** Providing technical and analytical support for: the development of: (a) emergency preparedness plans and individual investment levels to respond to an emergency related to a health-crisis of natural disaster; and (b) a set of principles and recommendation to increase resilience of investments implemented under the *Namami Gange* Program.

Component 2: Infrastructure Development (US$1,045 million, of which IBRD US$345 million)

30. ***Sub-component 2.1 – Carrying out of Priority Investments selected on the basis of their level of pollution of selected tributaries of the Ganga (IBRD US$150 million).*** NMCG identified three wastewater treatment investments in the State of UP in the cities of Agra, Meerut, and Saharanpur[31], respectively located on the Yamuna, Kali and Hindon tributaries of the Ganga. These investments, which will use the HAM PPP approach, were selected as they are among the largest pollution hotspots on these tributaries.

31. ***Sub-component 2.2 – Carrying out of Priority Investments selected on the basis of their status of implementation and need for further financing to achieve completion of: (a) the design, build, operate and transfer contractual arrangements in Buxar, Begusarai and Munger; and (b) other investments (IBRD US$160 million).*** This sub-component will finance selected investments currently under implementation by the ongoing NGRBP that will be carried forward to the proposed SNGRBP at the closing of NGRBP (December 30, 2021). Five investments will be carried over: three DBOT investments in Bihar: Begusarai, Munger and Buxar[32] and the first two HAM-PPP investments funded under the ongoing NGRBP:

[32] The Project will fund the central share of all investments, which amounts to 100 percent for investments sanctioned since 2017. The DBOT contracts in Begusarai, Munger and Buxar were sanctioned earlier and will remain with a 70:30 cost sharing between Central and State government. The Project will therefore fund the central share of 70 percent for these DBOTs.

Digha-Kankerbargh (HAM and DBOT) in Bihar and Howrah-Bally-Baranagar (HAM) in West Bengal. These investments were selected because, with the exception of the Howrah-Bally-Baranagar HAM-PPP, they will bring the treatment capacity to 100 percent and they will also develop full sewerage network coverage and target 100 percent house sewer connections in each city.

32. ***Sub-component 2.3 – Improving investment resilience to COVID-19-like emergency crises,*** including through the implementation of the recommendation of the emergency preparedness plans developed under Sub-component 1.4 in the Priority Investments carried out under Sub-component 2.2 of the Project, to improve the resilience of service delivery and to support service providers to respond to similar crisis or shock (IBRD US$5 million).

33. ***Sub-component 2.4 – Carrying out of Priority Investments selected on the basis of performance-based incentives for ULBs*** involving measures taken for pollution source prioritization and their performance in strengthening planning, management, and cost recovery of wastewater service delivery to promote holistic approaches at city level (IBRD US$30 million). A framework approach will be used to identify potential additional investments during Project implementation. The NMCG is considering investments to extend sewage networks in cities where initial investments have been made under the ongoing NGRBP and/or will be made under the proposed Project to saturate wastewater collection and promote last mile connectivity in these cities.

Component 3: IBRD Guarantees (IBRD US$19 million)

34. IBRD guarantees in the aggregate amount of up to US$19 million will be structured as contract-based payment guarantees to backstop certain payment obligations of the NMCG under three HAM-PPP contracts being financed under Sub-component 2.1.

Component 4: Program Communication and Management (US$24 million, of which IBRD US$16 million)

35. ***Sub-component 4.1 – Program Communication and Outreach (US$6 million).*** Developing and carrying out mass media and public outreach campaigns targeting different stakeholders to promote the adoption of behaviors related to achieving and sustaining a clean Ganga.

36. ***Sub-component 4.2 – Program Management Support (US$10 million).*** Supporting management and coordination for the *Namami Gange* Program and the Project, including project administration and capacity building on transaction advisory, environmental and social safeguards, financial management, procurement, and monitoring and evaluation: (a) at the national level; and (b) at the state level.

Component 5: Contingent Emergency Response Component (US$0 million).

37. Providing immediate response to an Eligible Crisis or Emergency, as needed.

Table 1: Project Cost by Component *(in US$ million, incl. taxes)*

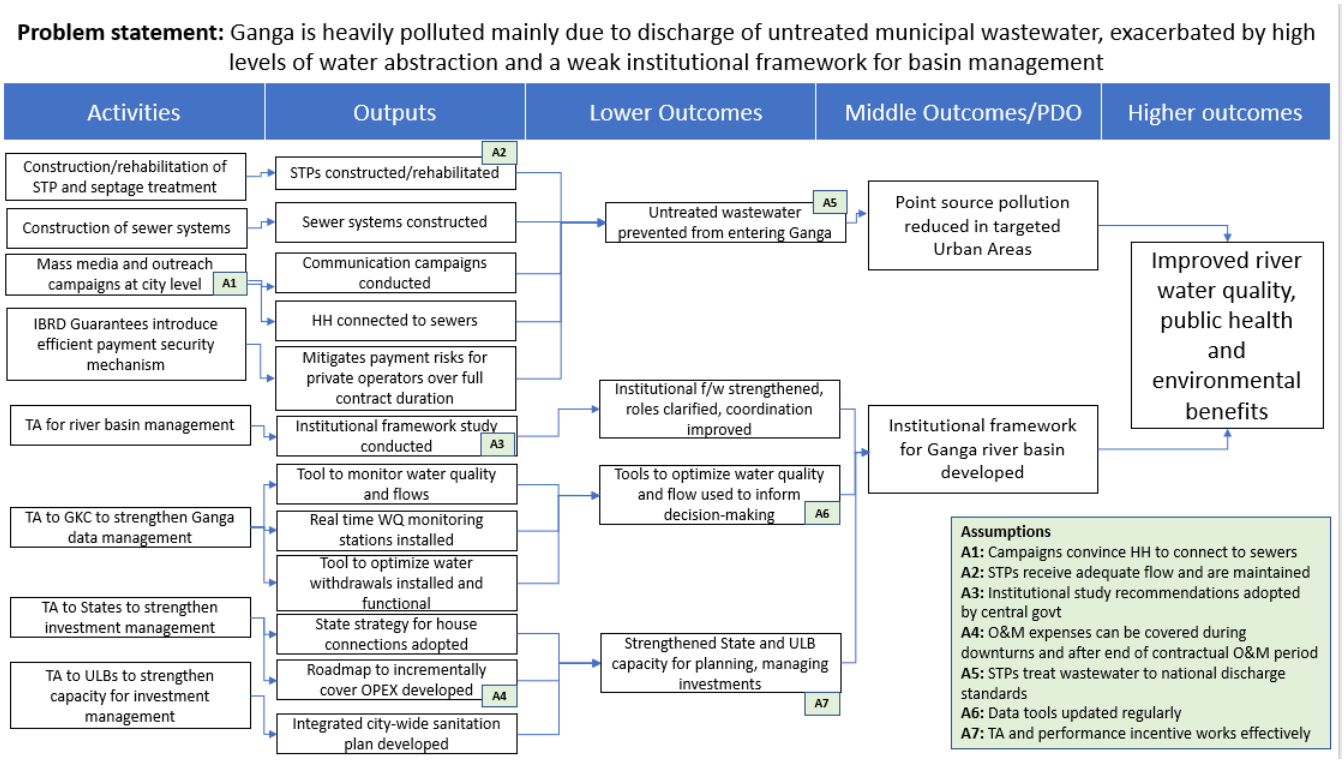
	Total Cost	IBRD	%	Counterpart Financing	%
Component 1: Institutional Development	30.0	19.0	*63%*	11.0	*37%*
Component 2: Infrastructure Development	1,045.0	345.0	*33%*	700.0	*67%*
Component 3: IBRD Guarantee	19.0	19.0	*100%*	0.0	*0%*
Component 4: Program Communication & Management	24.0	16.0	*67%*	8.0	*33%*
Component 5: Contingent Emergency Response Component	0.0	0.0	*100%*	0.0	*0%*
Front-end-fee	1.0	1.0	*100%*	0.0	*0%*
TOTAL PROJECT COSTS	**1,119.0**	**400.0**	***36%***	**719.0**	***64%***

C. Project Beneficiaries

38. The direct beneficiaries of the Project are 6 million people who will benefit from wastewater collection and treatment infrastructure and services improvements that are financed by the Project. The Project will also impact a broader range of beneficiaries such as tourists and pilgrims who visit the urban centers on the banks of the Ganga and its tributaries. Government officers and technical staff engaged in Ganga management agencies will benefit from capacity building under the Project, including training on wastewater management, procurement, environment and social safeguards and gender sensitization. Women will benefit through enhanced opportunities for employment in technical and management roles in national and State level implementing agencies and through measures to make workplace more gender sensitive. Further, the Project will help reduce the time women spend caring for children and other family members who fall ill because of inadequate sanitation. Other important benefits will be the increase in property prices due to better sanitary conditions in urban areas where sewers are installed, better sanitation services; reduced water pollution; and improved health outcomes.

D. Results Chain

39. The proposed Project contributes towards achieving the medium-term objectives of the *Namami Gange* Program, focusing on pollution abatement and improved water quality monitoring. It supports the longer-term vision of a clean and healthy Ganga through the DoWR,RD&GR to develop an institutional framework for Ganga basin management and to strengthen capacity at State and municipal levels for planning, financing and managing sanitation services.



E. Rationale for Bank Involvement and Role of Partners

40. The World Bank has been a long-term partner of the GoI in water resources management and Ganga rejuvenation. The Bank is the largest external source of financing to the GoI's efforts to clean the Ganga. Through the ongoing NGRBP, the Bank has provided critical support which helped shape the *Namami Gange* Program and supported the establishment and development of the NMCG into a highly functional program management agency. The Bank also supports other major programs in water resources management, including the National Hydrology Project, the National Groundwater Management Improvement Program, the Uttar Pradesh Second Water Sector Restructuring Project and the Dam Rehabilitation and Improvement Project, and draws from the convergence between these operations to strengthen Ganga basin management. For example, sustainable groundwater utilization and recovery of groundwater levels, planned under National Groundwater Management Improvement Program, can ultimately lead to increased lean season base flow in tributaries of the Ganga. The monitoring of surface and groundwater data, supported under the National Hydrology Project, will enable evidence-based implementation of e-flows management tools.

41. The Bank has significant global experience in urban services, river basin management and environmental management. In India, the Bank is using a range of instruments and approaches to support reforms in urban water and wastewater management, for example, supporting water supply and sewerage service delivery reform in Shimla, Himachal Pradesh through a series of Programmatic Development Policy Loans; demonstrating city-wide continuous piped water supply under the Karnataka Urban Water Supply Modernization Project; and a pipeline operation in Punjab to improve municipal services delivery including urban water supply. It also has the capacity to facilitate the transfer of

knowledge and experience to India and to promote India's experience to the world, including through twinning arrangements. The collaboration with the 2030 Water Resources Group , a public, private and civil society partnership administered by the Bank's Water Global Practice, has helped convene stakeholders to strengthen river basin management in the Hindon sub-basin of the Ganga, where the Saharanpur investment proposed for support under this Project, is located, and in Bundelkhand, where e 2030 Water Resources Group and the Government of Israel are implementing a pilot of improved farming and water management practices.

42. The Bank has extensive experience in PPPs in water, sanitation sector and other sectors. Together with the IFC, the Bank has been instrumental in working with NMCG to successfully adapt the HAM from the highways sector to the urban wastewater treatment sector. This innovative approach has been well received by the market and has become the solution of choice for NMCG for investments involving wastewater treatment.

43. NMCG works with a wide range of development partners, including the European Union (EU), through the EU-India Partnership, Germany's GIZ and KfW, Japan International Cooperation Agency (JICA), the Government of Israel and other technical and financial partners. The Project will build on and complement activities supported by the EU-India Partnership and Germany's GIZ to strengthen Ganga basin management. The South Asia Water Initiative (SAWI), funded by the Governments of the United Kingdom, Australia and Norway, has also been an important source of technical assistance, particularly in the area of strategic basin planning.

F. Lessons Learned and Reflected in the Project Design

44. The following lessons drawn from the ongoing NGRBP and the World Bank's global experience in river conservation are reflected in the Project design:

i. *Match ambition with execution capability*: The ongoing NGRBP set an ambitious river basin management goal at a time when the program management agencies at national and State level had recently been created and were yet to establish functional and technical capabilities to deliver on this mandate. The Central line ministry for the Project at launch was the MoEF&CC, a policy and regulatory ministry which was relatively less suited for program implementation. Given the complexity of the Project, the preparation time was inadequate. As a result, the detailed technical designs for investments were not ready by Project appraisal and the Project adopted a framework approach for the entire infrastructure component. Implementation also suffered due to differences in priorities of Central and State governments with the latter delaying their financial contributions equivalent to 30 percent of the cost of investments.

The proposed SNGRBP benefits from the course corrections carried out by the GoI to empower program management agencies and accelerate implementation. The *Namami Gange* Program and the associated actions by GoI were a breakthrough in revitalizing the government's efforts to rejuvenate the Ganga. The transfer of program management from the MoEF to the MoWR, RD&GR brought in enhanced Project design, implementation and supervision capabilities and simplified the governance structure. The passage of the Government Authorities Order 2016 empowered the NMCG to carry out the mandate envisaged by the NGRBP in 2011. In terms of investment readiness, new investments have been identified under SNGRBP during preparation. Design and bidding

documents for wastewater treatment investments in Agra, Meerut and Saharanpur (Sub-component 2.1) are at advanced stages of preparation and will include documentation related to land acquisition, statutory permissions and the Bank-cleared Environment and Social Due Diligence Report (ESDDR). The tenders for these investments are expected to be launched in June 2020 for Agra and Meerut and August 2020 for Saharanpur.

ii. *Integrated long-term planning at basin level*: A key lesson learnt from successful international examples of river clean-up is the need for a long-term, basin-wide and multi-sectoral approach to address river pollution instead of a 'city-by-city' approach. The design of the *Namami Gange* Program explicitly recognizes the need for basin-wide planning and incorporates a coordination mechanism at national and State levels which involves key stakeholders in multiple sectors. The proposed Project will build on this foundation and support the development of options for institutional strengthening and critical tools to manage water quantity and quality at a basin level. The extension of World Bank support through a Second NGRBP recognizes the long-term nature of river clean-up programs and positions the Bank as a reliable partner of the GoI in this effort.

iii. *Last mile connectivity optimizes the development outcome:* A key lesson learnt from the ongoing NGRBP is that house service connections to the sewer system are critical to achieve optimal utilization of STPs, pollution abatement and public health outcomes. Investments for sewer network extensions under the ongoing NGRBP did not include house connections to sewers, which were left as the responsibility of the household and ULBs. Connection speed was slow and uneven, leading to underuse of the networks and lower flows to STPs than anticipated. The State of UP integrated financing from the Atal Mission for Rejuvenation and Urban Transformation (AMRUT), a centrally sponsored scheme, to provide house service connections to sewer networks financed under the *Namami Gange* Program.

III. IMPLEMENTATION ARRANGEMENTS

A. Institutional and Implementation Arrangements

45. The proposed SNGRBP will utilize the institutional and implementation arrangements in place for the *Namami Gange Program*, which are also used for the ongoing NGRBP and have been strengthened in recent years. These implementation arrangements are outlined below:

(i) *National level:* The National Ganga Council, headed by the Prime Minister and with the Chief Ministers of five mainstem States as members, is the apex body. The Ministry of Jal Shakti (MoJS) is the key Central Ministry through its DoWR, RD&GR. The Central Ministry is supported by its key technical bodies e.g. the Central Water Commission (CWC) and the Central Ground Water Board (CGWB). The CWC and the CGWB, along with the CPCB (under the MoEF&CC), are responsible for water resources assessment through monitoring surface water and groundwater, as well as providing technical quality assurance. The NMCG is the implementation arm of the DoWR, RD&GR for the *Namami Gange* Program. An Empowered Task Force (ETF), chaired by the Union Minister of Jal Shakti, with the Chief Secretaries of the five Ganga mainstem States as members, is responsible for co-ordination and advice on matters relating to rejuvenation, protection and management of Ganga River and its tributaries. The ETF is responsible for approval of investments above Rs 10 billion (US$143 million), while NMCG is empowered to approve investments up to that amount.

(ii) *State level:* In each State, a State Ganga Committee is the apex body and is also designated as an

Authority under the Environment (Protection) Act, 1986. This Committee has been assigned the task of overseeing implementation of various programs and investments related to Ganga rejuvenation within the State. The nodal department at State level is typically the Urban Development or the Water Supply and Sanitation Department. The State Mission for Clean Ganga (SMCG) is an extended arm of the NMCG at State level to coordinate implementation of activities and it reports to the State nodal department. Executing Agencies (EAs) which possess the relevant technical expertise are identified at State level to implement specific investments.

(iii) *District level:* A District Ganga Committee is constituted in all districts located on the banks of the Ganga and is designated as an Authority under the Environment (Protection) Act, 1986. The role of this Committee is to plan and implement measures and interventions for rejuvenation, protection, restoration and or rehabilitation of degraded areas abutting the river Ganga and or its tributaries. This level has not been active thus far.

(iv) *City-level:* For pollution abatement investments undertaken at city level, it was planned that a tripartite Memorandum of Agreement be signed between the SMCG, the State EA and the respective ULB which lays out their roles and responsibilities. However, this has not been implemented thus far, the proposed Project will work to revive these, adapting their content based on the results of the institutional framework study on institutional arrangements.

46. NMCG will continue to be responsible for overall Project implementation: The NMCG, under the administrative control of the DoWR, RD&GR, is headed by a Director General (equivalent in rank to an Additional Secretary of the GoI), who is supported by five Executive Directors (equivalent in rank to a Joint Secretary of the GoI). The NMCG staff comprises 167 technical and administrative professionals with expertise in procurement, PPP, finance, safeguards, communications, monitoring and evaluation and so on. Given the complexity of the Project and scale of investments, NMCG will (a) retain a Project Management Consultant to assist in supervision of investments and efficient Project management; (b) retain a financial management and procurement consultant; and (c) appoint a Transaction Advisor and Project Engineer for each HAM contract financed under the Project. At State level, SMCGs are the extended arm of the NMCG and will coordinate and oversee implementation of activities in the State.

47. Investments are executed by different EAs, which are typically parastatal agencies responsible for urban water supply and sewerage in each State. The three discrete investments in Agra, Meerut and Saharanpur are located in UP and their EA will be the UP *Jal Nigam*, a parastatal responsible for water supply and sewerage provision in UP. The investments to be carried over from the ongoing NGRBP to the proposed SNGRBP are located in UP, Bihar and West Bengal. The corresponding EAs are the UP *Jal Nigam*, Bihar Urban Infrastructure Development Corporation (BUIDCO), and the Kolkata Municipal Corporation and the Kolkata Metropolitan Development Authority in West Bengal. Each EA has gained extensive experience in preparation, contracting and management of wastewater infrastructure investments under the ongoing NGRBP. The EAs will continue to be responsible for all contract management, including procurement, supervision, and payments, with support from NMCG and the respective SMCG.

48. The NMCG and SMCGs will be responsible for planning, investments selection, quality assurance, procurement, contract management, and monitoring and evaluation under the SNGRBP. The allocation of roles and responsibilities, including administrative and fiduciary arrangements, between the NMCG, SMCG and the EA shall continue as under the ongoing NGBRP. The NMCG will collaborate with other technical agencies, including CPCB and the MoJS's CWC, to draw upon their specialized expertise

and supplement the capacity of the main implementing agencies. The NMCG will also continue to collaborate with international, national and local knowledge institutions, private sector business houses and industries, and civil society groups.

49. Adequate staff, capacity and resources are available and will be further augmented in NMCG and SMCGs to ensure that planning, supervision, monitoring and reporting activities under SNGRBP are efficiently discharged. The NMCG and SMCGs are responsible for applying the framework developed under NGBRP that now applies to the *Namami Gange* Program as a whole, regardless of the source of financing. This Program Framework comprises:

(i) Investments framework for selecting and implementing investments;
(ii) Detailed implementation process flow (step-by-step process covering planning, preparation, appraisal, implementation, initial operations, long term operations, monitoring and evaluation, along with roles and responsibilities of the entities involved);
(iii) Guidelines for infrastructure investments preparation;
(iv) Environmental and Social Management Framework (ESMF);
(v) Governance and Accountability Action Plan;
(vi) Communication Strategy and Action Plan;
(vii) Financial Management Manual; and
(viii) Project Procurement Manual.

50. **Implementation Support**: Project implementation support will follow the arrangements in place for the ongoing NGRBP. It will be carried out by a team of World Bank specialists and expert consultants based primarily in New Delhi and specializing in specific dimensions of the Project with a special focus on wastewater collection and treatment, water quality monitoring and modeling, river basin and environmental management, urban planning, and program communications. The team will also rely on additional expertise to provide technical assistance and implementation support on other aspects as required. This support will include national and international staff or consultants to maximize knowledge exchange and value addition.

51. An additional focus on institutional development will be undertaken to support NMCG to fulfill the mandate given to it via the Government Authorities Order of 2016. Relevant capacity building activities and systems will be developed to increase interaction between implementing agencies and the people. Areas of specific attention will include technical preparation, social and environmental management, procurement, communications and grievance redressal.

B. Results Monitoring and Evaluation Arrangements

52. **NMCG is responsible for overall Program and Project monitoring whereas SMCGs and EAs are responsible for monitoring State-level activities.** EAs will be responsible for investment supervision, which will entail routine quality certification at various stages of construction, providing the basis for payment certification. SMCGs will oversee the implementation of investments carried out by EAs and the institutional development activities implemented in the States. The NMCG will ensure coordination and overall implementation of activities. It will help convene State and National Agencies for activities involving inter-State or national focus.

53. Quarterly monitoring reports will be prepared by NMCG with inputs from EAs and SMCG. Each report will include information on overall and investment-wise technical and financial progress, implementation and monitoring of social and environmental aspects, quality assurance, and monitoring of key performance indicator to inform the results framework. The NMCG has an online Management Information System (MIS) that tracks the progress of various activities of the *Namami Gange* Program, including activities financed by the Project.

C. Sustainability

54. Government ownership and commitment. The clean-up and rejuvenation of the Ganga enjoy broad public support and commitment at the highest political levels in India. The GoI's strong commitment to the *Namami Gange* Program has been demonstrated by: (i) the establishment in 2016 of the National Ganga Council headed by the Prime Minister and vested with the responsibility for 'superintendence, direction, development and control' of the Ganga basin (Government Authorities Order 2016), (ii) strong fiscal support in the form of a US$3 billion budgetary allocation from the GoI for the *Namami Gange* Program over the period 2015-20 and long-term commitment to a multi-phased approach which will graduate from pollution abatement to address river basin management in a holistic fashion; (iii) establishment of dedicated multi-tier implementation arrangements for the *Namami Gange* Program from Central to district levels; and (iv) a range of vibrant communication activities undertaken by the NMCG from ground-level activation events, social and traditional media outreach, public debates and lectures, to a flagship mass media campaign (the *Kartavya Ganga* [Duty towards Ganga] campaign produced under the ongoing NGRBP). The mainstem State governments have shown ownership to an extent by establishing and operationalizing Ganga Committees at State and district levels to guide the implementation of the *Namami Gange* Program. Nevertheless, significant political and governance risks remain, as described in section VII below.

55. Sustainability of investments. The Project design incorporate several measures to ensure sustainability of assets financed by the proposed SNGRBP:

(i) The Project will finance long-term contracts between EAs and private operators, with a minimum of 10 years of O&M built into DBOT contracts, and 15 years of O&M built into HAM PPP contracts, for all wastewater investments. O&M payments will be linked to satisfactory performance of the STPs and will be covered by the Central government over the life of the contract.

(ii) The Project will support the participating State governments to develop a strategy for increasing connections to the sewer system, plan to enhance public awareness and grievance redressal, and improve services provision (refer Sub-components 1.3 and 2.3 at II B: Project Description), which is expected to contribute to an improvement in the willingness to pay for wastewater services. These strong outreach and communication activities, together with new sewers and house service connections in targeted locations, will facilitate utilization and sustainability of assets.

(iii) ULBs where wastewater investments are located are expected to be responsible for payment of O&M expenses after the end of the contract (in 10 or 15 years for DBOT and HAM investments, respectively). Given the limited capacity of ULBs, the Project will support the strengthening of ULBs' capacity to plan and manage wastewater investments. To facilitate sustainability, the EAs will be supported to develop a transition plan and an asset handover protocol. The private operators will establish operating procedures and provide training to relevant staff for managing and supervising

operations.

(iv) The GoI decided to introduce the use of an IBRD Payment Guarantee to mitigate the risk of delays or default in HAM PPP payments under Sub-component 2.1, in lieu of the existing payment security mechanism.

IV. PROJECT APPRAISAL SUMMARY

A. Technical, Economic and Financial Analysis

(i) Technical Analysis

56. **Technical design:** The technical design of infrastructure investments under the Project seeks to balance the objectives of pollution abatement with achieving clean and livable cities over the long term. The National Urban Sanitation Policy (NUSP) of the GoI (2008), and the lessons learnt from the ongoing NGRBP, shows that technology selection should be incremental. The NUSP notes that even if sewers are ideal for dense settlements, they may not be feasible to execute immediately due to financial, technical and socio-economic constraints. Hence, the NUSP goes on to State that the objective of improving the sanitary conditions in the city can be addressed through interim solutions (e.g. on-site septic tanks or community septic tanks if space is limited) with a view to upgrade later to a more sophisticated system such as sewerage. Another interim solution that immediately addresses the objective of pollution abatement and contributes to the incremental improvement in sanitary conditions at a city level is Interception and Diversion (I&D) of wastewater and its treatment before discharge, along with the option of co-treatment of septage generated by on-site systems at the STPs.

57. Accordingly, the design of the Project includes two main types of investments:

i. I&D of wastewater flowing through drains into the river with pumping stations and conveyance systems and the construction and/or rehabilitation of STPs to treat the wastewater prior to discharging it in the river. Such investments promote co-treatment of septage and the construction of discharge points at STPs or main pumping stations for septage generated by on-site sanitation facilities.

ii. Wastewater collection through underground sewerage, pumping stations, and treatment at STP.

58. Sub-component 2.4 will identify additional investments during Project implementation to promote holistic city-wide sanitation. This can potentially include extension of sewerage in cities where initial investments have been made under the ongoing NGRBP and/or will be made under the proposed SNGRBP to saturate wastewater collection and promote last mile connectivity in these cities. The GoI is also thinking about a next phase, which consists of integrating the city and river management in city area, to promote the rejuvenation of wetlands and increase biodiversity.

59. Although the NGRBA was dissolved by the GoI in 2016, the NGRBA Program Framework, developed with the support of the ongoing NGRBP, continues to be followed for the selection, appraisal and execution of investments. The NGRBA Program Framework outlines the following technical appraisal aspects which will be followed for the three new municipal wastewater treatment investments identified

under the proposed SNGRBP (details of individual investments are at Annex 3: Project Description) and for any new investments that are taken up under a framework approach:

(i) Selection of investments to be determined by their relative impact on reducing the pollution load entering the Ganga. The three cities where the proposed investments are located are the largest pollution hotspots on their respective tributaries of the Ganga.

(ii) New Project investments will be designed based on latest available guidelines/manuals/rules of national technical agencies, including Central Public Health and Environmental Engineering Organization and CPCB. The treated effluent shall comply with the relevant discharge standards.

(iii) Investments shall be designed for a period of 30 years for civil works and 15 years for electro-mechanical equipment. The designs for all investments, including pumping station, sewage and septage treatment plants, shall consider future scenarios including anticipated sewage flows from current and planned land uses in the Project Area and contribute to city-wide coverage. Each design shall be based on an estimate of sewage flows from the population in the catchment, validated by flow measurements, details of industrial effluents if any (type of industries, flows), characterization of sewage, industrial and mixed effluents, detailed engineering surveys (topographic surveys, etc.), site investigations (soil sampling, etc.), and shall comply with the requirements of relevant codes and standards.

(iv) Assessment of the condition and performance of existing assets to ensure that these existing assets are rehabilitated and incorporated into the new systems wherever cost-effective.

(v) Preparation of Detailed Project Reports (DPR) that identify technically feasible solutions and assess their lifecycle costs to arrive at the least-cost solution. The DPR evaluate technologies that can comply with the discharge standards and for purposes of estimation of capital and operating cost, selects the one with lowest lifecycle cost, that is proven to be suitable for local conditions and which provides required degree of treatment. Since choice of technology is left open to the bidders to propose, the DPR and the bid documents provide guidance to the bidders on the key parameters to be considered in the design.

(vi) The technologies to be adopted in the investments shall have all regulatory and environmental clearances.

(vii) The design should include adequate and reliable alternate power supply arrangements to ensure satisfactory performance of the facility.

(viii) The investment should include a suitable sludge management strategy which ensures in situ treatment of sludge and subsequent safe disposal either at the site or at an approved landfill.

(ix) Anaerobic digestion of sewage sludge and ensuing energy recovery from biogas, a by-product of anaerobic digestion mandated for all STPs with capacities of 40 MLD and above.

(x) Where feasible, the option for sale of treated wastewater to industries (e.g. thermal power plants within 50 kilometers of a sewage treatment plant are mandated to purchase and use treated wastewater) and / or agriculture).

60. In addition to the three new investments, five ongoing investments in sewage collection and treatment that were initiated under the NGRBP will be carried forward to the proposed SNGRBP when the ongoing NGRBP closes on December 30, 2021 (details at Annex 3: Detailed Project Description). These

investments have also been appraised according to the technical criteria in the NGRBA Program Framework outlined above.

61. The procurement strategy supported under the proposed SNGRBP is an important part of its technical design and risk mitigation. Earlier Ganga clean-up programs focused on creating sewage treatment infrastructure, and the O&M of these assets did not receive adequate attention, resulting in a cycle of 'build-neglect-rebuild'. To address this challenge from a procurement perspective, NMCG, with support from World Bank and IFC, carried out a detailed analysis of the comparative advantages of various PPP models for STP construction and maintenance, including Engineering, Procurement, Construction (EPC), DBOT, pure annuity model and HAM (which had been adopted in the highways sector in India). This analysis was reviewed by experts drawn from a consortium of the Indian Institutes of Technology. The key findings were:

(i) Traditional contracts like EPC and item-rate contracts are not suitable for STP investments as these focus on asset construction, which incentivizing lower construction cost and not lowest lifecycle cost, as a result optimizing O&M costs does not receive enough attention.

(ii) DBOT achieves better risk allocation compared with traditional contracts. However, since the CAPEX is paid at commissioning, there is less incentive to build assets with a long-life cycle. Further, the operator has little capital at stake to ensure effective O&M under this approach.

(iii) Under a PPP annuity approach, the private operator finances the entire capital investment through a combination of debt and equity and is paid an annuity after construction over the contract duration to cover principle repayment and return on investment. This pure annuity approach was not retained as it put too much risk on the private operator and the financial sector. A Hybrid Annuity Model PPP or HAM PPP is a variant of this approach wherein a part of the capital investment (say, up to 50 percent) is paid by government through construction linked milestones and the balance is paid through an annuity over a 10-15-year contract duration. This approach, which was developed in the highway sector, was adapted to the specificities of the sanitation sector.

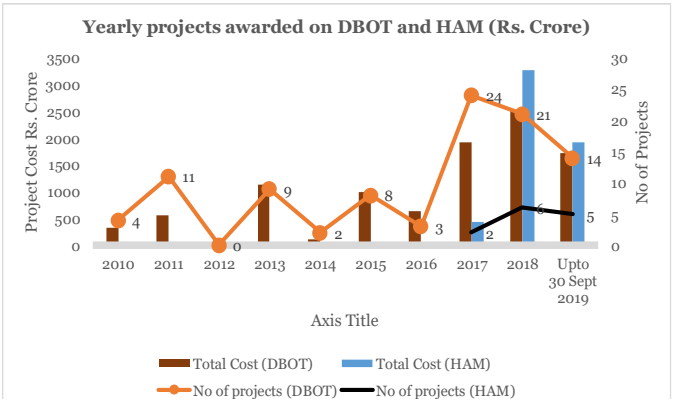
62. The analysis concluded that the HAM PPP contract is the preferred approach for the development and maintenance of STP as it offers certain advantages over other contractual forms:

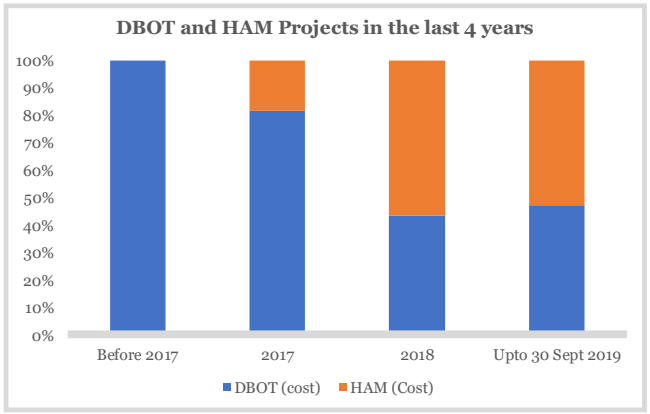
- The HAM PPP contract achieves an appropriate allocation of risks between the government and the private operator. From the government's perspective, the HAM contract incentivizes the private operator to complete the construction of assets on time and ensure their sustained performance over time. It also addresses with the Government's interest to ensure that services are delivered more efficiently and at a lower cost compared with the pure annuity model. From the private operator's perspective, the financing risk of the investment is shared with the government. The Central government taking on payment obligations under the HAM contract de-risks the private operator from weaknesses in payment of user charges for wastewater treatment and weak capacity of municipal governments to enforce and collect such charges.
- Both CAPEX and O&M annuity payments are linked to the performance of the treatment plant. Hence, the risk, and cost, of failure (e.g. non-functional/over-designed STP, non-compliance with discharge standards, poor O&M, etc.) is transferred to the private sector, which is better placed to efficiently mitigate this risk. The HAM PPP contract also incentivizes the private operator to generate savings or revenue in innovative and environmentally friendly ways, such as generating power through biogas

or selling treated wastewater for reuse.

63. The Cabinet of the GoI approved the use of the HAM PPP approach in January 2016. Under this approach, 40 percent of the capital cost is paid to the concessionaire based on achievement of contractual milestones during construction and the balance 60 percent is paid as CAPEX annuities over 15 years, in addition to O&M annuities. Most of the contracts awarded prior to 2017 were based on the DBOT model. Thereafter, HAM has emerged as the preferred approach for NMCG and the market players for investments involving STPs, while DBOT is preferred for investments focused on sewer network construction. On that basis, just two years after its introduction, the share of investments using HAM has exceeded 50 percent of the total annual amount of sanitation investments procured by NMCG, but only 25 percent of the number of projects, which suggests that investments procured using HAM PPP are therefore much larger than those using DBOT PPP (Figure 1).

Figure 1: *Namami Gange* Projects Awarded under DBOT and HAM





64. **Market Study:** As a part of Project preparation, a market study on emerging lessons from the HAM PPP approach was carried out. The key findings of the market study are:

i. While in the past, there was no clear preference in the market for one contracting model – HAM or DBOT – over another, of late the first ten HAM PPP contracts have consistently attracted more bidders than DBOT contracts during the same period. In 2019, the average number of bidders per new investment declined for both HAM and DBOT contracts, possibly due to the overall financial stress in the construction industry.

ii. In terms of quoted prices for HAM contracts, the competition appears to be healthy and the lowest quoted price is often on par or lower than the cost estimate sanctioned by NMCG.

iii. Reputable international firms have subsidiaries in India or form joint ventures which are incorporated in India and hence are treated as Indian companies. They participated in first bids but, from their perspective, are not competitive on simple build and operate technology, their comparative advantage is on high-tech or complex treatment systems. Foreign companies do not bid directly, mainly because of taxation and other issues irrespective of type of contract or sector.

65. The three new investments under the proposed SNGRBP will be procured using the HAM PPP contract. The investments that will be carried forward from the ongoing NGRBP to the proposed SNGRBP include three DBOT contracts, one HAM contract and one investment combining DBOT for network

construction and HAM PPP for STP construction (see Annex 3: Project Description for details). As of September 2019, more than 120 projects with a total sanctioned cost of Rs.128 billion (US$1.8 billion) have been undertaken by NMCG through DBOT contracts. Since the roll-out of the HAM in 2016, NMCG has awarded 7 HAM contracts (totaling US$770 million), and 10 more (totaling US$600 million) are at different stages of preparation and bidding (refer Figure 1).

(ii) Economic and Financial Analysis

66. An economic and financial analysis (EFA) has been prepared for the Project. In addition, an update of a program level economic analysis of the *Namami Gange* Program, of which the Project is a slice, was also undertaken.

67. EFA of Project Investments in Wastewater Treatment: An EFA for discrete Project investments in wastewater treatment under the proposed SNGRBP was carried out using the methodology for Cost Benefit Analysis (CBA) proposed by the United Nations Environment Program[33]. This methodology for estimating the Net Present Value (NPV) is based on a Cost of No Action versus Cost of Action (CNA-CA) approach. The analysis considered two types of benefits: environmental and health.

68. Infrastructure investments made under the Project have two major components: sewer network and STPs. Whereas all investments financed by the Project will result in environmental benefits, only sewer network investments will lead to health benefits as presented below.

Investment	Network	STP	Environmental Benefits	Health Benefits
Munger	Y	Y	√	√
Begusarai	Y	Y	√	√
Buxar	Y	Y	√	√
Digha Kankarbagh	Y	Y	√	√
Howrah	N	Y	√	X
Agra	N	Y	√	X
Meerut	N	Y	√	X
Saharanpur	N	Y	√	X

69. In order to estimate the cost of environmental impact, the shadow prices of undesirable outputs are estimated based on the assumptions provided in a UNEP report (2015). This Project is expected to result in GHG emissions over the period of Project life and therefore the shadow price of carbon has been factored in the estimation of economic benefits of the Project. The data on potential health benefits per capita has been taken from *Economic Impacts of Inadequate Sanitation in India* (2011) by the Water and Sanitation Program[34]. The resulting health and other economic benefits of a clean river have not been considered because that would require additional information which is not available.

70. The Benefit to Cost ratio of Project investments in ranges from 1.8 to 3.6 using a discount rate of 15 percent. The Economic Rate of Return ranges from 22 percent to 60 percent, whereas at Project level,

[33] United Nations Environment Program. 2015. Economic Valuation of Wastewater: The cost of action and the cost of no action
[34] *http://documents.worldbank.org/curated/en/820131468041640929/pdf/681590WSP0Box30UBLIC00WSP0esi0india.pdf*

the economic return is expected to be around 35 percent. These investments are likely to directly benefit a population of around 1.4 million[35] people. The results of the cost benefit analysis are presented below.

Investments	With 15% Discount Rate			With 10% Discount Rate			Economic Returns
	NPV of Total Benefits (Rs. Crore)	NPV of Total Cost (Rs. Crore)	Cost Benefit Ratio	NPV of Total Benefits (Rs. Crore)	NPV of Total Cost (Rs. Crore)	Cost Benefit Ratio	
SNGRBP	**₹ 6,856.4**	**₹ 2,765.7**	**2.5**	**₹ 12,470.1**	**₹ 3,769.2**	**3.3**	**35%**
Munger	400.7	184.2	2.2	720.9	229.6	3.1	27%
Begusarai	262.9	145.9	1.8	447.1	177.8	2.5	22%
Buxar	221.1	103.5	2.1	397.6	128.8	3.1	27%
Digha Kankarbagh	1726.5	792.9	2.2	3114.3	972.8	3.2	27%
Howrah, Bally and Baranagar	1034.2	353.6	2.9	1895.8	509.5	3.7	47%
Agra	1114.4	503.2	2.2	2042.5	752.2	2.7	41%
Meerut	1561.7	434.5	3.6	2863.4	648.2	4.4	60%
Saharanpur	534.2	246.8	2.2	979.1	349.3	2.8	35%

71. Economic Analysis of the *Namami Gange* Program: An economic analysis of the *Namami Gange* Program was carried out to evaluate its benefits relative to its costs. This builds on the seminal cost benefit analysis of the Ganga Action Plan[36] which had also been updated to inform the preparation of the NGRBP. Consistent with this approach, it has been updated again to reflect the *Namami Gange* Program. Specifically, it undertakes the following: (i) updates estimates of non-user and user benefits of the Ganga as a function of the quality of the water and applies the benefit functions to derive values for the benefits of the proposed actions under the *Namami Gange* Program; and (ii) compares these benefits with the costs of the actions to provide quantifiable net benefits. This updated analysis finds a substantial increase in non-user benefits after allowing for changes in inflation and real income since the 2000 study. A comparison of the costs and benefits is given in the table below for the two elasticities of benefits with respect to income. The data show that benefits are well in excess of costs in both cases, particularly in the case of the higher income elasticities. The benefit to cost ratio is 2.5 in the base case and 8.5 in the high elasticity case and the internal rates of return are 32 percent and 90 percent, respectively. A detailed description is at Annex 5.

[35] Based on investments including sewer network component

[36] Markandya A and Murty MN. 2000. *Cleaning-up the Ganges: A Cost Benefit Analysis of the Ganga Action Plan*

Net Benefits of the *Namami Gange* Program

	Base Case Income Elasticities of WTP	Higher Income Elasticities of WTP
NPV of Costs US$Mn.	2,006	2,006
NPV Benefits US$Mn.	5,013	17,111
NPV Net Benefits US$Mn.	3,190	15,288
Benefit Cost Ratio	2.5	8.5
IRR	32%	90%

B. Financial Management

72. The following FM arrangements are proposed for the Project. Further information is in Annex 5

(i) **Disbursement and Eligible expenditures:** The total Project cost is estimated at US$1,119 million, of which US$400 million will be IBRD-financed. The method for disbursement of funds by the Bank will be "Reimbursement". The IBRD Loan will finance 100 percent of the Central share of eligible Project expenditure up to US$381 million and subject to a maximum limit for each sub-component.[37] Under the Infrastructure Development Component, the Bank will finance 100 percent of the Central government's share of eligible expenditure excluding land and rehabilitation & resettlement (R&R) costs, if any. For infrastructure investment contracts carried forward from the NGRBP, the existing cost sharing ratio between Center and State will continue.

(ii) **Flow of Funds:** NMCG is registered as a Society and will receive Project funds in an earmarked Project bank account from the budget of the DoWR, under the MoJS. NMCG will transfer funds to each SMCG on a quarterly basis for the implementation of infrastructure investments approved by NMCG based on demand for funds submitted by the respective SMCG. The NMCG will release installments to SMCGs only on receipt of expenditure statements for previous release and after adjustment of any unspent balance. The State Government will release its share of funds, if any, to the SMCG within two months of the receipt of the installment from the NMCG. Fund flow arrangements will be the same as that of the ongoing NGRBP. As required by GoI, in 2017 NMCG has switched over to Public Financial Management System (PFMS), which is a standard system of fund flow and primary bookkeeping designed for central sector schemes like the *Namami Gange* Program. Currently, all project bank accounts of NMCG, SMCGs and EAs are registered with PFMS and payments at all levels are happening through the PFMS system.

(iii) **Interim Unaudited Financial Reports (IUFRs):** Each SMCG will submit quarterly IUFRs to the NMCG in agreed formats. The NMCG will consolidate the IUFRs received from the SMCGs along with its own and submit a quarterly consolidated IUFR to the Bank within 45 days of the end of each quarter.

(iv) **External Audit**: Annual External audits of NMCG and SMCGs will be conducted by the Comptroller and Auditor General (C&AG) and State Auditor General (AG) respectively under Standard Terms of Reference agreed between the C&AG, DEA and the Bank for audit of Bank-financed projects. Pursuant to the World Bank Policy on Access to Information, the Bank will require that the NMCG disclose the audited financial statements on the Project website. The annual audited Project

[37] These limits are laid down in the Table "Project Cost by Components" in Annex 3.

financial statements of the NMCG and SMCGs will be submitted to the Bank, which will make these statements available to the public through its external website.

(v) **Internal Audit:** The NMCG and each SMCG will also have internal audits to assess the effectiveness of internal controls and to provide independent assurance on the adequacy of internal controls. Internal audit arrangements of the proposed SNGRBP is being further strengthened based on learnings from the ongoing NGRBP.

(vi) **Due diligence of EAs:** The EAs of the proposed SNGRBP are the same parastatals as those of the ongoing NGRBP. The EAs have adequate accounting and reporting systems to account for Project resources and expenditures.

(vii) **FM Manual:** An FM Manual was prepared for the ongoing NGRBP that laid out the detailed financial management processes of this project, including budgeting, fund flows, internal control frameworks, accounting, financial reporting and auditing. The Manual has been updated to reflect specific requirements of the proposed SNGRBP. It is an integral part of the *Namami Gange* Program Framework.

(viii) **FM Risk Rating: Moderate.** Under the ongoing NGRBP, FM-related concerns have included: delays in submission of IUFRs and audit reports; lack of internal audits for part of the implementation period; and staffing inadequacies in SMCGs. Most of these concerns have been addressed over time, but the timeliness and quality of audit reports remains a challenge. NMCG has initiated discussion with C&AG for timely submission of audit reports. Also, under the proposed SNGRBP, the coverage of internal audits will be increased. The FM risk of the Project at this stage is rated as 'Moderate'.

C. Procurement

73. **Procurement regulations**: Procurement for the proposed SNGRBP will be carried out in accordance with the World Bank's Procurement Regulations for IPF Borrowers for Goods, Works, Non-Consulting and Consulting Services, dated July 1, 2016 (revised in November 2017 and August 2018). Unless otherwise agreed with the World Bank, the World Bank's Standard Procurement Documents, Requests for Proposals, and Forms of Consultant Contract will be used. For Procurement under PPP Concessions and Similar Private Sector Arrangements, the selection will be carried out under the provisions of paragraph 6.42-6.45 of Bank Procurement Regulations. Procurement will be carried out in accordance with the provisions of the Project Procurement Strategy for Development (PPSD) and the Procurement Plan that may be updated from time to time with the World Bank's approval (details in Annex 5).

74. **E-Procurement**: The Project will use electronic procurement systems (viz. National Informatics Centre (NIC) platform) for aspects of the procurement process, including: issuing Procurement Documents and addenda, receiving applications/quotations/Bids/Proposals, and carrying out other procurement actions. This system has been assessed by the World Bank and was found to be acceptable.

75. **Procurement capacity**: The procurement arrangements will continue as under the ongoing NGRBP, building on the significant experience acquired and national and State levels, in particular for large PPP procurement and management. NMCG will retain the responsibility of overall Project implementation, funds allocation and investment monitoring. SMCGs shall coordinate at the State level

and EAs will be responsible for implementation of works through contractors. The EAs will be responsible for detailed procurement management functions like preparing and issuing tenders, opening and evaluation of the tenders, placing contracts, managing contract, regular supervision, and authorization of payments. NMCG will continue the practice of appointing Transaction Advisors to help the EAs from preparation to award and closure of contracts.

76. Risks and mitigation measures, including impact of COVID-19. The potential procurement risks are: (i) delays in the procurement process; (ii) poor participation of bidders in bidding process; (iii) delays in decision-making due to bureaucratic processes; (iv) non-compliance with agreed procurement arrangements; (v) lack of a satisfactory procurement complaint handling system; and (vi) impact of COVID-19 on the financial, infrastructure and construction sectors. Although the severity and duration of the impacts of COVID-19 are uncertain, they are expected to aggravate the stress on the financial sector, increasing the difficulty of reaching timely financial closure. The government's increasing need for resources to mitigate the impact of COVID-19 and economic slowdown may limit its ability to spend on infrastructure in the short term. The construction sector, also under stress may face more challenges related with project completion, new project financing and order inflows, on account of disruptions in the movement of labor and materials in the wake of COVID-19.

77. The following risk mitigation measures were developed in consultation with the implementing agencies: (a) use of skilled procurement staff for handling procurement activities; (b) adequate publicity, slicing and packaging of the works to maximize the interest of bidders; (c) careful design of qualification requirements for such packages and conducting vendor meets to understand concerns and suggestions of potential bidders; (d) monitoring of the Procurement Plan; (e) training provided by the World Bank; (f) use of e-procurement; (g) disclosure of procurement-related information; (h) appropriate handling of complaints; and (i) phase tender publication over time, organize pre-bid meetings and more broadly, work with Client to propose arrangements such as payment advances or other stimulus to help private operators go back to normalcy. The design of the Project is in itself a mitigation measure, by proposing infrastructure investments at a critical time and by introducing an IBRD guarantee for payment security for the three new HAM PPP investments to be procured under the Project. The IBRD Guarantee will provide 'AAA' risk mitigation with respect to the long-term payment obligations by the GoI under these contracts. Hence, it will help attract private investment and commercial financing for these investments (refer Section I Component 3 for details).

78. Justification for using HAM contracting model: As a part of project preparation, a market study on emerging lessons from the HAM contracting model was carried out for further details see Section III A: Technical Analysis.

79. Procurement Risk Rating: The overall procurement risk rating for the Project is assessed as 'Moderate' based on the risk factors and mitigation measures. Procurement risk and the progress on various mitigation measures will be reassessed during the implementation phase and the risk rating will be updated accordingly.

Legal Operational Policies

80. OP 7.50 on International Waterways: The Ganga River and its tributaries are considered international waterways for the purpose of the World Bank's Operational Policy 7.50 "Projects on

International Waterways". In fulfilment of this policy, a notification was sent to the Governments of China, Bangladesh and Nepal on December 27, 2019. No objection to the Project was received.

Safeguards

(i) Environmental Safeguards

81. Safeguards Category: Overall, the proposed Project will have a positive impact on targeted urban areas and the Ganga river. However, the Project will have the following potential impacts and risks during construction and operation phases:

- siting and design of treatment and disposal facilities in sensitive locations;
- management of site, health and safety issues during construction;
- potential risk of inadequate operation of facilities leading to impacts on water quality;
- disposal of treated sewage and sludge from the treatment facilities and their impact on the receiving environment; and
- loss of land, livelihood or sources of livelihood.

82. Based on this, the Project is assigned a safeguards category of "A" and Operational Policies 4.01 Environmental Assessment, 4.04 Natural Habitats, and 4.11 Physical Cultural Resources, are triggered.

83. Environmental Safeguards: The Ganga faces extreme pollution pressures and significant threats to its biodiversity. The proposed Project interventions to enhance sewage collection and treatment will have multiple positive environmental benefits. It is envisaged that the Project interventions, by reducing the pollution load in the river, will protect and enhance sustenance of these sensitive habitats. This will support efforts to conserve endangered species such as Gangetic Dolphin, freshwater crocodile and other flora and fauna that depend on the river. A recent survey[38] indicated that the mortality rate of Gangetic Dolphin reduced compared to the previous years. One of the reasons could be improved water quality and water availability in the river.

84. Safeguards Instruments: The investments identified to date under the proposed Project are located in the States of UP, Bihar and West Bengal, either on the main stem or tributaries of the river within these States. For each of the three HAM PPP investments to be procured under the Project, an Environmental and Social Due Diligence Report (ESDDR) was prepared. As the exact locations of additional infrastructure investments to be funded under the Project are not yet known, NMCG prepared an Environmental and Social Management Framework (ESMF). The ESMF outlines the procedures for screening investments for their impacts, the types of safeguard instruments to be prepared and the institutional responsibilities to prepare the instruments. The ESMF clarifies the responsibility for preparation of safeguards documents in case of different types of PPP contracts as follows:

(i) *HAM PPP contracts:* Preparation of ESDDR is the responsibility of the NMCG/EA and the preparation of an investment-specific Environment and Social Impact Assessment (ESIA) will be the

[38] Wildlife Institute of India, Conserving Gangetic Dolphin, Smart Strategy Implementation and Adaptive Management for the Ganga River (WII – GACMC, 2019).

responsibility of the winning bidder, based on the design that each selected concessionaire would have prepared after contract signing.

(ii) *DBOT contracts*: an upfront ESIA is the responsibility of NMCG/EA.

85. Institutional Arrangements: The NMCG recognizes environmental and social issues and plans to mitigate them through a set of management procedures detailed in the ESMF. The NMCG and SMCGs will ensure that policies and procedures described in the ESMF are applied to all investments financed under the proposed SNGRBP.

86. Disclosure: Advanced drafts of the ESMF, which includes an RPF, and ESDDRs were reviewed by the Bank and were disclosed in-country and on the World Bank's external website on February 21, 2020. A final ESMF, which includes an RPF, was reviewed by the Bank and disclosed in country on March 24, 2020 and on the World Bank's external website on April 6, 2020.

87. Climate assessment: The Project locations are present across varying geo-climatic conditions and are exposed, to varying degrees, to the risk of drought and flooding. The vulnerability to climate risks and the adaptive capacities to manage them varies at the State and local levels. The monthly flows during the monsoon are projected to increase under a future climate change scenario. Increased water flow and sedimentation in the Ganga basin due to climate change will lead to more floods in India. Flash floods in the upper regions of the river basin also trigger landslides and are expected to increase in frequency and intensity with rising temperature. Droughts are more common too, because there are now more days with no rain at all. Based on the results of the climate screening exercise, the Project design will incorporate adaptation measures to address the risks of climate vulnerability. Climate screening of the Project found the impact rating to be moderate. Climate and geophysical hazards are likely to impact the structural integrity, materials, siting, longevity and overall effectiveness of the investments. Investments under the Project will include household connections to sewerage system, wastewater treatment and disposal, and septage management. Investments involving wastewater treatment plants beyond 40 MLD capacity will be required to establish an energy recovery facility to minimize net electricity consumption.

88. Climate co-benefits: The total climate co-benefits in this Project amount to US$54.77 million (13.7 percent). The Project has potential for increasing climate co-benefits.

89. Green House Gas Accounting: The GHG Accounting assessment used the latest Intergovernmental Panel on Climate Change guidance of 2019. It quantifies the net annual average emissions at 63,979 tCO2-eq and the emissions during the economic lifetime at 4,053,299 tCO2-eq (gross) and 1,919,426 tCO2-eq (net). These emissions are obtained on the assumption that wastewater treatment technology used will be Sequential Batch Reactors, which is among the most emissive as its nitrification and denitrification process releases nitrogen gas (N_2) in the atmosphere. The choice of technology will be determined by the private operator for each investment under the Project and will conform to national discharge standards for STPs. The total emission levels may therefore decrease but the Project is likely to remain a net emitter. The economic analysis costed GHG emissions at shadow price of US$80/ton. Taking this into consideration reduces the NPV of the Project by US$38 million or 3 percent.

(ii) Social Safeguards

90. Key Issues. While communities are expected to benefit from the Project, its implementation may lead to adverse social impacts. During construction of investments, these might potentially include:

- loss of land or structures;
- loss of livelihood and/or loss of access to areas for livelihood support;
- loss of common property resources, and
- public safety issues because of labor influx and construction activities.

91. Operational Policies Triggered. Operational Policies 4.11 Physical and Cultural Resources and 4.12 Involuntary Resettlement are triggered. OP 4.11 has been triggered considering the presence of number of historic and heritage structures in the Project area and cultural significance of the Ganga river. OP 4.12 has been triggered as social due diligence carried out for three HAM based investments shows that the investments may lead to loss of small piece of land (which will be purchased through mutual negotiation on willing buyer – willing seller basis), potential loss of livelihood and will cause inconvenience to residents around the construction zone. However no involuntary resettlement is envisaged. Investment-specific ESIA will be carried out and ESMP / RAPs will be prepared as required as per the Resettlement Policy and Land Acquisition Framework (RPLAF) that has been prepared as part of ESMF. OP 4.10 Indigenous Peoples is not triggered as the experience of the ongoing NGRBP shows that urban areas where investments are being implemented across all the five states does not have tribal population. Even if some tribal households are found, they have largely assimilated with the mainstream population

92. Social Safeguard Instruments. As not all investments have been identified, NMCG updated the ESMF prepared for the ongoing NGRBP to include the baseline information on tributaries to be included in the proposed SNGRBP. The ESMF is to be applied to all investments under the proposed Project. The ESMF includes a Resettlement Policy Framework (RPF), which specifies the procedures, probable impacts, eligibility, entitlements, and other measures to be followed in the event of resettlement and/or land acquisition. The ESMF also includes a Gender Development Framework (GDF), which will help analyze gender issues during the preparation stages of the Project and design interventions to address women's needs. Gender analysis will be part of the Social Impact Assessment (SIA).

93. Institutional Arrangements: NMCG is responsible for providing overall guidance implementation of ESMF provisions. At State level, the SMCG will be responsible for ensuring implementation of ESMF procedures in all investments. Social specialists have already been appointed in NMCG and all SMCGs. All EAs will designate Social Coordinators at the investment level.

94. Citizen Engagement: The Project includes a robust citizen engagement strategy: (a) community/stakeholder consultations as the primary tool to promote stakeholder participation in the Project design and implementation process; (b) robust communications and public outreach program to mobilize citizens, community groups, academics, private sector, and so on as key actors to achieve a clean and healthy Ganga; (c) citizen monitoring committee to be established at investment level to assess and generate feedback on the Project; and (d) GRM to respond to the needs of beneficiaries, including Project-affected persons.

95. Gender-specific considerations and gender-based violence (GBV)/sexual exploitation and abuse. The primary gender gap pertaining to the operation is low participation of women in technical roles, as engineers and planners in the water and waste management sector. To address this, the operation will: a) review and implement institutional guidelines related to women's re-entry and advancement; and b) develop a network of women mentors (women professionals in technical roles) and women interns by offering internship opportunities to women students enrolled in STEM courses. Further, the proposed SNGRBP will also: a) provide technical training opportunities for women professionals; b) offer field placements; c) support improving the work environment for women staff by providing clean and separate sanitation facilities in the office and at work sites; d) explore provision of safe and reliable transport to support field visits and late working hours; and e) strengthen the functioning of the Internal Complaints Committee in accordance with the GoI's Sexual Harassment Act, 2013.

96. The GBV risk assessment carried out for the ongoing NGRBP indicated the Project is low risk for GBV and accordingly an action plan was prepared which is under implementation by Project implementing agencies and contractors. Since there is continuity of participating States and carry-forward of selected investments from the ongoing NGRBP to the proposed SNGRBPSNGRBP, the risk GBV risk assessment is retained and the action plan will be updated to include any new investments. The Project will follow the recommendations of the GBV Good Practice Note.

V. GRIEVANCE REDRESSAL

97. Grievance Redress Mechanisms (GRMs): The ongoing NGRBP has a multi–tier grievance redress system established national, State and executing agency levels. Grievances of any kind are submitted through various mediums (e.g. a dedicated toll-free number, direct calls to concerned officials, online via a dedicated portal, in written form, etc.) and are addressed. The same grievance redress mechanism will continue for SNGRBP as well.

98. Communities and individuals who believe that they are adversely affected by a World Bank supported Project may submit complaints to existing Project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address Project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit *http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service*. For information on how to submit complaints to the World Bank Inspection Panel, please visit *www.inspectionpanel.org*.

VI. KEY RISKS

99. The overall risk for the Project is rated as Substantial. The individual ratings for risk categories are summarized in the datasheet of this document. Key risks of note are described below:

100. Political and Governance: Substantial. The priority and commitment accorded to the Ganga clean-up by successive national governments remains high. The *Namami Gange* Program is a flagship program of the Central government and a stated priority of the current Prime Minister, who chose in 2014 to contest the national elections from Varanasi, a major city located on the banks of the Ganga. Ownership is uneven across basin States and is related to political alignment, which is susceptible to change over time. In addition, project management capabilities vary across States. Hence, the political and governance risks are rated as Substantial. The Project design has incorporated measures to mitigate such risks. NMCG is selecting investments on the basis of clear and published technical criteria. The Project will engage with the States, EAs and sub-State level institutions early to build ownership, clarify roles and responsibility sharing. It also proposes TA support to improve capacities of EAs for PPP contract management.

101. Macroeconomic risk: Moderate. Until recently, this would have been rated Low in view of the robust finances and strong fundamentals of the economy. However, the supply and demand disruptions caused by COVID-19 will likely aggravate the economic slowdown and stress in the financial sector. In view of the rapidly evolving circumstances of the pandemic, it is difficult to predict to what extent this will affect the Indian economy and the *Namami Gange* Program. The macroeconomic risk is therefore rated as Moderate. The World Bank has worked with the GoI to design an emergency response to the COVID-19 pandemic and will continue to monitor the evolution of the situation and to provide adapted support going forward. At a Project level, the use of an IBRD Guarantee provides risk mitigation with respect to the long-term payment obligations of the government under the three HAM PPP investments and hence will help mobilize private investment and commercial financing for these projects. The investments in infrastructure by the Project will contribute to stimulating economic recovery and job-creation after the COVID-19 pandemic.

102. Sector strategies and policies: Substantial. The use of the HAM PPP contracts for wastewater treatment has received a good response from the market. While there is increasing evidence of successful implementation of HAM PPPs during the construction phase, there is as yet insufficient indication of their effectiveness during the O&M phase. This introduces a potential risk that this innovative model may not be able to deliver on its promise to keep the private sector involved and meet discharge standards throughout the 15-year O&M phase. The initial experience of the first generation of HAMs now starting the O&M phase under the *Namami Gange* Program is encouraging, with private operators reportedly meeting discharge standards. This risk will be mitigated by close joint supervision by EAs, SMCGs, NMCG and the Bank to identify and address potential O&M issues early on.

103. Recent changes introduced by the GoI that make standards for sewage discharge more stringent will increase the cost of wastewater treatment, affect the choice of treatment technology and reduce the market of private operators immediately able to run plants that are capable of treating wastewater to the revised standards. This risk will be mitigated by NMCG and the Bank through the bidding documents of the three HAM PPPs to be procured under the Project to find the right balance between stricter technical criteria and ensuring sufficient qualified competition. The Project will support the organization of market consultations to explain the new discharge standards, their expected impacts on sanctioned costs and encourage operators to adapt to this new reality and be able to submit bids in keeping with the Project implementation schedule.

104. The *Namami Gange* Program is organized around three phases, starting in 2015 and likely to extend to beyond 2028. When the Program was launched, a budget was initially approved for a period of

five years from 2015-20 and this has been extended through December 2021. The high level of political commitment to the Program suggests that an extension of the *Namami Gange* Program will be approved by GoI in due course.

105. Technical design: Substantial. The infrastructure, construction and banking sectors and the economy as a whole are under stress. Several major Indian infrastructure construction companies and one of the largest private banks have recently filed for bankruptcy. The three DBOT contracts to be carried forward from the NGRBP, Begusarai, Munger and Buxar, which combine sewer network extension and STP construction, all experienced termination during the construction phase due to under-performance or bankruptcy of the private operator. The consequences of the current national lockdown due to the COVID-19 pandemic for the economy are unknown at this point. The roll-out of more stringent discharge criteria in this context will further increase the stress. The infrastructure investments under the Project will also help mitigate the consequences of the COVID-19 pandemic. It will contribute to stimulate the economy and job-creation. The Project design also include concrete measures to improve preparedness and resilience of investments to such shocks, and to be able to reallocate funds for emergency response if required.

106. The private sector and financial markets have demonstrated their technical understanding of the proposed HAM PPP and the attractiveness of this contractual model for delivering infrastructure investments. However, due to the limited access to long-term financing for HAM PPP contracts, bidders may face increasing constraints in obtaining the required amount of commercial financing and, therefore, in reaching financial closure on a timely basis. Such constraints will also be reflected in higher risk premia charged by the private operators. These risks are considered substantial in the current economic context and considering the COVID-19 outbreak, unless adequate measures are introduced by the GoI to open additional liquidity in the market and stimulate the infrastructure and financial sectors. The mitigation measure to address financing and payment risk includes introduction of an IBRD guarantee for payment security for the three new HAM PPP to be funded under the Project. The IBRD guarantee will provide additional comfort to private investors and operators in mitigating payment risks for the full contract duration. NMCG and the Bank will continue to monitor the financial markets for liquidity and access to long-term capital and will enhance the financial due diligence by requesting that letter of comforts from identified financiers be submitted jointly with bids and align the timing of financial closure accordingly.

107. There is a risk of large variation of effluent quality in I&D investments, which may be more difficult to treat than wastewater collected in sewer networks. Wastewater tapped from open drains is more subject to dilution during rain events or to contamination by industrial wastewater. HAM PPP contracts include mitigation measures for this risk (namely if effluent is above or below the contractual range, the private operator will not be liable to penalties for not meeting the discharge standards). However, variable pollution loads at STPs' inlets may affect the chemical and bacteriological treatment processes for some time, which may create a liability. Additional mitigation measures include real-time water quality monitoring at STPs' inlets and outlets and close supervision, by NMCG and the SMCGs, EAs and the Bank, of private operators' capacity to stabilize treatment processes quickly. Another I&D risk is that most drains carry large quantities of solid waste, some part of which is small enough to pass through the screens and negatively affect the capacity of pumping stations and STPs to function properly. Mitigation measures under the Project include ensuring that the designs of pumping stations and STPs include high quality screening systems and maintenance at key locations, well-crafted stormwater overflows, and promoting timely planning and development of sewer networks.

108. Institutional capacity for implementation and sustainability: Substantial as a result of uneven ratings at various administrative levels. At the national level, the risk to institutional capacity is low. NMCG has evolved into a strong, well-staffed and effective institution. It has gained substantial expertise and has a good track record in designing and implementing over 310 various investments under the *Namami Gange* Program, of which over 150 in wastewater. It has successfully introduced the innovative HAM PPP contract to complement DBOT contracts. The proposed study on strengthening the institutional framework for Ganga basin management will assess and mitigate potential risk as it reviews roles and responsibility-sharing and proposes options for Ganga basin management. The Project will include legal covenants in place under the ongoing NGRBP, requiring "*maintaining qualified personnel and resources sufficient to carry out project management*" and ensuring "*continuity of the leadership of the NMCG and the SMCGs"* (refer to Datasheet).

109. At the State level, the institutional capacity risk is Moderate. SMCGs face staffing and capacity constraints, which undermine their capacity to supervise and monitor investments. Investments in each State will be implemented by the State EA, which is an established *parastatal* with demonstrated experience in implementing investments including execution of a quality assurance function. However, the staffing situation in SMCG and EAs is uneven and, as demonstrated by recent experience, can be impacted by unpredictable decisions at the state level. This risk will be mitigated by ensuring knowledge and experience exchange from NMCG to SMCGs, by temporary secondment of NMCG staff and/or consultants to SMCGs, and by internal staff allocation when EA allows it, consistent with the legal covenant in place under the ongoing NGRBP, which states: "*DOWR and the States shall maintain a dedicated, multi-disciplinary team of suitably qualified personnel in each Executing Agency (EA) with resources sufficient to carry out their respective parts of the project*". This risk has been mitigated by introduction of the above legal covenant in the proposed Project.

110. The institutional risk at ULB level is high. ULBs have weak capacity, lack autonomy in functioning and are financially near-completely dependent on the State government. While ULBs have the Constitutional mandate for water and sanitation service delivery, in reality, the water and sanitation service delivery is *de facto* implemented by the State government on financing aspects and by State EAs on technical aspects. Due to the inherent weaknesses and poor finances of ULBs, the private sector has been reluctant to enter into PPP contracts with ULBs. The *de facto* primacy of the State government and the EAs in this sphere leaves the ULBs generally insufficiently informed or involved, although they have an important role in granting permissions for construction, in coordinating planning with other works and in encouraging and supporting households to connect to sewer networks, when they are included in investments. The design of the Project is in itself a robust mitigation measure against the risk of weak ULB capacity and finances. The design of PPPs under the Project ensures that payments for CAPEX and up to 15 years of OPEX are covered by the Central government. EAs and private operators retain the responsibility not only of building the assets but also of managing them, under the close supervision of NMCG and the SMCGs, during the 10 or 15 years of O&M under the PPP contracts. The Project will also engage ULBs early in the process of investment preparation and will support them to develop integrated city-wide sanitation plans. It will also provide performance incentives to ULBs that show improvement in planning and management of wastewater services.

111. The sustainability risk is Substantial. The absence of a revenue model for NMCG, and at the ULB level for wastewater collection and treatment, introduces a risk to the long-term sustainability of the assets funded under the Project. Mitigation measures under the Project include assessing, in close

collaboration with the Central and State governments and ULBs, pragmatic roles and responsibility-sharing arrangements for the operations of the assets. The Project will also support the preparation of a plan and a roadmap to establish O&M arrangements, develop related policies for long-term sustainability of service delivery at the completion of the PPP contracts and introducing a performance-based approach to funding allocation combined with dedicated technical assistance to support reform for greater sustainability. GoI may be interested in scaling up such approaches at the Program level in a later phase.

112. Fiduciary: Moderate. Procurement and FM risks are considered Moderate thanks to the considerable experience gained by NMCG, the SMCGs and the EAs under the ongoing NGRBP and the broad alignment of the *Namami Gange* Program with Bank procurement requirements. Nevertheless, there is a possibility that some of the EAs require improving audit arrangements and financial management of investments. The mitigation measures to address them is to ensure close monitoring of investments by NMCG and the Bank during Project implementation. Procurement risks, including due to COVID-19, consequences of the national lockdown in India and mitigation measures are presented in Section II.B.

113. Environmental and Social: Substantial. The risk of delayed and insufficient communication to key stakeholders, and limited understanding of the risks by ULBs, key line departments and community level stakeholders warrant an Environmental and Social risk rating of Substantial. EAs' awareness of these risks has substantially improved since the start of the NGRBP. Environmental and social risks related to known investments supported under the Project have already been identified and suitably mitigated. Mitigation measures includes maintaining Project management support to SMCGs and EAs in the five States in which NGRBP is implemented, to ensure that experienced environmental management and social development specialists are available at NMCG and SMCGs throughout Project implementation. The Project will promote introducing septage management, which is currently unregulated or only partially managed by ULBs. NMCG will continue its efforts to increase awareness and communication activities to key stakeholders to enhance their knowledge and capacities and will institutionalize the monitoring of environmental and social due diligence procedures in all investments.

114. Stakeholders: Substantial. Some investments are likely to pose challenges to both institutional stakeholders and beneficiary communities. There is scope to improve coordination between the Ministry of Jal Shakti's own agencies (in particular between NMCG and CWC), and other agencies such as CPCB (MoEF&CC), and with their equivalents at the State level. These institutions will also be compelled to follow environmental norms set forth by NMCG and others, to ensure that the efforts to reduce pollution are sustained. Since these institutions are not involved or insufficiently involved in the ongoing NGRBP, NMCG will continue its advocacy and coordination efforts to ensure that they comply with pollution reduction measures, directly or through the contractors they manage.

115. At the ULB level, the reliance on interception and diversion (I&D) of open-air drains carrying wastewater and not including the development or extension of sewerage networks creates a risk of not sufficiently cleaning the city, as it does not improve human and environmental health in the cities. I&D is a technically more attractive solution to meet the overall goal of cleaning the river. I&D is comparatively faster to implement and gives large flows of wastewater into STPs from the day of commissioning. The Project design itself includes mitigation measures by promoting the development of participatory and citywide planning of wastewater infrastructure, supporting the preparation of sewer network investments

and supporting workshops to mobilize funds for their implementation, and setting up funds under the Sub-component 2.4 which may include funding some of these investments.

116. At the community level, disruption during construction, and the potential reuse of treated wastewater in agriculture or other domestic uses or sale of treated water to industries by the contractor could pose challenges as they may require the development of new pipelines and facilities not included in the investments, would require clear mechanisms to ensure technical and financial sustainability of these additional infrastructure, and represent a risk of pollution incident or local flooding in case of malfunction. This risk would be mitigated by close supervision and by NMCG for all investments under the *Namami Gange* Program. Moreover, GRM systems in place under the ongoing NGRBP will be utilized under the proposed Project.

VII. RESULTS FRAMEWORK AND MONITORING

Results Framework
COUNTRY: India
Second National Ganga River Basin Project

Project Development Objectives(s)

The objective of the Project is to reduce point-source pollution from targeted Urban Areas of the Ganga river basin and support the Central Ministry to strengthen the institutional framework for Ganga river basin management.

Project Development Objective Indicators

Indicator Name	PBC	Baseline	End Target
Reduce point-source pollution from targeted Urban Areas of the Ganga river basin			
Amount of BOD pollution load reduced due to Project interventions (Metric tons/year)		0.00	30,000.00
Number of STPs constructed or rehabilitated under the project which meet the national discharge standards at least 95 percent of the time (Number)		0.00	8.00
Support the central ministry to develop an institutional framework for Ganga river basin management			
Adopted recommendations of the study on institutional framework for Ganga river basin management are implemented (Percentage)		0.00	80.00
A public online system for continuous monitoring of water quality and flow in the Ganga and selected tributaries is functional (Yes/No)		No	Yes

Intermediate Results Indicators by Components

Indicator Name	PBC	Baseline	End Target
Institutional Development			
Number of States which have a roadmap for sustained O&M sanitation assets beyond the timeframe funded by Central Government (Number)		0.00	1.00
A system for more detailed water balance tracking in key reaches is developed and implemented to guide operational flow regime optimization (Yes/No)		No	Yes
Detailed assessment of environmental flow options for all impacted river reaches completed, documented and disseminated (Yes/No)		No	Yes
Number of ULB with an integrated city-wide sanitation plan informed by a GIS and roadmap for financing long-term operation and maintenance approved by the ULB (Number)		0.00	2.00
Percentage of female staff in NMCG and state-wise EAs (Percentage)		4.30	20.00
Share of grievances redressed within 30 days of receipt (Percentage)		80.00	90.00
Infrastructure Development			
Wastewater treatment capacity created under the project (Liters (Million))		0.00	800.00
Volume of wastewater treated due to project interventions (Liters (Million))		0.00	600.00
Number of facilities setup for fecal sludge treatment under the project (Number)		0.00	5.00
Number of water quality monitoring stations generating real-time data (Number)		76.00	150.00

Indicator Name	PBC	Baseline	End Target
Nb of km of network laid under the project (Kilometers)		0.00	800.00
Nb of house connections delivered under the project (Number (Thousand))		0.00	200,000.00
Program communication and management			
Number of mass media campaigns implemented to promote behavior change (Number)		0.00	4.00
Share of core staff positions filled in each implementing agency maintained above 80% at any point in time (Percentage)		80.00	90.00

Monitoring & Evaluation Plan: PDO Indicators

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Amount of BOD pollution load reduced due to Project interventions	Quantity of Biochemical Oxygen Demand (BOD) abated based on wastewater treatment at STP, consolidating real-time monitoring of BOD quantity at inlet minus the quantity of BOD at the outlet of each STP built or rehabilitated under the Project.	Daily consolidation of measurements, monthly reporting from States to NMCG and consolidation by NMCG in their quarterly	While the ultimate measurement mechanism should rely on real-time water quality monitoring systems installed during the Project and	It is calculated by taking the difference between the BOD concentration at the inlet and outlet points of the STP in mg/l. Volume and BOD data will be provided every 2 hours by the real-time water quality monitoring devices installed at each STP, allowing to	S/CPCB and NMCG

		reports, shared to the Bank.	fed the data into NMCG's monitoring interface, interim solutions based on self-measurement and independent spot-checks may be used until the RTWQM and interfaces are in place.	calculate the quantity of BOD avoided for each time slot. The data will be consolidated on a monthly basis.	
Number of STPs constructed or rehabilitated under the project which meet the national discharge standards at least 95 percent of the time	Number of STPs constructed or rehabilitated under the project which are in compliance with the national discharge standards for BOD at least 95 percent of the time	Quarterly, through NMCG Quarterly Progress reports	Real-time water quality monitoring stations installed under the Project will provide every 2 hours a data point on volume, BOD, COD, TSS, pH at inlet and outlet of	Volume and BOD data will be provided every 2 hours by the real-time water quality monitoring devices installed at each STP. An STP will achieve the requirement of this indicator if less than 19 increments of 2 hours show data above the discharge standard for BOD. (A month has 365 increment of 2 hours, 5% is 18.25)	S/CPCB and NMCG

			each STP funded or rehabilitated under the Project. This data will be fed into NMCG's monitoring interface. Interim solutions based on self-measurement and independent spot-checks may be used until the RTWQM and interfaces are in place.	Every increment for which the discharge standard is not met will lead to applying the contractual daily penalty for not meeting the discharge standard to the operator.	
Adopted recommendations of the study on institutional framework for Ganga river basin management are implemented	This indicator will monitor the completion of the study on institutional framework for Ganga river basin management and that the adopted recommendations of the study are being implemented.	quarterly, based on actual implementation of the adopted recommendations.	DoWR, RD & GR of the MoJS, in collaboration with NMCG, which will record progress through their	NMCG Quarterly report and regular Bank supervision	DoWR, RD & GR of the MoJS

			quarterly progress reports		
A public online system for continuous monitoring of water quality and flow in the Ganga and selected tributaries is functional	Interface integrating data from the national Water Resources Information System (CWC-managed), tailored to NMCG's needs of monitoring continuous (real-time or frequent updates) water quality and river flow and feeds an online system available to the public.	Quarterly from year 2	India Water Resources Information System	Real-time collection from WRIS, including of data contributed by real-time water quality monitoring stations installed under the Project and the NGRBP.	NMCG and CPCB

Monitoring & Evaluation Plan: Intermediate Results Indicators					
Indicator Name	**Definition/Description**	**Frequency**	**Datasource**	**Methodology for Data Collection**	**Responsibility for Data Collection**
Number of States which have a roadmap for sustained O&M sanitation assets beyond the timeframe funded by Central Government					
A system for more detailed water balance tracking in key reaches is developed and implemented to guide operational flow regime optimization	Tool to consolidate in space and time: level in reservoirs, abstraction from irrigation canals, domestic and industrial use, e-flow requirement and major events (Khumb) and optimize use for greatest	One-off tool development	NMCG to coordinate with CWC and State agencies	WRIS and other direct arrangements as required	NMCG

	environmetnal and economic benefits.				
Detailed assessment of environmental flow options for all impacted river reaches completed, documented and disseminated	Detailed assessment of environmental flow options for all impacted river reaches completed, documented and disseminated	One-off	NMCG	Quarterly progress reports	NMCG
Number of ULB with an integrated city-wide sanitation plan informed by a GIS and roadmap for financing long-term operation and maintenance approved by the ULB	Each ULB to develop a plan for city-wide coverage integrating sanitation and treatment development, through piped or on-site solutions, supported by a full GIS mapping of wastewater networks, pumping stations, STPs, FSM discharge points and eixsting property data. Options for financing long term O&M will promote utility creation through institutional isolation of sanitation service, possible revenue streams and autonomy in governance. The plan preparation will seek to stimulate ULBs to update property databases for revenue generation. The plan will seek to integrate river and wetland	One-off for each city	ULB	Plans approved by ULB city councils, States Urban Development Departments to support and NMCG to supervise	ULB, States Urban Development Departments, NMCG

	management, drainage and solid waste to develop holistic decision-making at the urban metro / catchment level.				
Percentage of female staff in NMCG and state-wise EAs	This indicator will measure female staff who are able to progress from their current grades in NMCG and EAs during the project implementation period.	Once a year, starting Year 2	Data from NMCG and state level EAs	Administrative/HR data from state level EAs	state level EAs
Share of grievances redressed within 30 days of receipt	NMCG, SMCG and EAs to monitor the number of grievances redressed within 30 days of receipt and the share of the total this represents. A grievance is reddressed when the complainant receives a response to the issue raised.	Quarterly, Year 2 Onwards	EAs, SMCG, NMCG	Consolidated data on GRM monitoring maintained at NMCG and SMCG	EAs, SMCG, NMCG
Wastewater treatment capacity created under the project	Measures the capacity of wastewater treatment facilities constructed or rehabilitated under the Project	Quarterly	Progress reports	EA monitoring, SMCG and NMCG supervision	EAs, SMCG, NMCG
Volume of wastewater treated due to project interventions	This indicator measures the volume of wastewater conveyed to STPs built or rehabilitated under the Project	Quarterly, Year 2 Onwards	Operational real-time water quality monitoring data from the Sewage	STPs built or rehabilitated under the Project will be equipped with real-time monitoring systems providing	NMCG/EAs

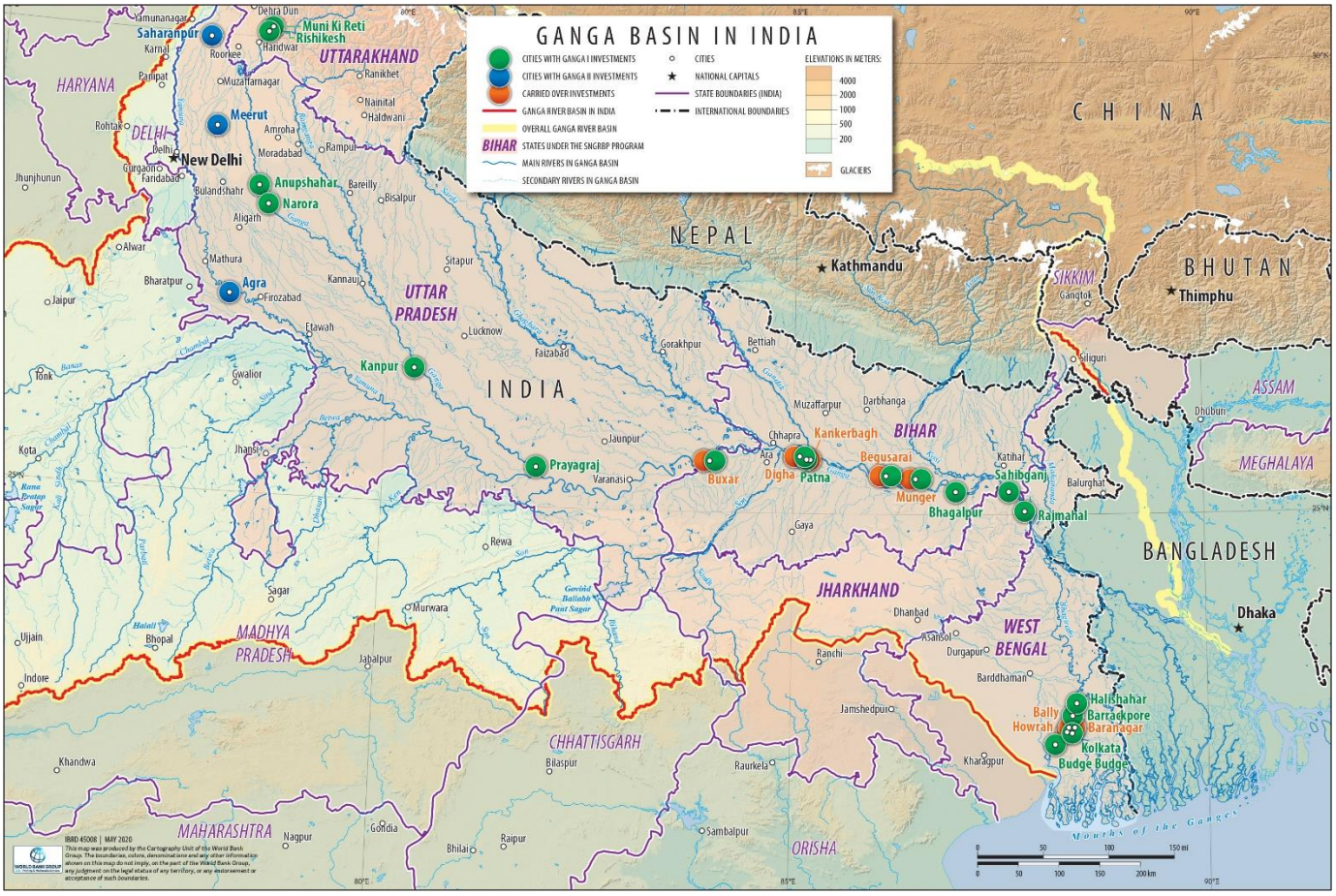
			Treatment Plants	every [2 hours] a data point on volume monitoring at inlet of each STP. This information will be collected on a monthly basis by consolidating the 365 increment of 2 hour measurement during the month.	
Number of facilities setup for fecal sludge treatment under the project	Measures number septage treatment facilities created (standalone or co-treatment at STP)	Quarterly	Progress reports	EA monitoring, SMCG and NMCG supervision	EAs, SMCG, NMCG
Number of water quality monitoring stations generating real-time data	Self-explanatory. Target value to be determined. Stations will be proposed at inlet and outlet of each STP built or rehabilitated under the Project, station upstream and downstream each major urban center and at each nalla discharging drainage water into the Ganga or selected tributaries	Quarterly	Progress reports	SMCG – SPCB and NMCG -CPCB supervision	SMCG, NMCG
Nb of km of network laid under the project	Sum of sewerage nework length laid (sewerage network and rising mains) in investments under the project	Quarterly	Progress reports	EA monitoring, SMCG and NMCG supervision	EAs, SMCG, NMCG

Nb of house connections delivered under the project	Number of households in which greay water and blck water outlets are conveyed to a sewer network built rehabilitated or operated under the Project	Quarterly	Progress reports	EA monitoring, SMCG and NMCG supervision	EAs, SMCG, NMCG
Number of mass media campaigns implemented to promote behavior change	This indicator measures the outreach campaigns developed and its effectiveness to plan and implement behavior change for pollution reduction, whether mass-media campaigns implemented by NMCG or targeted campaigns implemented by States or sub-State institutions	Quarterly, Year 1 onwards	NMCG and state level institutions	NMCG Quarterly Progress report will consolidate and monitor progress	NMCG and state level institutions
Share of core staff positions filled in each implementing agency maintained above 80% at any point in time	Core staff positions include Director-level positions and key procurement, FM safeguards and M&E staff	Quarterly	NMCG, SMCG and EAs	To be included in NMCG Quaterly progress reports, which will consolidate information from States quarterly progress reports	NMCG, SMCG and EAs

VIII. INDICATIVE TERMS AND CONDITIONS FOR THE GUARANTEE

A Summary of Indicative Terms and Conditions of a Proposed IBRD Guarantee with a Letter of Credit in Support of Governmental Payments is provided in Annex 7.

ANNEX 1: Indicative Map of the Ganga basin



ANNEX 2: Ganga Water Quality Data

1. The water quality of the Ganga has been assessed as unfit for many 'best uses', particularly 'bathing' in several stretches (see Table 1), as designated by Central Pollution Control Board (CPCB) water quality standards. The best-use classes designated by CPCB are:

- A- Drinking Water Source without conventional treatment but after disinfection;
- B- Outdoor bathing (organized);
- C- Drinking water source after conventional treatment and disinfection;
- D- Propagation of Wild life and Fisheries;
- E- Irrigation, Industrial Cooling, Controlled Waste disposal.

2. From its source in Gangotri in the State of Uttarakhand until Kannauj in Uttar Pradesh (UP), the river water quality is fit for bathing based on a combination of the three key parameters – Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD) and Fecal Coliforms (FC)[39]. Once the river enters Kannauj, water quality sharply deteriorates and from there on until discharge into the Bay of Bengal, the level of FC is higher than the permissible level for bathing[40]. In addition, there are three critical stretches where BOD is also higher than the permissible level: from Kannauj to Prayagraj, and from Varanasi to Ghazipur in UP, and from Tribeni to Uluberia in West Bengal.

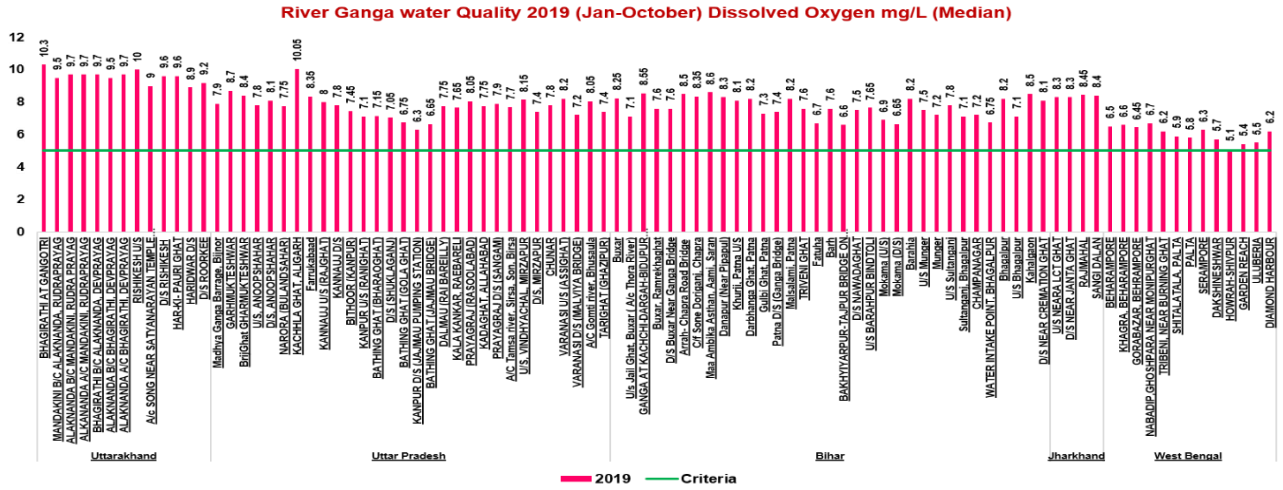
Table 2.1: Primary Water Quality Criteria for Bathing, as per Environment Act Amendment Rules (2000), notified by Ministry of Environment, Forests and Climate Change

Criteria	Rationale
1. Faecal Coliform 500 (desirable) MPN/100ml: 2500 (Maximum Permissible) 2. Faecal Streptococci 100 (desirable) MPN/100ml: 500 (Maximum permissible)	To ensure low sewage contamination. Faecal coliform and faecal streptococci are considered as they reflect the bacterial pathogenicity. The desirable and permissible limits are suggested to allow for fluctuation in environmental conditions such as seasonal changes, changes in flow conditions etc.
3. pH: Between 6.5-8.5	The range provides protection of the skin and delicate organs like eyes, nose, ears etc. which are directly exposed during outdoor bathing.
4. Dissolved Oxygen: 5 mg/l or more	The minimum dissolved oxygen concentration of 5 mg/l ensures reasonable freedom from oxygen consuming organic pollution immediately U/s which is necessary for preventing production of anaerobic gases (obnoxious gases) from sediments
5. Biochemical Oxygen Demand 3 day, 27°C: 3 mg/l or less	The Biochemical Oxygen Demand of 3 mg/l or less of the water ensures reasonable freedom from oxygen demanding pollutants and prevent production of obnoxious gases.

[39] Bathing class water quality corresponds to the following standards: BOD: 30 mg/L, DO: up to 5 mg/L, and FC: 2,500 per 100 ml.
[40] NMCG, 2020, Water Quality in River Ganga.

3. **Beginning in 2019, the water quality of the Ganga started to show modest yet encouraging improvements**. The Central Pollution Control Board (CPCB) of the GoI reports that, in 2019, levels of Dissolved Oxygen (DO) met the bathing water quality threshold for DO in the entire main stem of the Ganga (over 2,500 km). Between 2014 and 2019, levels of DO, Biochemical Oxygen Demand (BOD) and Fecal Coliforms (FC) improved in several stretches of the main stem of the river. During an unprecedented national lockdown from March 2020 onwards to curb the spread of COVID-19, industries stopped operating, agricultural activity halted, and rivers carried much less solid waste. This, and higher flows in the river compared with the same period in 2019, led to a reportedly visible improvement in the water quality of the Ganga and some of its heavily polluted tributaries. The National Mission for Clean Ganga (NMCG) and CPCB are using this opportunity to document the share of the pollution generated by domestic wastewater, as it is the source of pollution least affected by the lockdown, which could be used as a baseline for further action to reduce pollution discharges into the river basin. As of April 2020, official measurements by the CPCB are yet to be released[41].

Figure 2.1 Ganga Water Quality, Jan-Oct 2019: Dissolved Oxygen, mg/l (median)



Total locations- 93
Complying- All locations

https://economictimes.indiatimes.com/news/politics-and-nation/lockdown-health-of-river-ganga-improves/ articleshow/ 74946264.cms?from=mdr> Accessed April 7, 2020

Figure 2.2 Ganga Water Quality, 2014 vs 2019, Jan-Oct: BOD, mg/l (Median)

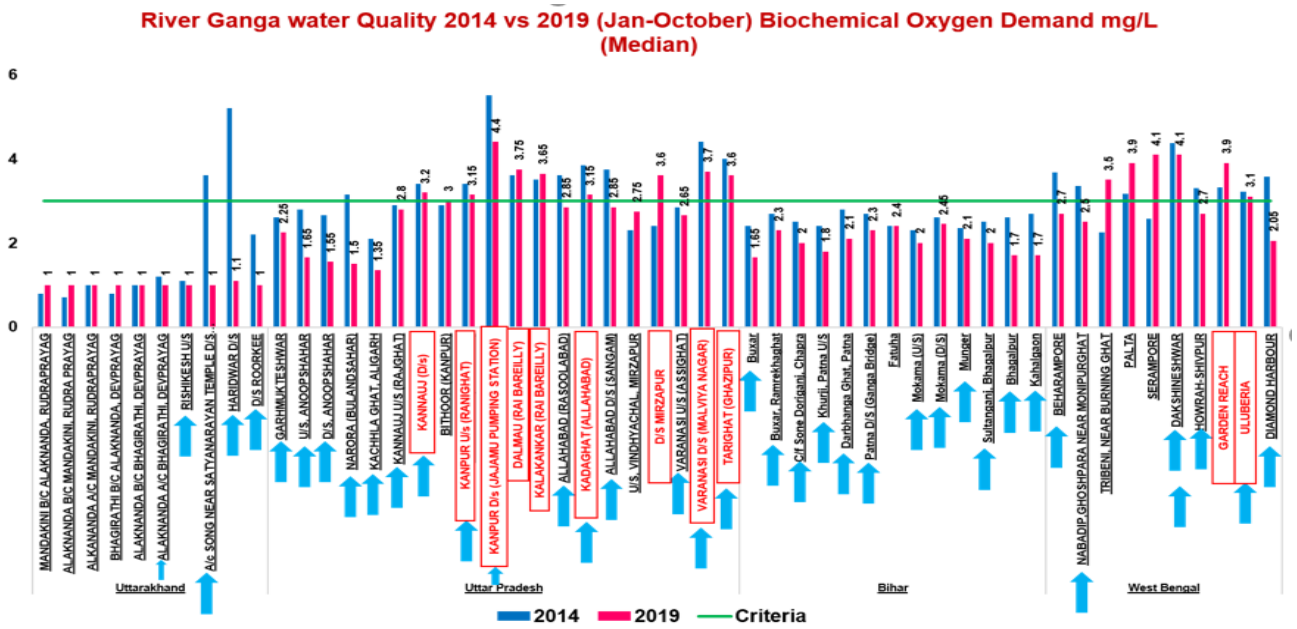
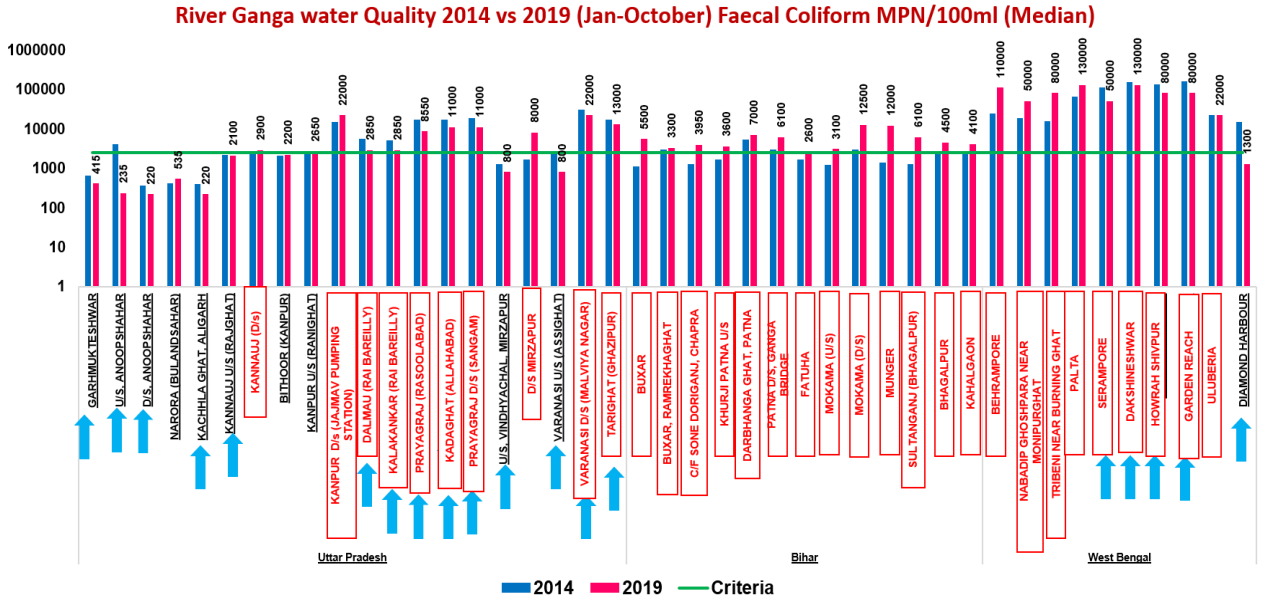


Figure 2.3 Ganga Water Quality, 2014 vs 2019, Jan-Oct: FC, MPN/100ml (Median)



ANNEX 3: Detailed Project Description

Component 1: Institutional Development: This component will support to the national, State and municipal governments to strengthen implementation and financing arrangements and develop a framework to improve Ganga river basin management.

Sub-component 1.1 – Strengthen the institutional framework for Ganga basin management

1. *Institutional and Stakeholder Assessment and development of an institutional framework for Ganga River Basin Management:* This sub-component will support the DoWR,RD&GR in strengthening the framework for Ganga river basin management. It will fund consultants' services and technical assistance arrangement to carry out a comprehensive analysis of the functions and mandates of key institutions at Central, State and sub-State levels involved with aspects of Ganga River Basin Management, of the relevant laws and regulations, and of possible options for NMCG to operationalize the mandate it received through the Government Authorities Order of 2016. Key institutions will include, at the national level, the DoWR,RD&GR, NMCG, other relevant agencies involved in collecting data and monitoring flows (CWC), water quality and pollution (CPCB), including non-point source pollution, and groundwater levels and abstraction (CGWB) the Governments of the eleven States of the Ganga river basin and State and sub-State-level institutions (SPCB, SGWB, etc.). This study will make recommendations on options for strengthening the institutional framework for Ganga river basin management, describing the roles and responsibility sharing among key institutions and a roadmap for their implementation. The study will focus on data collection, monitoring and use for either strategic planning, forecasting and decision making. It will take into account the changing climate context in the Ganga basin and how institutional arrangements can be designed to enhance climate resilience, especially for poor and vulnerable sections, and identify gender gaps and measures to address these. It will be conducted with wide stakeholder consultation throughout its implementation: at the beginning to ensure that it fully understands and integrates the perspectives of Central, State and local administrations and a range of other key stakeholder groups including major cities/ULBs and water consumers (farmers associations, industries, etc.); to present and discuss the options considered and roadmaps for their implementation to seek feedback and ensure that these options are sensible for all stakeholders; and at the end create large ownership on the recommended approach. NMCG will organize a presentation of the study recommendations, integrating the results of the consultations, for final review and adoption by the Central and State levels, and will record the adopted recommendations. This sub-component will also finance technical assistance to support the implementation of the adopted recommendations of the study. The component will support analytical work and policy-level discussions to develop institutional guidelines to promote women's entry and career progression in technical roles in river basin management. Proposed interventions will include tracking the number of women recruited and encouraging retention of women staff at NMCG and SMCGs through rolling out best-practices/pilots around leadership training for women, re-entry options post maternity leave, preferences for on-site deputations, on-the-job training/skilling choices including sabbatical/study leave options for securing professional degrees and international exposure visits.

Sub-component 1.2 – Development and application of tools to monitor and inform decision making for river basin management

2. This sub-component will develop critical tools to improve river basin management and strengthen evidence-based decision-making for Ganga basin management.

3. *Interface for water quality and flow monitoring:* Develop a publicly available online interface integrating water quality and quantity data and information from the national Water Resources Information System (WRIS). NMCG will use this interface for continuous monitoring of water quality and flow in the River Ganga and its tributaries, including to indicate whether STPs equipped with real-time water quality monitoring systems are meeting discharge standards. This sub-component will also engage consultants to provide recommendations for development of a basin-wide water quality and flow monitoring framework, and to develop the protocols and capacity for its use in informing evidence-based decision making. This will include overall system design, gap analysis and a detailed time-bound plan (with targets and indicators) to bridge identified gaps. The Project would then allocate fund to support implementation of an approved plan.

4. *Real time water quality monitoring:* Support NMCG (in coordination with the Central Pollution Control Board and State Pollution Control Boards) to install additional real-time water quality monitoring stations at strategic locations and to ensure data is feed into the WRIS, and from there, to the interface described above. The number, type and location of new stations, will be specified in the above-mentioned plan. First priority will be monitoring at inlet / outlet locations of STPs built or rehabilitated under the Project. Second priority may be upstream and downstream of major urban areas, and the discharge points for major drains. The Project will explore how real-time water quality data can inform compliance of STPs with national standards in real-time, thus automating enforcement of PPP contracts provisions on discharge standards.

5. *System to monitor water allocation and flows in Uttarakhand and Uttar Pradesh:* The Ganga river basin concentrates the largest agricultural area and irrigation areas in India, a number of large hydropower dams, over 40 percent of India's population and many large industries. As a result, the pressure of competing demands for Ganga water for hydropower, irrigation, industry, human settlements and social/cultural needs, have led to significant water withdrawals from the river and its tributaries, especially in Uttarakhand and Uttar Pradesh. Withdrawals are expected to increase with demographic and economic growth. If not managed, this increasing demand for water could undermine the ability of pollution reduction efforts to improve river water quality. Approximately 60 percent of the Ganga's total annual flow is diverted for canal irrigation alone; at Haridwar, diversions represent 80 percent of the total annual flow, and at Narora, they represent 90 percent of the total annual flow (CPCB 2015). The impact of these diversions is most acutely felt in the dry season, which is also when the demand for hydroelectric power generation is greatest. In recognition of this, NMCG recently made a notification on environmental flows (e-flows), making compliance with a minimum e-flow level mandatory for all existing and future projects. This activity will engage consultants to develop a system to monitor major water withdrawals in Uttarakhand and Uttar Pradesh (extending to Varanasi – the end of the most polluted stretch) and develop a tool that uses these data together with data on dam reservoir levels, canal diversion volumes, and e-flows requirements, to dynamically assess the river water balance. The tool would be used to compare temporal and spatial patterns of supply and demand, monitor e-flow compliance, and develop scenarios that optimize the economic and environmental outcomes from the available water consumed. The activity will use data from existing flow monitoring to the extent possible. It will finance goods and minor works to install flow monitoring stations at critical locations in order to improve the accuracy of the water balance. All data generated under this component will be fed

into the WRIS. At a later stage, this tool could also inform the piloting of eco-compensation i.e. mechanism to compensate the upstream area of a watershed for providing ecosystem services.

6. *Environmental flows technical consultations*. Over the last 10 years there have been a range of different efforts in the Ganga basin to investigate e-flows, but none have been comprehensive or led to implementing a realistic e-flow regime. This sub-component will support an evidence-based, participatory investigation of environmental flow (e-flow) options, for all river reaches across the Ganga basin where substantial flow regime modification has occurred. It will engage consultants to undertake a comprehensive new basin-wide investigation of e-flow options, including scientific assessments of the likely ecological benefits of the e-flow options on the environmental health of the river and tributaries, on improving biodiversity and wetland rejuvenation, as well as on cultural and social aspects of the Ganga. The investigation will focus on the mainstem of the Ganga and on major tributaries (including the Yamuna, Hindon, and Ramganga). It will use data and tools developed as a part of other activities under this component and will be conducted with wide stakeholder consultation to discuss e-flow recommendations that balance environmental and economic outcomes, and to discuss incentives for keeping more flow in the river. This sub-component will also help support initial strengthening of a river basin planning process.

7. *Strengthening the Ganga Knowledge Center (GKC)*. This sub-component will provide technical assistance support to strengthen the GKC as the repository of data and information on the Ganga river basin, to make such data and information publicly available online along with a feedback mechanism and to promote its use as an input to communication and outreach campaigns (under Sub-component 4.1 and by other stakeholders) targeting either specific stakeholders or the general public to make the link between their actions and river conditions and advocate behavior change at scale. The TA will also support GKC in developing its forecasting capacity, using the data and information collected under the above tasks to inform scenario modelling to explore water management options that balance economic, environmental and social factors, including gender considerations. It is expected that this modelling will build on the significant effort supported by the Bank and the South Asia Water Initiative (SAWI, a trust fund financed by the governments of the United Kingdom, Australia and Norway) in participatory river basin modelling, to inform decision-making, to run scenarii of impact of proposed activities on water quality and quantity in the Ganga river basin, and report on such impacts to inform decision making.

8. The Communication and Outreach program (Sub-component 4.1) will support the consultations and communication activities to be implemented under each of the above listed activities. Improved monitoring and optimization of water quality and flow supported under this sub-component can strengthen resilience to climate-influenced changes in water quantity and quality.

Sub-component 1.3 – Support to Participating State Governments and ULBs to strengthen their capacity for wastewater service delivery and river management. This sub-component will provide technical assistance to improve the capacity of the State line department and participating ULBs to improve wastewater and river management, based on the recommendation of the study to be carried out in Sub-component 1.1.

9. *Support to participating States.* This sub-component will support selected States, including the States where the Project will finance investments, in studying possible options, roles and

responsibility sharing between parastatal EA and ULBs for O&M arrangements of wastewater service delivery from an institutional, technical and financial capacity stand-point with the aim of ensuring long-term sustainability of service delivery. These studies will inform the preparation by the participating State governments, of a roadmap for sustained O&M of sanitation assets beyond the 15 years funded by the Central government under the current PPP arrangements, and of additional policy pieces, such as a State level sanitation strategy, a connection strategy for household sewer connections; and a roadmap to generate revenues, possibly through tariffs, making it possible to incrementally cover O&M costs.

10. *Strengthening ULB capacity:* In the PPP projects under the NGRBP, capital expenditures and 10 to 15 years[42] of operational expenditures are provided in full by the Central government. This dilutes the incentive for States or ULBs to engage into recovering O&M expenses from users. However, the opportunity to introduce user fees and set the basis for sustainability is best done when provided with a new or improved service and the incentive for ULBs to engage is greater if the funding made available by the Central government is conditioned to performance improvement. Therefore, this activity will fund consultants' services to encourage ULB in taking a more active role in the sustainable management of the assets funded under the Project and will develop a comprehensive technical assistance package to support them. It will support participating ULBs, on a demand basis, to strengthen their planning, institutional, technical and financial capacity to manage wastewater. This sub-component will also benchmark each of the ULBs supported under the NGRBP and this Project, based on their progress on strengthening their planning, institutional, technical and financial capacities to manage wastewater services. The top ranked ULBs will be added to the criteria, currently solely focused on amount of pollution discharged into the river, to set priority for allocation of additional funding through the performance-based incentive described at Sub-component 2.4.

11. The support to each ULB will be tailored to the needs and interests of each ULB and could include all or parts of the below proposed activities, which will be carried out through consultants' services and technical assistance.

12. In terms of planning, this sub-component will promote the development, in cities where investments will be funded under the Project, of a comprehensive long-term city-wide inclusive sanitation plan integrating not only future urban growth, water demand, wastewater generation and management (network, non-network, I&D and treatment and reuse), but also drainage, solid waste, and river and wetland management and rejuvenation in the city area. The TA will promote creating or updating a GIS mapping the wastewater network and treatment facilities and linking, whenever possible, households and costumer information to better understand the current revenue stream of property taxes funding the wastewater management. Such plan will help inform discussion on where it makes economic sense to invest to develop or extend sewer networks and house connections and where to support non-network solutions for fecal sludge collection, transport, and treatment to maximize environmental and public health benefits through city-wide sanitation coverage. These plans will promote catchment and holistic approaches and will encourage participation of key stakeholders and consultation with the general public at key stages. The plan will then be used to structure investments and technical assistance activities which could be proposed for funding by programs available to ULBs such as the national government's urban

[42] DBOT PPP entail 10 years of O&M while HAM PPPs have 15 years of O&M.

missions (AMRUT, Smart City), State government funds, or could be presented to multi/bilateral development banks (e.g. ADB, KfW, JICA) and international technical assistance agencies (e.g. GIZ), possibly though funding workshops at ULB or State level.

13. On the institutional side, the TA package would include working with interested ULBs to isolate sanitation service delivery in an institutionally dedicated unit and cost center; provide training to staff mapped to this unit on sanitation and PPP contract management, so that they can be the ULB counterpart for PPP contract management during the O&M Phase.

14. On the financial side, the TA would support ULBs willing to update their property database, which currently forms the revenue basis for sanitation fees, and record properties into the sanitation GIS, with the understanding that a share of the incremental tax revenue generated will be channeled to the sanitation service cost center. It will also explore options to introduce or strengthen dedicated user fees for water and sanitation services. With respect to service management, the TA will prepare a framework for service level benchmark monitoring system, help ULBs create or strengthen staff capacities to improve integrated planning, implementation and monitoring of sanitation service delivery.

15. This component will directly contribute to improved operational efficiencies of wastewater collection and treatment systems financed under the SNGRBP (see Component 2) and include relevant training on climate change.

16. **Sub-component 1.4 – *Namami Gange* Program Emergency response preparedness.** This sub-component will provide Consultant's service and technical assistance to assess the preparedness of investments under the *Namami Gange* Program to respond to an emergency related to a health-crisis or natural disaster and develop a set of recommendations and principles to increase the resilience of investments implemented under the Program. This sub-component will also develop emergency preparedness plans at program and investment levels, establishing the protocol to follow in case of a health crisis requiring people to confine in their homes as was the case for the COVID-19 crisis or in case of a natural disaster such as flood, earthquake, drought or extreme climate event and making concrete recommendations to increase the resilience of investments implemented under the Project.

Component 2: Infrastructure Development

17. **Sub-component 2.1: Wastewater treatment investments**. The NMCG has identified three HAM investments in the State of UP in the cities of Agra, Meerut, and Saharanpur, located on the Yamuna, Kali and Hindon tributaries of the Ganga, respectively. These investments were selected because they are the largest pollution hotspots on these tributaries which are not yet the focus of an interments under the *Namami Gange* Program. Each investment will consist of goods and works to intercept and divert wastewater currently flowing through open drains into the river with pumping stations and conveyance systems and the construction and/or rehabilitation of STPs, which will allow to treat 100 percent of the wastewater generated by these cities prior to discharging it in the tributaries of the Ganga river. The private operator will be encouraged to include in its design specific measures based on early lessons from the COVID-19 crisis. Additional measures may be supported under Sub-component 2.3 to integrate the recommendations of the emergency preparedness plans to be developed in parallel under Sub-component 1.4. These investments will

be procured using the HAM PPP approach, and will be combined with activities under Sub-component 1.3 to promote planning of sewerage network extension, helping ULBs interested in securing funding for their implementation, possibly through the framework approach under Sub-component 2.4 and will be partially funded under the Project as presented in the table below. A description of each investment is included in the Appendix to this Annex below.

Table 1: Total cost of new investments including interest payment and inflation indexation

	Investment	State	Tributary	Description	Total Cost (US$ million)	Cost under SNGRBP (US$ million)
1	Agra	UP	Yamuna	HAM: I&D, STP	170	60
2	Meerut	UP	Kali (East)	HAM: I&D, STP	140	55
3	Saharanpur	UP	Hindon	HAM: I&D, STP	90	35
	Total				**400**	**150**

18. As a part of Project preparation, a market study on emerging lessons from the HAM contracting model was carried out. The key findings of the market study are at Section III. A (i) Technical Analysis.

19. **Sub-component 2.2: Carry forward of selected investments from NGRBP to SNGRBP***:* This sub-component will finance selected investments currently under implementation under the ongoing NGRBP that will be carried over to the proposed SNGRBP at the closing of NGRBP (December 30, 2021). It is anticipated that five investments will be carried over: Digha Kankerbargh (HAM and DBOT) in Bihar, Howrah, Bally, Baranagar (HAM) in West Bengal (these are the first two HAM contracts funded under the ongoing NGRBP), and three investments in Begusarai, Munger and Buxar (all DBOT) in Bihar. The DBOT contracts in Begusarai, Munger and Buxar were procured under the ongoing NGRBP and faced delays as the NMCG terminated the DBOT contracts with the private operators for lack of performance, leaving unfinished works. These investments were also selected because each will bring the treatment capacity to 100 percent in each city and, except in Howrah, Bally, Baranagar, they will also develop full sewerage network coverage and target 100 percent house connections in these cities. Moreover, these investments are complementing ongoing investments under the NGRBP. The Digha-Kankerbargh investment will complement investments under the ongoing NGRBP to will bring both sewage network coverage and treatment capacity to 100 percent in Patna, the capital of the State of Bihar. In West Bengal, the proposed investment will increase the sewage treatment capacity in Kolkata from 21 percent to 54 percent. The ongoing NGRBP is financing the Tolly Nallah investment in Kolkata, which combined with another investment under preparation, will, upon completion, bring the sewage treatment capacity in Kolkata, the capital city of West Bengal, to 100 percent. For each of these investments that are carried forward from the ongoing NGRBP to the proposed SNGRBP, the Project will fund the balance of capital expenditure (CAPEX) and the first three years of operational expenditures (OPEX). The balance OPEX will be financed by GoI. The Appendix to this Annex provides details of each investment.

Table 2: Total cost of carried over investments including interest payment and inflation indexation

	Investment	State	Description	Total Cost (US$ million)	Cost under SNGRBP (US$ million)

1	Digha Kankerbargh	Bihar	HAM and DBOT	230	86
2	Howrah, Bally, Baranagar	West Bengal	HAM	182	38
3	Begusarai	Bihar	DBOT	39	12
4	Buxar	Bihar	DBOT	29	8
5	Munger	Bihar	DBOT	55	16
	Total			**535**	**160**

20. **Sub-component 2.3: Improving Investments resilience to COVID-19-like emergency crises.** This sub-component will support the implementation of the recommendations of the emergency preparedness plans developed under Sub-component 1.4 to improve the resilience of service delivery and to support service providers to respond to similar crisis or shock. These may include goods and works to develop remote management capabilities, increase the stocks of chemicals on STP sites and develop renewable energy generation capabilities on site to allow maintaining service provision in case of restricted movements of people and to supplement electricity supply.

21. **Sub-component 2.4: Introducing a performance-based incentive for ULBs***:* This sub-component aims to introduce criteria to allocate funding to ULBs based both on measures for pollution source prioritization and their performance in strengthening planning, management, and cost recovery of wastewater service delivery to promote holistic approaches at city level. A framework approach will be used to identify potential additional investments during Project implementation. The NMCG is considering investments to extend sewage networks in cities where initial investments have been made under the ongoing NGRBP and/or will be made under the proposed Project to saturate wastewater collection and promote last mile connectivity in these cities.

22. Learning the early lessons from the COVID-19 pandemic, each investment will include dedicated equipment and protocols to improve resilience in case a health crisis requires limiting people's movements. These will focus on protecting the health and safety of the staff and their families, by having quality personal protection equipment in sufficient quantities for sanitation workers and ensure that sanitation workers are considered priority workers for testing; develop SCADA systems and automation allowing the remote management of key treatment facilities, to continue operating facilities in a lockdown situation; and secure supply chains for chemicals and ensure stock of at least two months' worth of chemical on site to be able to sustain treatment and have flexible and adaptive protocols to optimize response to a specific crisis or emergency.

23. These interventions will support reduction in the volume of untreated wastewater discharged into water the Ganga and its tributaries. This will reduce flood risk and impact of floods as floodwaters will be less contaminated[43]. Hence, these interventions will increase residents' resilience to these climate-exacerbated events. The proposed investments that have a sewer network component will have a positive impact on the urban environment in targeted cities and increase their climate resilience.

24. Further, the design of the investments encourages energy efficiency and requires that any STP of 40MLD or more includes an energy recovery system to reduce energy costs. Options to

[43] The rehabilitated and new climate-resilient sanitation infrastructure will be less likely to be overwhelmed and/or damaged.

reduce Green House Gas (GHG) emissions will also be encouraged. Since January 2016, the GoI has made it compulsory that treated wastewater be reused by all thermal power plants located within 50km of a STP.

Component 3 – IBRD Guarantee

25. *Current form of Payment Security:* The HAM PPP contracts create long-term liabilities for NMCG for the payment of annuities to the private operator over fifteen years of O&M period. For the HAM-PPP projects, NMCG establishes an escrow-based payment security mechanism for two purposes – providing payment security and making quarterly payments. For the payment security, NMCG maintains a minimum balance ("Minimum Escrow Balance") required to meet the next two upcoming milestone payments during the Construction Period; and two years of O&M Payments (Capex Annuities, O&M Charge, Power Charges, etc.) during the operations period. The Escrow Agreement is entered between NMCG, State Agency, Concessionaire and the Escrow Bank for the benefit of the Concessionaire. The concession payments are made from the Escrow Account once the State Agency clears the invoice raised by the Concessionaire. Failure of NMCG to maintain the Minimum Escrow Balance for 90 days is treated as NMCG event of default in the Concession Agreement.

26. *IBRD Guarantee as cost effective alternate Payment Security:* Maintaining Minimum Escrow Balance in the Escrow Account has been a useful project-specific interim arrangement to kick-start a large program like *Namami Gange*. The maintenance of Minimum Escrow Balance locks-in capital for 15 years of contract incurs sunk cost for the Government at higher cost of capital, which could otherwise be committed to project investments. In addition, with the potential for scaling-up of the program, alternative cost-effective risk mitigation mechanisms can be considered by the Government. To optimize the design and funding needed for the payment security, the NMCG is considering the use of an IBRD Guarantee as a more cost-effective payment security mechanism. Consistent with international experiences in offering similar World Bank guarantees as payment security mechanism, the IBRD guarantee will be offered to cover only two rolling quarters of annuity payments during the fifteen years of O&M period. The benefits of using an IBRD Guarantee for the overall program include:

- Replacing the need to hold 2 years of O&M period payment in the Escrow Account with an IBRD Guarantee for 2 Quarters would free up significant amount of upfront capital which can be allocated to new investments. This will further help optimize use of scarce public resources in the context of post-COVID-19 priorities of the Government.
- Replacing the need to maintain the Minimum Escrow Balance with an IBRD Guarantee would offer a savings of 50% of the annual costs of providing a payment security;
- Building a track record for more efficient payment security mechanisms under the HAM PPP;
- Incentivizing payment discipline to all parties through contractual arrangements associated with IBRD guarantees, which will be an important element to improve private investors' confidence in the sanitation sector.

27. *The proposed IBRD Guarantee will be structured as a payment guarantee* to backstop certain payment obligations of NMCG under the three HAM-PPP contracts. The principal risk the IBRD

Guarantee will mitigate is that of contractual payment default by NMCG under those contracts due to unavailability of funding in the relevant Escrow Account to meet periodic O&M payment requirements. The risk of unavailability of funding in the Escrow Account arises from inadequate allocation of funding by Government for these HAM-PPP investments over the life of the contracts. The proposed IBRD Guarantee is expected to provide comfort to the private operators that the annuity payments will be made in a timely manner. Following the core principle of World Bank Guarantees – that of partiality – the coverage of payment risk will only be partial, that is, a maximum of two quarterly O&M period payments for the three HAM-PPP investments.

28. *Market testing of IBRD Guarantee as alternative payment security*: To assess the market appetite, NMCG and Bank conducted a market testing workshop on 6th February 2020 with a number of key developers, operators and commercial lenders. The objective of this market testing exercise was to discuss with private sector on the potential consideration of IBRD Guarantees as risk mitigation package for HAM-PPP projects in lieu of the maintaining Minimum Escrow Balance at the Escrow Account. Around 37 participants representing various equity investors, operators, advisors, public and private commercial banks attended the meeting. The participants showed strong interest and asked NMCG to consider offering IBRD Guarantee for the next round of HAM-PPP projects. Based on the feedback, the NMCG had requested the Ministry of Finance for the potential use of IBRD Guarantee to cover the payment obligations during the O&M phase under the three HAM PPP investments proposed under Sub-component 2.1.

29. *Sizing of IBRD Guarantee:* The sizing of the guarantee is estimated to be US$ 19 million to match with the expected sum of two quarterly O&M period payments of the three HAM-PPP projects. Considering the guarantee coverage period of 15 years, the proposed guarantee sizing includes additional buffers for increase in inflation and appreciation of the local currency. The O&M period payments include a pass-through provision for incorporating actual inflation on Opex costs. Because the guarantee is offered in US Dollars and the payments under the HAM-PPP contracts are in Indian Rupee, the proposed guarantee sizing has to factor in currency appreciation. The calculation of guarantee sizing involves use of shadow O&M period cost figures of the three HAM-PPP contracts developed by the NMCG and the Bank. As these contracts are in procurement stage, the analysis to arrive at the sizing is not included here.

30. *Indicative Structure of Proposed IBRD Payment Guarantee:* As provided in the indicative Term Sheet, the proposed IBRD payment Guarantees will be offered through a Standby Letter of Credit (SBLC) structure to be issued by a commercial bank (SBLC Bank, as a beneficiary of the IBRD Guarantee). The SBLC will be drawn by the Escrow Agent if NMCG fails to transfer the amount required to meet an upcoming quarterly O&M payment. Once the SBLC is drawn, the amount drawn converts into a short-term loan to NMCG under a Reimbursement and Credit Agreement (RCA) between NMCG and the SBLC Bank. If NMCG fails to repay the SBLC Bank this short-term within the prescribed duration (say, 12 months), the SBLC Bank can call on the IBRD Payment Guarantee. Any payment made by IBRD under the IBRD Guarantee will trigger an obligation on the part of GoI to repay IBRD under the Indemnity Agreement with IBRD. The Indemnity Agreement will require the GoI to repay IBRD on demand, or as IBRD may otherwise direct. The decision to procure one or more SBLC Banks for three projects will be made after the procurement of HAM-PPP contracts are completed and private operators are identified. The SBLC Bank will be competitively procured in conjunction with the NMCG.

Figure 1: Proposed IBRD Payment Guarantee– Indicative Fund Flow Structure

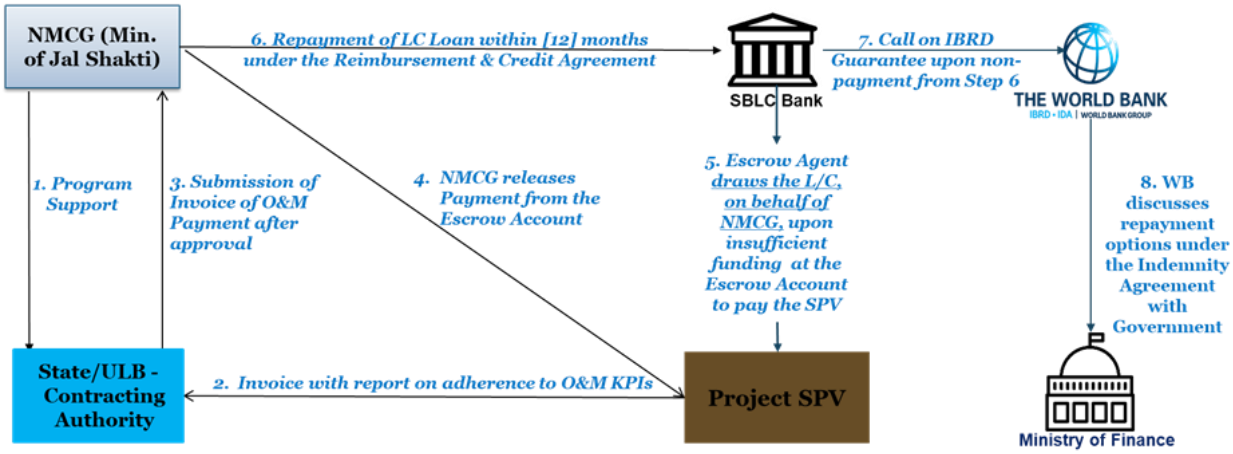
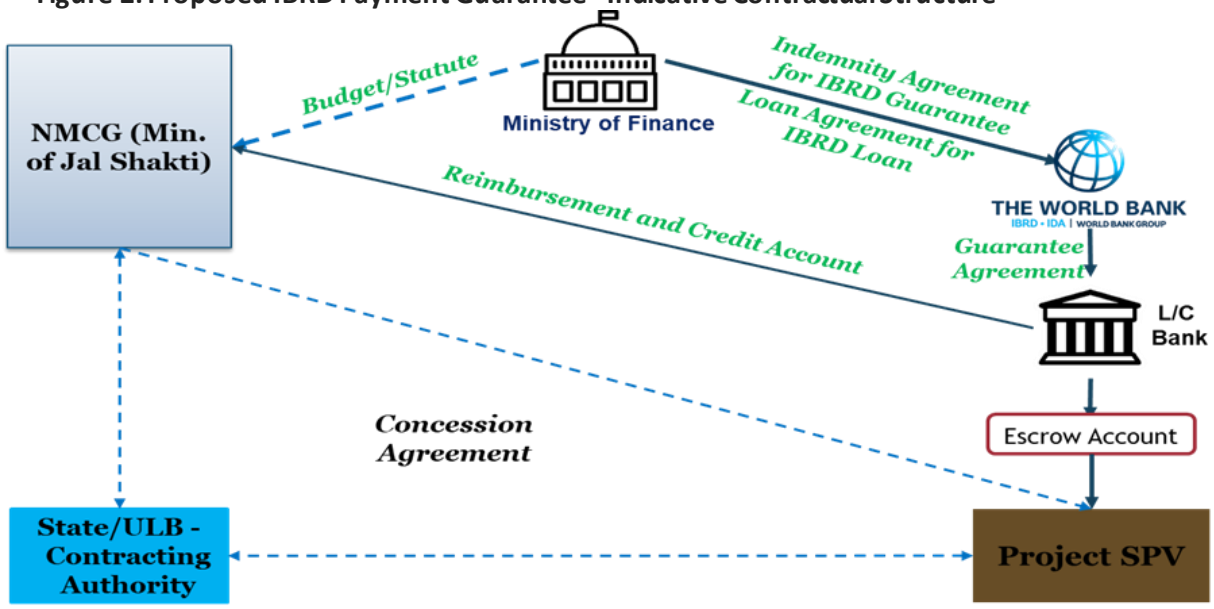


Figure 2: Proposed IBRD Payment Guarantee– Indicative Contractual Structure



31. *Guarantee structure contributes to a reduced risk exposure for IBRD:* The proposed IBRD Guarantee will mitigate only the risk of GoI's payment default due to inadequate allocation of funding by the Government to meet contractual payment obligations of NMCG to private sector under the three HAM-PPP projects. The proposed IBRD Guarantee is not exposed to project implementation or private sector performance risks, instead assumes sovereign risk of India (an investment grade country) and therefore represents a low risk exposure for the Bank on potential

call on the guarantee. For the existing HAM-PPP projects, there has been no delays or lack of adequate funding allocation from the GoI, thus confirms the Government's interest to continue providing funding support to the program.

Component 4 – Program communication and management

Sub-component 4.1: Communication and Outreach Program.

32. There is widespread recognition that the success and sustainability of the Ganga rejuvenation program will, as with other river clean-up efforts globally, hinge also on high levels of public awareness and stakeholder participation, and on securing tangible changes in behavior of stakeholders whose practices and activities impact water quality and usage in the river. Also, given the emotive status of the Ganga in India, the sensitivities and concerns of a wide range of stakeholders need to be considered in the design and implementation of any program of interventions.

33. The NMCG has, with the support provided under the first NGRBA Project, sought to integrate these communication objectivities into its program. It continues to conduct a range of vibrant communication activities ranging from ground-level community engagement, social and traditional media outreach, public debates and lectures, to a flagship mass media campaign (the *Kartavya Ganga* campaign) aimed at changing specific behaviors that impact the river (such as ritual practices of pilgrims coming to the river, or and persuading city-dwellers to connect to sewer networks).

34. NMCG's existing communications and outreach capacities allow them to be pivoted rapidly to disseminate COVID-19 related awareness messages, and it is already using its social media channels[44] and its network of grassroot workers – Ganga *Praharis* or Messengers – who are working on relief activities to relay important health-related information to the public. The clear links between the COVID-19 advisable actions, the importance of handwashing with soap and the larger WASH agenda allow these messages to be integrated seamlessly into ongoing campaigns, and these activities will be scaled up and/or calibrated to include other relevant messages as the knowledge-base and the situation evolves.

35. As the Ganga Rejuvenation program moves beyond immediate pollution abatement activities to addressing longer-term issues of securing adequate flows in the river and ensuring the sustainability of interventions and investments, the Communications & Outreach program will need to expand its focus, messages and target audiences.

36. This Project sub-component will support a range of outreach activities and communications campaigns aimed at:

    - strengthening public understanding and support for the Ganga rejuvenation program and mobilizing widespread participation in it;
    - catalyzing the critical changes in stakeholder behavior and practice needed to achieve the objectives of rejuvenating the river; and
    - setting up two-way platforms for ongoing stakeholder dialogue and engagement; and

[44] Twitter handle @cleanganganmcg and Facebook Namami Gange

- enabling NMCG to publicly communicate the activities, impacts and benefits achieved, as well those planned.

37. The sub-component will finance the development of mass media campaigns at the national and State level aimed at awareness creation or promoting improved stakeholder practices and behaviors, e.g. higher uptake for connections to sewers or the adoption of water-efficient agricultural practices. These mass media campaigns will be complemented by city-focused outreach and public engagement interventions.

38. Communications and outreach activities will be leveraged to create a network of women professionals in technical roles (engineers and planners) and women students in science, technology, engineering and mathematics (STEM) to enter the wastewater management sector, as described in Section III. Implementation Arrangements. These young women will be provided with paid internship/apprenticeship offers on a competitive basis in NMCG and SMCGs. The component will also create a collective of women in managerial positions at NMCG and include them as ambassadors in information dissemination and outreach campaigns targeting women students. The proposed gender action will introduce young women to the world of work and develop a pipeline of future women technical professionals keen on working in the sector.

39. The Communications & Outreach program will also support NMCG's engagement and consultations with stakeholders on an ongoing basis to ensure they are as constructive and meaningful. it will also help develop channels for the dissemination of the data and information being generated under activities of component 1 and use it to inform the Communications and Outreach campaign of activities.

40. This component will directly contribute to a more reliable, better managed, and more intensely used sanitation system by increasing the number of connections to the sewer network, thereby raising the beneficiaries' satisfaction with sanitation services and resilience to floods.

Sub-component 4.2: Project Management support

41. This component will support NMCG in coordinating and implementing Project activities, including incremental and administrative expenses and critical consultant support. It will comprise:

- **Incremental and administrative expenses:** Support the costs of office infrastructure and equipment, incremental professional staffing, training, and operational costs, for NMCG and SMCGs in the five States currently implementing the NGRBP. This support will enable these agencies to manage the *Namami Gange* Program and not just activities financed by the Project.
- **Consultants:** Support procurement of critical consultants e.g. project management unit (PMU) within NMCG and if required, within EAs; preparation of safeguards documents; compliance with fiduciary procedures; design review and supervision consultants; transaction advisory for HAM contracts.

42. Consistent with the arrangements under the ongoing NGRBP, the Project will finance 100% of the management support at the national level. At the State level, the Project will finance the

central share of 70% of management support costs, the remaining 30% will be borne by the State.

Component 5 – Contingent Emergency Response Component (US$ 0 million).

43. This Component provides the opportunity for the Government to request the Bank to re-allocate Project funds to support emergency response to an adverse health crisis or natural event that causes a major disruption and require immediate response and/or reconstruction effort. This component would draw resources from the unallocated expenditure category and/or allow the Government to request the Bank to re-categorize and reallocate financing from other Project components to partially cover emergency response and recovery costs. An Operations Manual specific to Component 5 would need to be prepared.

44. Disbursements would be made against a positive list of critical goods or the procurement of works, and consultant services required to support the immediate response and recovery needs. All expenditures under this component, should it be triggered, will be in accordance with paragraph 11 of OP 10.00 and will be appraised, reviewed and found to be acceptable to the Bank before any disbursement is made. In accordance with paragraph 11 and 12 of OP 10.00, this component would provide immediate, quick-disbursing support to finance goods (positive list agreed with the Governments), works, and services needed for response, mitigation, and recovery and reconstruction activities. Operating costs eligible for financing would include the incremental expenses incurred for early recovery efforts arising as a result of the impact of the major natural disasters.

45. Goods, Works and Services under this component would be financed based on review of satisfactory supporting documentation presented by the government including adherence to appropriate procurement practices in emergency context. All supporting documents for reimbursement of such expenditures will be verified by the Internal Auditors of the Government and by the NMCG, certifying that the expenditures were incurred for the intended purpose and to enable a fast recovery following the damage caused by adverse health crisis or natural events, before the Application is submitted to the Bank. This verification should be sent to the Bank together with the Application.

46. Specific eligible expenditures under the category of Goods include: (i) construction materials; water and wastewater treatment supplies and equipment; water, land and air transport equipment, including supplies and spare parts; (ii) medical supplies and equipment; (iii) school supplies and equipment; (iv) petroleum and fuel products; (v) construction equipment and industrial machinery; and (vi) communications equipment.

47. Specific eligible expenditures under the category of Works may include urgent works (repairs, rehabilitation, construction, etc.) to mitigate the risks associated with the health crisis or natural disaster event for affected populations.

48. Specific eligible expenditures under the category of Services may include urgent studies (either technical, social, environmental, etc.) necessary as a result of the effects of the health crisis or natural disaster (identification of priority works, feasibility assessments, delivery of related analyses, etc.).

in US$million, incl. taxes	Total Cost	IBRD	%	Counterpart Financing
Project Cost by Component				
Component 1: Institutional Development	**30.0**	**19.0**	***63%***	**11.0**
1.1 – Development of an institutional framework for Ganga basin management	2.0	2.0	*100%*	0.0
1.2 – Development and application of tools to monitor and inform decision-making for river basin management	20.0	9.0	*45%*	11.0
1.3 – Support to participating State Governments and ULBs to strengthen their capacity for wastewater service delivery and river management	7.0	7.0	*100%*	0.0
1.4 – *Namami Gange* Program Emergency response preparedness	1.0	1.0	*100%*	0.0
Component 2: Infrastructure Development	**1,045.0**	**345.0**	***33%***	**700.0**
2.1 - Wastewater treatment investments	400.0	150.0	*38%*	250.0
2.2 – Carry-forward of selected investments from NGRBP to SNGRBP	535.0	160.0	*30%*	375.0
2.3 - Improving Investments resilience to COVID-19-like emergency crises	10.0	5.0	*50%*	5.0
2.4: Introducing a performance-based incentive for ULBs	100.0	30.0	*30%*	70.0
Component 3: Innovative financing	**19.0**	**19.0**	***100%***	**0.0**
IBRD Guarantee	19.0	19.0	*100%*	0.0
Component 4 – Program communication and management	**24.0**	**16.0**	**67%**	**8.0**
4.1: Program Communication and Outreach	12.0	6.0	*50%*	6.0
4.2: Program Management support	12.0	10.0	*83%*	2.0
Component 5 – Contingent Emergency Response Component	**0.0**	**0.0**	**100%**	**0.0**
TOTAL BASELINE COSTS	**1,118.0**	**399.0**	***36%***	**719.0**
Physical contingencies		0.0		
Financial contingencies		0.0		
TOTAL PROJECT COSTS	**1,118.0**	**399.0**	***36%***	**719.0**
Interest during implementation		0		
Front-end fees		1.0		
TOTAL FINANCING REQUIRED	**1,119**	**400.0**	***36%***	**719.0**

Appendix to Annex 3: Description of each investment

49. This appendix presents a description of each investment to be procured or carried forward under the Project.

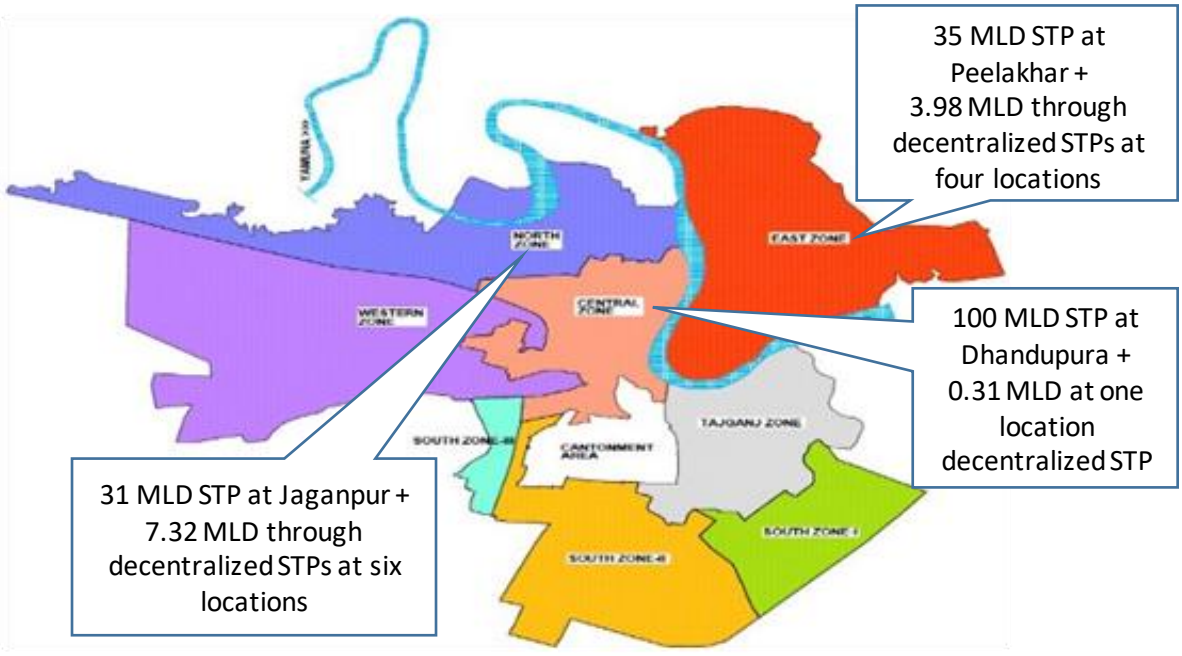
I. Agra Wastewater Treatment Works (I&D, HAM)

50. Agra is the home of the iconic Taj Mahal and a major regional urban center in western UP. It is located on the western bank of the Yamuna river, about 200 km downstream from New Delhi. Agra has a population of 1.79 million (Census 2011). Agra's elevation varies from 150 to 170 meters above sea level and groundwater table is between 2.3 and 23 meters below ground level. The Agra municipal area covers about 121 km^2 and is divided into 90 wards. While the main part of the city, Cis-Yamuna is on the western side of the river; the City has spread onto the eastern side, which is called the Trans-Yamuna area. Agra is a major tourist destination, it is included in the Golden Triangle tourist circuit along with New Delhi and Jaipur, and in the UP-Heritage Arc tourist circuit along with the cities of Lucknow and Varanasi.

Sanitation Status in Agra

51. The first drainage scheme for Agra was built in 1917. It was rehabilitated and extended in 1945 & 1965. UP Jal Nigam prepared the Agra Sewerage Master Plan in 2008 with a design horizon of 2050. As per this master plan, Agra is divided into nine sewerage zones[45] as shown in Figure 3.

Figure 3: Sewerage Zones in Agra and Project Investments



[45] *Central Zone, Northern Zone, Western Zone, Eastern Zone, Taj Ganj Zone, Southern Zone I, Southern Zone II, South Zone III and Cantonment Zone*

52. The current sanitation situation of Agra is as follows:

- ***Drains:*** To date, most of the city wastewater is discharged directly into multiple open-air drains across the city, creating an unhygienic environment. Agra has90 drains which currently carry a total volume of 286.85 MLD. Of these, 29 drains are intercepted and diverted to existing STP's, while the remaining 61 drains discharge untreated wastewater into the Yamuna river. The proposed investment under the SNGRBP Project will tap all 61 drains that are currently untapped and will convey the wastewater flow to 3 centralized STPs and 10 decentralized STPs.
- ***Sewer Network***: Agra has 572.34 km of sewerage system covering 30 percent of the city and operated and maintained by the Agra Jal Sansthan. Due to tremendous population growth, influx of tourists and urbanization, different sections of existing sewerage network are partially and/or fully saturated, carries reduced flow and the existing STPs are not receiving designed flow. All sewerage development projects including planning, construction and commission of the projects are executed by the UP Jal Nigam (UPJN). UPJN has proposed a new project under AMRUT for laying an additional 251 km of sewer network in the Western Zone of the city, which will increase the city sewer coverage to close to 50 percent of the population.
- ***SPS:*** 26 SPS intercept and divert 29 drains across Agra and convey the wastewater flow to STPs.
- ***STP:*** There are 9 existing decentralized (small-scale) STPs in Agra city, representing a combined capacity of 220.75 MLD. Presently, all STPs are functioning and are in good condition, zone wise details of sanitation system in Agra city is presented below in Table 1. Recently, UPJN has awarded an O&M contract to a private operator for the management of STPs for 10 years.

What investments will the Project finance in Agra and how will they change the sanitation scenario in the city?

53. The wastewater treatment investment under the Project includes the construction of 3 centralized STPs, detailed in Table 2 and 10 decentralized STPs (Table 3). These STPs represent a combined installed capacity of 177 MLD along with sewage pumping stations to tap 61 drains. This will create capacity to treat nearly 100 percent of the wastewater generated by Agra for the next 10 years, according to population projections. This investment will use the HAM PPP contract and will include 15 years of O&M fully financed by the Central Government. The bids shall be invited on technology neutral basis for STPs. The UPJN is preparing bid document with the help of a Transaction Advisor.

Table 1: Existing and proposed wastewater treatment infrastructure in Agra

Zone	Sewer Network	Drain Tapped	IPS/SPS/MPS	Existing STP (MLD)	Proposed STP (MLD)
East Zone	41.23 km	1. Ispat Nagar nala 2. Foundary Nagar Nala 3. Naraich Nala 4. Ram Bagh-I Nala 5. Rambagh-II Nala 6. Etmad-ud Daula Nala 7. Mal Godown Nala 8. Industrial Area Nala 9. Peelakhar Nala	3 No. IPS (Naraich and Etmad-ud-daula) 1 no. MPS at Peelakhar	10 MLD STP at Peelakhar 4.5 MLD at Kalindi Vihar	35 MLD STP at Peelakhar + 3.98 MLD through decentralized STPs at four locations financed under the proposed SNGRBP
North Zone	108.55 km	10. Amar vihar-I Nala; 11. Amar vihar-II Nala 12. Burhi ka Nagla Nala	2 Nos. IPS; 1 no. MPS	2.25 MLD STP at Buri ka Nagla. 14 MLD STP at	31 MLD STP at Jaganpur + 7.32 MLD through

Zone	Sewer Network	Drain Tapped	IPS/SPS/MPS	Existing STP (MLD)	Proposed STP (MLD)
		13. Anurag Nagar Nala 14. Manoharpur Nala		Jaganpur	decentralized STPs at six locations; financed under the proposed SNGRBP.
West Zone	155.40 km		3 Nos. SPS/IPS; 1 no. MPS	40 MLD STP maintained by UPJN & 36 MLD STP maintained by ADA at Sadarban	251km Sewage network under AMRUT
Central Zone	70.72 km	15. Rajwah Nala 16. Balkeshwar Nala 17. Sub-Balkeshwar Nala 18. Waterworks Nala 19. Krishna Colony Nala 20. Paliwal park Nala 21. Bhairon Nala 22. Khoja Nala Tapping 23. Peepal mandi Nala 24. Mantola Nala 25. Baluganj Nala 26. Khairati tola 27. Sanjay Place drain	7 Nos. SPDS/IPS (Rajwah, Balkeshwar, Sub Balkeshwar, Water Works, SPS Sanjay Place, Bhairon and Khoja); 1 no. MPS at Khairati tola	78 MLD STP at Dhandupura	100 MLD STP at Dhandupura + 0.31 MLD at one location decentralized STP; financed under the proposed SNGRBP
Cantonment Zone	-	-	-	-	-
Tajganj Zone	131.84 km	28. Taj East nala	3 Nos. SPS/IPS; 1 no. MPS	24 MLD STP Dhandhupura New	-
South Zone I					-
South Zone II	63 km	29. Devri Road Nala	1 No. MPS Taal Semri	12 MLD STP Devri Road	-
South Zone III	1.4 km				-

Table 2: Proposed Centralized STPs of total 166 MLD

Sl. No.	Centralised Treatment Plant	Sewerage Zone
1	**35 MLD** Aerobic Process with Biological Nutrient Removal technology based STP at Peelakhar	Eastern Zone
2	**31 MLD** Aerobic Process with Biological Nutrient Removal technology based STP at Jaganpur	Northern Zone
3	**100 MLD** Aerobic Process with Biological Nutrient Removal technology based STP at Dhandupura	Central Zone

Table 3: Proposed Decentralized STPs of total 11.6 MLD

Sl. No.	Decentralised Treatment Plants (Bio-digester Based Package Treatment)	Sewerage Zone
1.	1.0 MLD STP for K K Nagar Drain	**North Zone**
2.	0.02 MLD STP for Kailash Mandir	
3.	0.6 MLD STP for Kamayeni Hospital	
4.	2.35 MLD STP for Wyepur Drain	
5.	0.35 MLD STP for Artoni Drain	
6.	3.0 MLD STP for Gailana and Transport Nagar	
7.	0.30 MLD STP for Jalma Drain	**Central Zone**
8.	1.13 MLD STP for Mau Nala I & II Drains	**Eastern Zone TRANS Area**
9.	1.1 MLD STP for Dharwale Baba I,II & Islam Nagar Drains	
10.	0.25 MLD STP for Peeli Pokhar Drain	
11.	1.5 MLD STP for Moti Mahal (I-VIII) & Indira Memorial Bridge Drains	

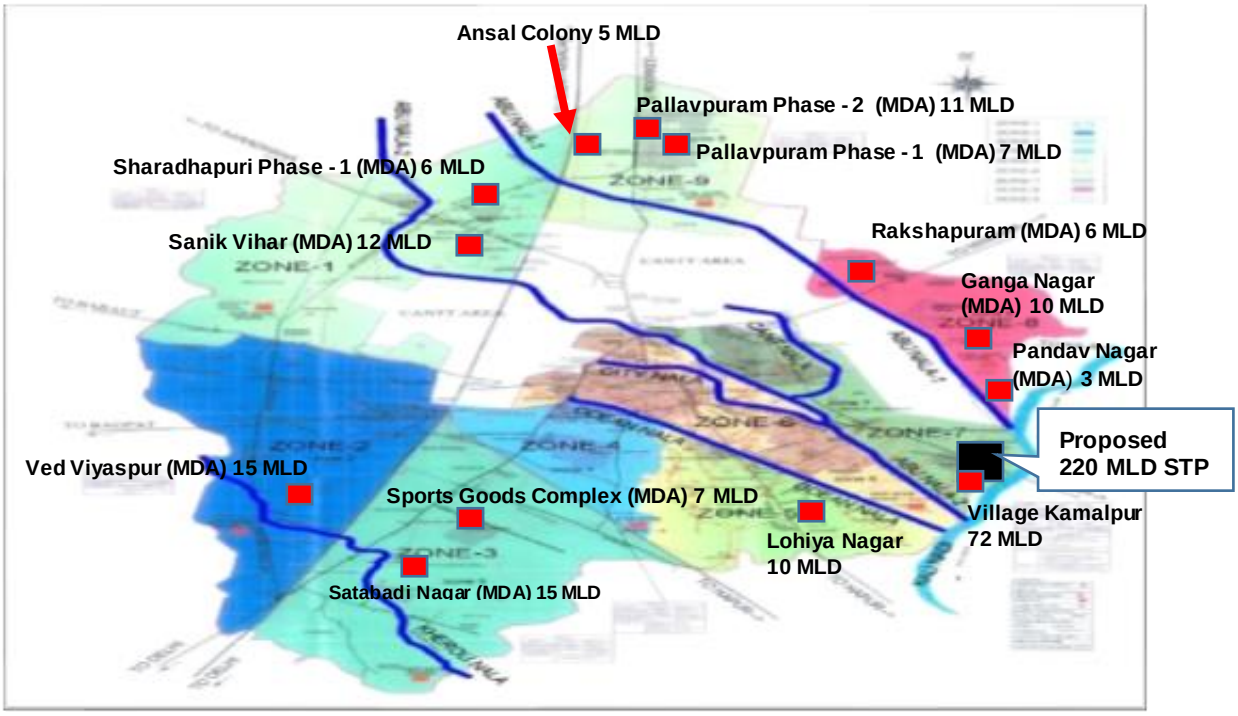
II. Meerut Wastewater Treatment Works (I&D, HAM)

54. Meerut is a city in western UP, located on the right bank of the Kali river about 70 km northeast of New Delhi, the national capital of India. It is the second largest urban center in the National Capital Region of Delhi and the second most important industrial center in UP. The city is experiencing rapid urbanization and high density of population in the core areas (4,781 persons/ km^2). The city has experienced a sharp increase in population from 0.29 million in 1961 to 1.4 million in 2011 (Census 2011). Meerut's elevation varies from 223 to 238 meter above main sea level. The groundwater table is generally about 5 to 20 meters below ground level. The Meerut municipal area has 90 wards and area is about 142 km^2. The city is one of the largest producers of sports goods, and the largest producer of musical instruments in India. The city is also an education hub in western UP.

Sanitation Status in Meerut City

55. The sewerage zones in Meerut city and location of investment under the proposed SNGRBP is at Figure 4.

Figure 4: Sewerage zones and STPs in Meerut and Proposed Location of Project Investment



56. In addition, few colonies developed by the UP Housing Board and Meerut Development Authority (MDA) has been covered by full sewer and handed over to Meerut Nagar Nigam. Thus, the total sewerage network including that of Nagar Nigam constitute is about 90 km of main sewer and 370 km of branch sewers which covers 25-30% of the area of the city at present. Limited area of the main city is covered by old sewer system at present.

57. The current sanitation status of Meerut is as follows:

- **Drains:** There are 5 major drains in Meerut, discharging 372 MLD domestic wastewater and industrial effluent (distillery based) in to the Kali river. Meerut Development Authority (MDA) has constructed 13 decentralized STPs, with a cumulative capacity of 179 MLD collected through sewer network. The wastewater of these drains has been tested by UPJN through SPCB and accredited laboratories, results shows that all parameters are within permissible limits of domestic sewage discharge.
- **Sewer Network:** Sewerage system in Meerut was introduced in 1975. The main components of the sewerage system comprise 460 km total length of network including 23 km trunk sewer and 7 SPS in Meerut Nagar Nigam and MDA area which covers around 30 percent of the area of the city at present. The intermediate pumping stations transfer the wastewater to main pumping station at Hapur Road in ward no. 19, whilst other pumping stations discharge the wastewater into different drains (Odean Nala) that finally discharges into the River Kali. A project named as Meerut Sewerage Scheme Part-I, Phase-I (Zone 5 &7) was sanctioned under Jawaharlal Nehru National Urban Renewal Mission of the GoI to build 237.15 km of sewerage network, 7550 manholes, 8660 sewer connecting chambers, 2 intermediate pumping stations, 2 main pumping stations, 1140 m rising main from 450mm to 1100 mm diameter and 72 MLD sewage treatment plant along with required allied works like pumping plants and power connection etc.
- **SPS**: There are 7 SPS in Meerut city, which interconnect through sewerage system and natural drains.
- **STP**: There are 13 of existing STPs at decentralized of 179 MLD capacity. Presently, all STPs are functioning and in good condition, details are presented below in Table 1.

58. ***What investments will the Project finance in Meerut and how will they change the sanitation scenario in the city?*** The proposed SNGRBP will finance interception and diversion of the main drains of Meerut city and conveyance of wastewater to an STP of 220 MLD. The bid shall be invited on a technology neutral basis under a HAM PPP including 15 years of O&M.

Table 4: Existing and proposed sewerage infrastructure in Meerut

Sr. No.	Location	Capacity of STP (MLD)	Proposed STP (MLD)
1	Ved Viyaspur (MDA)	15	
2	Satabadi Nagar (MDA)	15	
3	Sports Goods Complex (MDA)	07	
4	Pandav Nagar (MDA)	03	
5	Sharadhapuri Phase - 1 (MDA)	06	
6	Sanik Vihar / Sharadhapuri Phase – 2 (MDA)	(06 + 06)	
7	Pallavpuram Phase - 2 (MDA)	11	
8	Pallavpuram Phase - 1 (MDA)	07	
9	Rakshapuram (MDA)	06	
10	Lohia Nagar (MDA)	10	
11	Ganga Nagar (MDA)	10	
12	Ansal Colony (MDA)	05	
13	Village Kamalpur (Nagar Nigam, Meerut) under construction	72	220
	Total	**179 MLD**	**220 MLD**
	Grand Total	**399 MLD**	

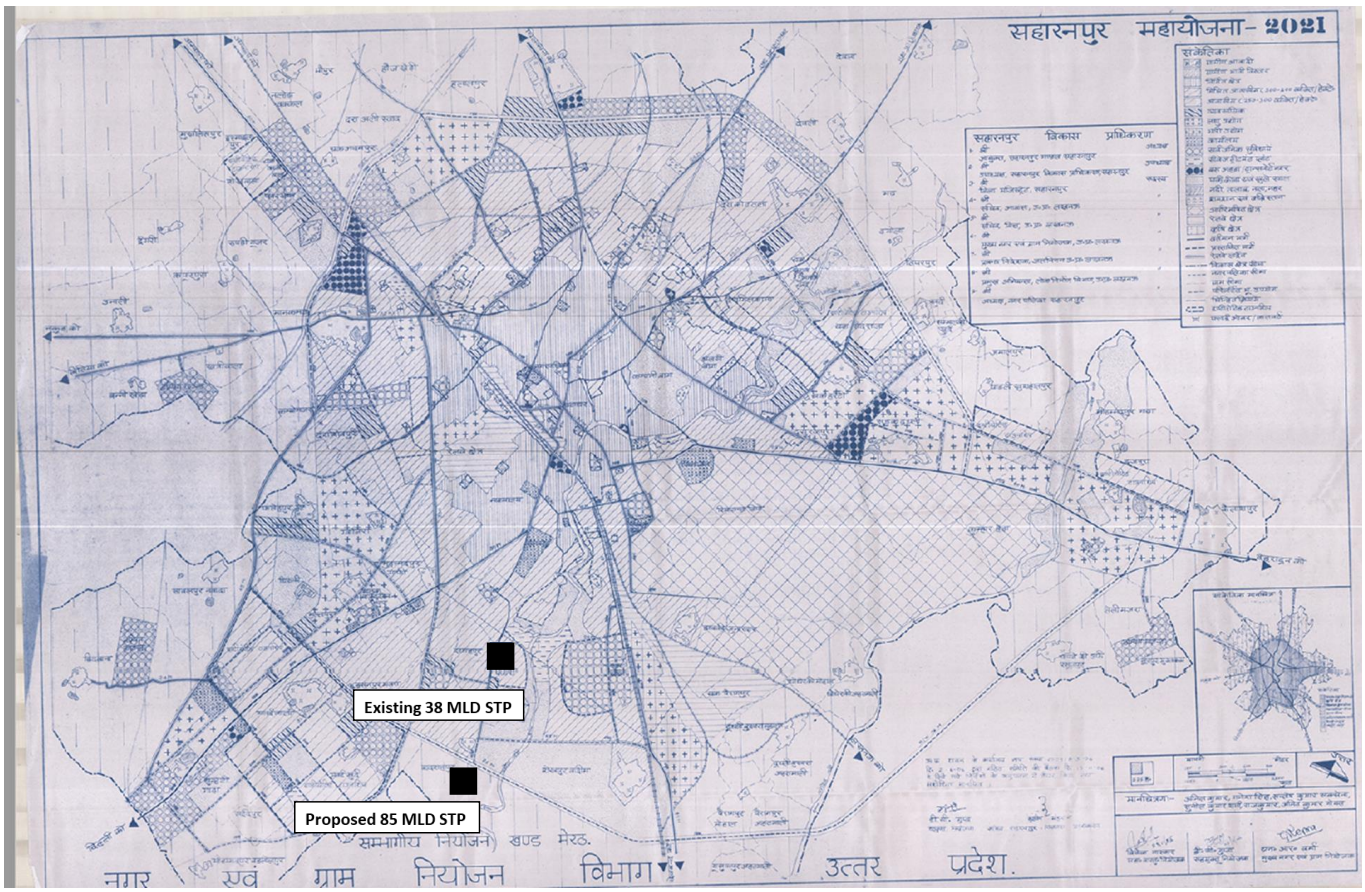
III. Saharanpur Wastewater Treatment Works (I&D, HAM)

59. Saharanpur city is situated close to the borders of the States of Haryana and Uttarakhand. It is located about 164 km from New Delhi, the national capital and 70 km from Dehradun, the capital of the State of Uttarakhand. Saharanpur city is situated in the upper doab region and is located on the land lying between two converging rivers, Yamuna and Ganga. Saharanpur is located on the banks of the Dhamola and Pandhoi river (a major tributary of river Hindon) with a population of 7.05 lakhs (2011 Census). Saharanpur has nearly flat terrain, elevation varies from 267 to 280 meters above main sea level and groundwater table is generally about 10 to 20 meters below ground level. The Saharanpur municipal area is divided into 86 wards and covers about 53 km^2. Saharanpur district is one of the prosperous districts of UP. There are several large-scale industries located in Saharanpur which include paper mills, dairy, textile industry and sugar mills.

Sanitation Status in Saharanpur Town

60. The existing and proposed wastewater pumping stations and treatment plant locations in Saharanpur are at Figure 5.

Figure 5: Existing and Proposed Wastewater treatment Infrastructure in Saharanpur



61. Saharanpur current sanitation status is as follows:

- **Drains:** 51 drains have been tapped under the Yamuna Action Plan – II in Saharanpur (table 1), collecting and treating 38 MLD of wastewater. These drains are overflowing due to population increase.
- **Sewer Network:** The total length of sewerage network in Saharanpur Nagar Nigam is about 111km in four sewerage zones, out of which 27.37km is trunk sewer and 84.15km is branch sewers. There are 3 Intermediate Pumping Stations (IPS) and 1 Main Pumping Station (MPS). The IPS pumps the sewage to the MPS from where it is pumped to a 38 MLD STP.
- **Sewage Treatment Plant (STP)**: There is a 38 MLD STP located at Praduman Nagar, maintained by UPJN. The STP is functioning and is in good condition.

What investments will the Project finance in Saharanpur and how will they change the sanitation scenario in the city?

62. The proposed investment will finance the interception and diversion (I&D) of 51 drains, the construction of 9 IPS, one MPS and an 85 MLD STP in Bashapur (Table 3). The bid shall be invited on a technology neutral basis under a HAM PPP including 15 years of O&M.

Table 1: Existing IPS/MPS at Saharanpur

Sr. No.	Name of IPS/MPS	No. of Nalas/ Drains tapped	Nearest Location	Capacity of IPS (MLD)
1	IPS-Dalmandi	8	Eastern side of River Pandhoi	6.9 MLD
2	IPS-Rakesh Theatre	14	Left and Right side of River Dhamola, Pandhoi	12.6 MLD
3	IPS- Govindnagar	17	Right side of Pandhoi river and between Rakesh theatre	24 MLD
4	IPS-Paduman nagar	12	Khalasi road, west river of Dhamola River.	38 MLD
	Total	**51**		

Table 2: Summary of Existing Sewer in Saharanpur City

Sr. No.	Sewerage Zone	No. of wards	No. of colonies	Trunk sewer (km)	Branch sewer (km)
1	Zone – 1	6	19	3.8	8.2
2	Zone – 2	11	90	9.45	20.95
3	Zone – 3	6	20	6	27
4	Zone – 4	7	28	8.19	28
	Total	**30**	**157**	**27.37**	**84.15**

Table 3: Details of Proposed I&D and STP in Saharanpur

Sr. No.	Name of IPS/MPS	No. of Nalas/Drains tapped	Capacity (MLD)
1	IPS-1 Near Numaish Camp	Janata Colony Drain, Numaish Camp-V shape Drain	1.57
2	IPS-2 Near Toilet block, Shakti Nagar	4 Nalas/Drains	3.77
3	IPS-3 Near Sapna Talkies	10 Nalas/Drains	9.31
4	IPS-4 Old Police Chowki	5 Nalas/Drains	2.86
5	IPS-5 Near Pahalwan Pulia	5 Nalas/Drains	6.43
6	IPS-6 Near Taj Nala	14 Nalas/Drains	95.30
7	IPS-7 Paper Mill Road	4 Nalas/Drains	11.50
8	IPS-8 Near Kanshi Ram Colony	6 Nalas/Drains	19.41
9	IPS-9 near Govindnagar 1	1 Nalas/Drains (Hati Gate)	22.18
10	MPS-(Inside the STP site)	Drains/Nalas of IPS-6, 8 and 9	136.89
		STP- Badshapur	**85 MLD**

IV. Investments to be carried forward from the ongoing NGRBP to the proposed SNGRBP

Digha Kankerbargh Zone in Patna Bihar

63. The investment combining the zones of Digha and Kankerbargh in Patna, the capital of the State of Bihar. It is composed of a HAM and a DBOT PPP contract. The DBOT part of the investment will develop 438km of sewer network to bring the city from no coverage to full coverage in both Digha zone and Kankerbargh, benefiting a population of 874,000. The HAM part of the investment will develop two STPs, one in Digha: 100MLD and one in Kankerbargh: 50MLD. These STPs will bring the treatment capacity from nil currently to 100 percent in Digha and in Kankerbargh. Moreover, Digha and Kankerbargh are the remaining parts of Patna city which were not covered by sewers and STP. Therefore, this investment will also bring Patna to full coverage by sewer networks and will bring the treatment capacity at city level from 57percent currently (including 40 percent developed under ongoing NGRBP-funded investments) to 100 percent.

Howrah, Bally and Baranagar, West Bengal.

64. This investment using a HAM PPP contract to rehabilitate or expand STPs in three towns located in the northern part of Kolkata, Howrah: 65 MLD, Bally: 40 MLD and Kamarhati & Baranagar: 60 MLD. These STPs will bring the treatment capacity in each city from nil currently to 100 percent and will treat wastewater intercepted and diverted from open air drains. This investment does not include developing sewage network in these cities. This investment will increase the treatment capacity of Kolkata, the capital city of the West Bengal State, from 21 percent to 54 percent. Combined with the Tolly Nallah STP investment which will add 117 MLD under the ongoing NGRBP, this will further increase the treatment capacity. Another investment is under preparation (DPR stage) to tap the remaining 11 drains discharging untreated sewage in the Ganga river, using I&D, and to further increase treatment capacity financed under the ongoing NGRBP. Once implemented, these investments will collectively bring the treatment capacity in Kolkata city to 100 percent.

Begusarai, Munger and Buxar, Bihar

65. Begusarai, Munger and Buxar are three towns of the State of Bihar which do not have any infrastructure for collection and treatment of wastewater. Although comparatively smaller, the investments in Begusarai, Munger and Buxar will develop sewage network and STPs allowing to bring coverage and treatment to 100 percent. These investments all experienced early termination of the contracts due to issues with the private sector. They are investment under the earlier cost sharing model of 70 percent by Central government (now 100% paid under the Project) and 30 percent by the State and the ULBs. They were selected under the Project because they require attention to fix what was not delivered under the original DBOT, and because of the opportunity given to work with States and ULBs and leverage on the financial commitment they need to provide for each of these investments.

66. **Begusarai** is a town of 146,000 inhabitants (2011 census) with no sewerage or treatment system. Most of households having septic tanks and effluent from these septic tanks is

discharged in open drains and these connected through natural drains, which ultimately connected to the Ganga river. A DBOT contract was awarded in 2011 to a private operator before the beginning of the NGRBP and was partly funded through retroactive financing. The contractor was not able to deliver, and the contract was terminated in 2017 by BUIDCO for lack of performance. A new bidding process was launched, following the same modalities as originally sanctioned. It was procured as a DBOT, which will be funded at 30 percent by the State of Bihar and 70 percent by the Central Government. The Project will finance 105 km of sewer network to which the 32,000 households the town counts will be able to connect. This will bring the sewerage coverage from nil to 100 percent. It will also develop a 17 MLD STP, which will allow treating the full extent of the wastewater generated by the town of Begusarai. The contract has been awarded in January 2020 and the private operator is initiating the mobilization and design phase.

67. **Buxar**: Buxar is a town of 137,000 inhabitants with no sewerage or treatment system. Houses are equipped with on-site sanitation facilities, with toilets mostly connected to septic tanks. Septic tank overflow and greywater from kitchen and bathrooms are discharged into the roadside drains that transport wastewater to the main natural drains, which ultimately discharge this wastewater untreated into the Ganga river. A DBOT contract was awarded in 2011 to a private operator before the beginning of the NGRBP and was partly funded through retroactive financing. The contractor was not able to deliver, and the contract was terminated in 2017 by BUIDCO for lack of performance. New bidding documents are under preparation, following the same modalities as originally sanctioned, namely a DBOT, which will be funded at 30 percent by the State of Bihar and 70 percent by the Central Government. The Project will finance 106 km (39 km already laid) of sewer network to which the 30,000 households the town counts will be able to connect. It will also build a 16 MLD STP. This will enhance sewerage coverage from nil to 100 percent and will allow treating the full extent of the wastewater generated in Buxar.

68. **Munger**: Munger is a town of 240,000 inhabitants with no sewerage or treatment system. The wastewater from septic tanks, kitchen and bathrooms is discharged into road side surface drains, which are generally connected to the main natural drains, which ultimately discharge this wastewater untreated into the Ganga river. A DBOT contract was awarded in 2012 to a private operator, who was not able to deliver, and the contract was terminated in 2016 by BUIDCO for lack of performance. A new bidding process was launched and is at bid evaluation stage. It follows the same modalities as originally sanctioned, namely a DBOT, which will be funded at 30% by the State of Bihar and 70 percent by the Central Government. The Project will finance 166 km of sewer network to which 50,000 households of the town counts will be able to connect. It will also build a 30 MLD STP. This will enhance sewerage coverage from nil to 100 percent and will allow treating the full extent of the wastewater generated in Munger.

ANNEX 4: Economic Analysis of the *Namami Gange* Program

I. Background

The economic analysis of the *Namami Gange* Program evaluates the benefits of the Program relative to its costs. This builds on earlier work, co-authored by the economist engaged by the World Bank to undertake this economic analysis and published in 2000[46] and on an update of the study that evaluated the NRGBP Project for reducing pollution loadings into the river in 2011. Specifically, it undertakes the following tasks:

i. Updates estimates of non-user and user benefits of the Ganga as a function of the quality of the water and applies the benefit functions to derive values for the benefits of the proposed actions under the current program.

ii. Compares these benefits with the costs of the actions to provide indicative values of the measurable and quantifiable net benefits.

This Annex is organized as follows. Section II updates the non-user benefits of the 2000 study. Section III does the same for the user benefits, other than those related to health, agriculture and fisheries. Section IV compares the estimated costs of Namami Gangi program. Section V reports the benefit-cost ratios for the clean-up program, taking account of the uncertainties on both the cost and benefit side. Section VI concludes, with a discussion on the limitations of the results.

II. Non-user Benefits of Cleaning the Ganga

Non-user benefits of any environmental asset are defined as those that derive from a person's knowledge of the existence of the asset independently of any use made of it. Thus people in India who treasure the Ganga for religious reasons even though they do not visit it are said to have a non-user benefit from its very existence. The 2000 study established that this value depended among other things on the quality of the Ganga. The quality measure was an average indicator for the whole river, based on annual average BOD levels at 14 monitoring stations[47]. It is calibrated so that if the Ganga meets bathwater quality standards everywhere (defined as no more than 1 mg of BOD per liter of water), then the index will take the value of 100. The actual value in 1995 was estimated at 48.63.

The benefits were quantified in monetary terms for the urban literate households of India in 1995, based on a survey of such households. The survey elicited such values as a function of a number of factors, one of which was water quality. The estimated function that provided the best fit (details of which can be found in Chapter 6 of the book) took the following form:

$$LogB = -1.53 + 1.4738 LogQ + 0.286 LogY$$

[46] Markandya, A. and M.N. Murty, "Cleaning-up the Ganges: A Cost Benefit Analysis of the Ganga Action Plan. Oxford University Press, New Delhi, 2000. This economic analysis has been undertaken by Anil Markandya, a co-author of this study.

[47] The original list was Rishikesh, Hardwar d/s, Garhmukteshwar, Kannauj u/s, Kannauj d/s, Kanpur u/s, Kanpur d/s, Allahabad u/s, Allahabad d/s, Varnasi u/s, Varnasi d/s, Patna u/s, Patna d/s, Rajmahal.

Where:

B = The non-use value per household expressed in 1995 Rupees per annum.

Q = The quality indicator for the Ganga, measured as a weighted average of the annual average BOD values at 14 monitoring stations.

Y= Household income expressed in 1995 rupees per annum.

The function indicates that the willingness to pay for improved quality increases by .28 percent for each one percent improvement in income. As noted at the time, this is on the low side compared to some other studies, but it is not outside the range of values that have been found[48]. Most of the evidence indicates a value that is less than one, although some recent studies have suggested that the value may be close to one or even above that[49]. In order to allow for the uncertainty in this elasticity two estimates are reported: one with the estimated elasticity of 0.28 as in the original study and the other with an elasticity of 1.0, which has been suggested by some more recent studies.

In order to transfer the function to estimate non-user benefits in the present, we need to adjust for inflation. Converting from 1995 prices to 2019 prices (latest data available) implies an increase in the price level by a factor of 4.44. Thus the new function becomes:

$$LogB = -0.98 + 1.4738LogQ + 0.286LogY$$

To estimate the change in non-user values of the Ganga for full bathing water quality throughout an update is needed for the latest year available of: (a) the number of urban literate households to whom the non-user benefits apply and (b) the average income of those households.

Number of urban literate households.

1) The number of urban literate households is only available for 2011 and is estimated at 79.5 million[50]
2) The urban literacy rate is estimated for the same year at 85%[51]
3) The percent of urban households that are Hindus is estimated at 74.82%[52]

The combination of the three sources gives a number of urban literate households at 97.5*0.85*0.7482 = 50.2 million. There are a number of approximations involved in this calculation, but it is the best that can be made given the information available. More recent data would reveal a higher number of households to whom the non-user benefits apply, as the total number of urban literature households will have grown since 2011 and the literacy rate will have risen a little.

Average income of those households

[48] In studies of the risk of mortality the income elasticity has been estimated in the range of 0.2 to 0.6 (Gerking, DeHaan and Schulze, 1988; Jones-Lee, Hammerton and Philips,1985; Alberini, Hunt and Markandya, Viscusi and Aldy, 2003). A study of the income elasticity for environmental improvements put the value at less than one (Kristom and Reira, 1996).
[49] Studies indicating a value greater than one are (Navrud and Lindhjem, 2010). Hammitt and Robinson (forthcoming).
[50] http://mohua.gov.in/pdf/5c80e2225a124Handbook%20of%20Urban%20Statistics%202019.pdf
[51] http://censusmp.nic.in/censusmp/All-PDF/6Literacy21.12.pdf
[52] https://www.census2011.co.in/religion.php

An attempt has been made to estimate urban literate household income for a more recent year than 2011. This was done as follows:

1) The latest year for which income of urban literate household income is available is 2004-05, when it is estimated at Rs.99.852[53]
2) Adjusting for inflation to get it into 2019 prices gives a value of Rs.258,661 (WDI indicators)
3) Between 2004-05 there has been considerable growth in per capita incomes. The WDI indicators put the increase between those dates and 2019 at around 200%. Thus the average income of urban literate households in 2018 is estimated at Rs. 258,661*3 = Rs.791,659.

Allowing for these two changes over the past 23 years results in a very large increase the value of non-user benefits. The WTP figures for the river if it met bathing water quality standards everywhere are shown in Table 1.

The figures indicate an increase in non-user benefits in terms of rupees of a factor of between 13 and 36, depending on which elasticity of income taken. Of this inflation accounts for a factor of around 4.4, increases in number of urban literate households a factor of 2 and increases in real income the rest. In US dollar terms the benefits of bathing water quality increases by a factor of between 6.8 and 18.3. The difference between the increase in US$ terms and in rupee terms reflects in part the greater inflation in rupee terms.[54]

Of course, the program under consideration will not take the Ganga to bathing water quality throughout, so it is necessary to estimate the non-user benefits in terms of the change in water quality from its present level to the level that will be achieved through the program. In order to do that information is needed on expected changes in levels of BOD after the implementation of various components of the new program.

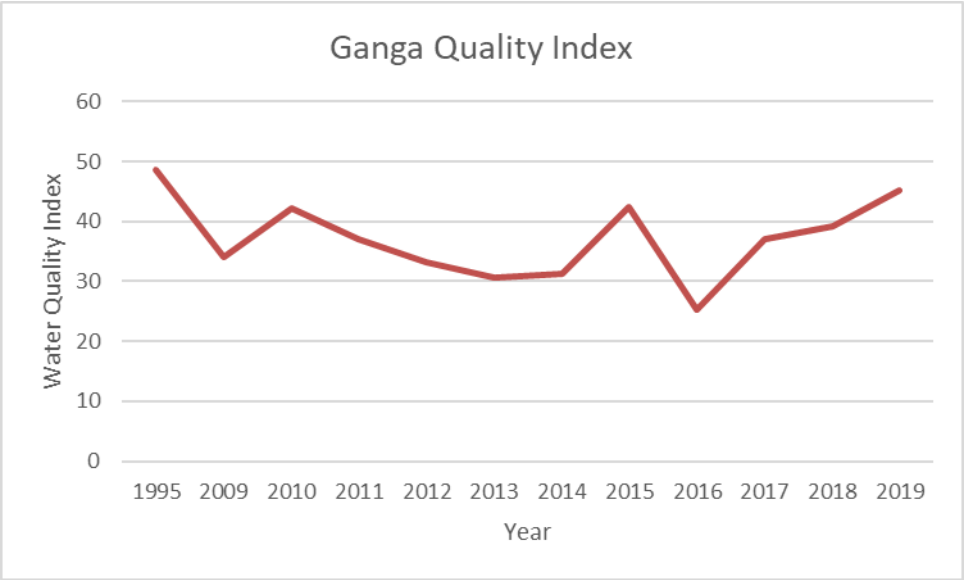
Table 1: Non-User Benefits WTP for Bathing Water Quality in the Ganga

		Units	In 1995	Adj. to 2018 Prices	2018 Values in 2018 Prices
	Nof of Urban Literate HH	Mn.	24.93	24.93	50.18
	Average HH Income	Rs./Yr	44,705	198,502	791,659
Elasticity = 0.286	WTP for Bathing Quality	Rs./Yr	558	2,478	3,680
	Total WTP for Bathing Quality	Rs.Mn./Yr	13,911	61,768	184,662
	Total WTP for Bathing Quality	US$Mn./Yr	395		2,699
Elasticity = 1.0	WTP for Bathing Quality	Rs./Yr	558	2,478	9,881
	Total WTP for Bathing Quality	Rs.Mn./Yr	13,911	61,768	495,826
	Total WTP for Bathing Quality	US$Mn./Yr	395		7,247
	Exchange Rate	RS./USD	35.2		68.42

[53] *http://www.thesuniljain.com/files/thirdparty/NCAER%20How%20India%20Earns%20Spends%20and%20Saves.pdf*. Table 2.24 from the cited source.

[54] The exchange rate in 1995 was Rs.35.2 to the US dollar, while in 2009 it was Rs.48.8, an increase of 38%. In the meantime, however, price inflation in India was 160%. Hence the increase in value in rupees is greater than the increase in value in dollars.

Figure 1: Water Quality Index for Ganga: 1995-2019

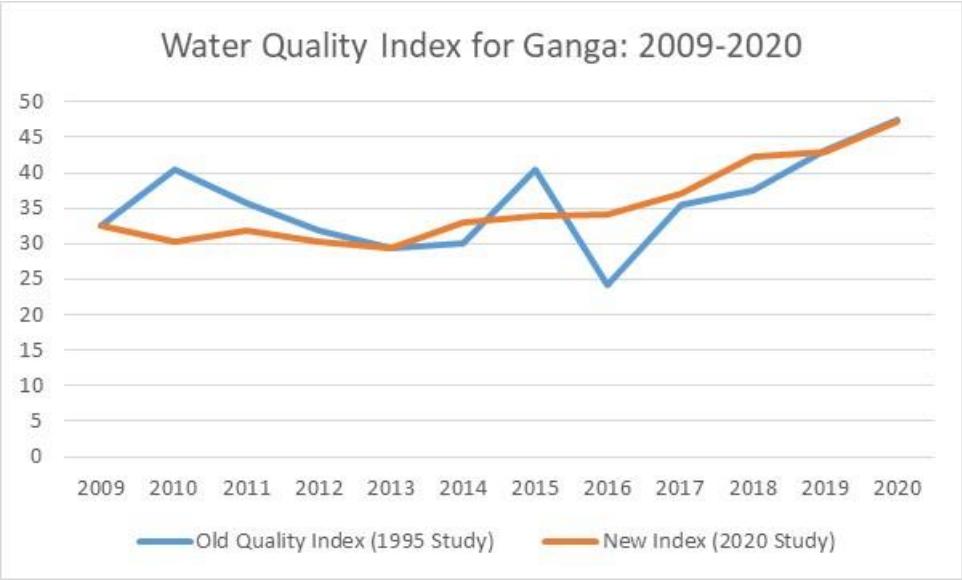


Source: NMCG, Data on water quality prepared by the CPCB and shared with the World Bank in April 2020

Data provided recently shows the water quality index between 2009 and 2019 based on the original set of monitoring stations. This is plotted in Figure 1, along with the 1995 value that was the reference point for the original study. The figure shows some fluctuations over the period, with every year being lower than the 1995 value: the starting point for water quality shifts from 48.63 in 1995 to 45.12 in 2019.

Since the original study the monitoring of the quality of the river has been expanded to 52 monitoring stations. As the new program needs to be evaluated relative to quality measured using data from these stations, the new index has been calculated for data from 2009 to 2020 and calibrated so that it coincides with the old index for 2009 (the one year for which both indices were reported). This allows the new index to be used to value improvements in quality relative to values estimated using the old index. The new and old indices are shown in Figure 2.

Figure 2: Old and New Indices of Water Quality in Ganga: 2009-2019



These estimates will be used to value the estimates of different configurations of water quality improvement under the ongoing program.

Extension to Include Hindus Not Living in India

Before going on to estimate use values an extension of the non-user benefits has been included. The team raised the possibility of extending the measurement of benefits to urban literate Hindus not resident in India. To do this an estimate of the Hindu population in the diaspora is required, along with its average household income.

There is an estimate of the population of Indian migrants across the globe from UN statistics[55]. For 2019 the figure was 17.5 million[56]. Not all, however, will be Hindus. To obtain an estimate of that a second source gives the Hindu populations of two countries: the USA and the UK, for which the latest Hindu populations are estimated respectively as 2.29 million and 0.84 million[57]. The corresponding total number of Indian migrants in those countries from the UN data are 2.7 million (USA) and 0.92 million (UK). Combining the two would indicate that 86% are Hindu. Applying that to the total Indian migrant population of 17.5 million would yield an estimate of 15.1 million.

The average household income of the Indian migrant population is not available. It will certainly be higher than that of the resident urban literate population. In 2018 the average for the latter is estimated at Rs792,000 or US$11,570 at market rates of exchange and US$43,660 at purchasing power exchange (PPP) rates. The PPP converted rate is probably closer to the income of non-resident Indians but it still likely to be an underestimate. Unfortunately, as there is no reliable figure,

[55] *https://www.un.org/en/development/desa/population/migration/data/estimates2/estimates19.asp*
[56] It is assumed that long-established Hindu populations of countries such as Indonesia, Malaysia etc. are not to be included in this estimate. The focus therefore is only on Hindu migrants from India (i.e. people born in India).
[57] Shcheglov, Serguei. "Countries with The Largest Hindu Populations." WorldAtlas, Jan. 15, 2019, worldatlas.com/articles/countries-with-the-largest-hindu-populations.html.

a lower bound to their WTP for the program can be obtained by assuming the same income as for resident urban literate Indians.

Table 2 gives the value of Non-user benefits of bathing water quality if Indians living outside India are included. The value for 2018 increases relative to that in Table 1 by 30%.

Table 3 gives the corresponding values for different levels of bathing water quality when this group of beneficiaries is added to the total.

Table 2: Non-User Benefits WTP for Bathing Water Quality in the Ganga Including Indian Not-Resident in India

		Units	In 1995	Adj. to 2018 Prices	2018 Values in 2018 Prices
	Urban Literate HH in India	Mn.	24.93	24.93	50.18
	Literate HH Outside India	Mn.			15.10
	Average HH Income	Rs./Yr	44,705	198,502	791,659
Elasticity = 0.286	WTP for Bathing Quality	Rs./Yr	558	2,478	3,680
	Total WTP for Bathing Quality	Rs.Mn./Yr	13,911	61,768	240,232
	Total WTP for Bathing Quality	US$Mn./Yr	395		3,511
Elasticity = 1.0	WTP for Bathing Quality	Rs./Yr	558	2,478	9,881
	Total WTP for Bathing Quality	Rs.Mn./Yr	13,911	61,768	645,034
	Total WTP for Bathing Quality	US$Mn./Yr	395		9,427
	Exchange Rate	RS./USD	35.2		68.42

The value for different levels of quality is shown in Table 3, based on the new index and starting with the actual value in 2019. Again, the numbers go up by about 30% compared to the case where non-resident Indians are excluded.

III. User Benefits of Cleaning the Ganga

The 2000 study estimated the use benefits for two groups of people: those living within 0.5 km either side of the river in neighborhood of the cities of Allahabad, Varanasi and Calcutta; and those pilgrims who visited bathing ghats in the same areas. For local residents the sampling was limited to urban literate households and for pilgrims it was restricted to literate households. As for the non-use benefits, the WTP for improvements in water quality was estimated as a function of the quality, measured in BOD concentrations. The resulting equation for the whole sample was:

$$LogB = -1.73 + 1.651 LogQ + 0.258 LogY$$

Where:

B = The non-use value per household expressed in 1995 Rupees per annum.

Q = The quality indicator for the Ganga, measured as a weighted average of the annual average BOD values at 14 monitoring stations.

Y= Household income expressed in 1995 rupees per annum.

Table 3: Non-use Value of Water Quality Index for Different Quality Levels (US$ Mn.) Including Benefits to Non-Resident Indians

Value for Different Quality Levels		
Quality	US$Mn./Yr.	
	Low	High
42.945	940	2,524
45	1,007	2,704
50	1,176	3,159
55	1,354	3,635
60	1,539	4,132
65	1,732	4,650
70	1,932	5,186
75	2,138	5,741
80	2,352	6,314
85	2,571	6,905
90	2,797	7,511
95	3,030	8,134
100	3,267	8,773

The function indicates that the willingness to pay for improved quality increases by 0.26 percent for each one percent improvement in quality.

In order to transfer the function to estimate non-user benefits in the present, we need to adjust from inflation. Converting from 1995 prices to 2019 prices implies an increase in the price level by a factor of 4.44. Thus, the new function becomes:

$$LogB = -1.193 + 1.651LogQ + 0.258LogY$$

To apply it to the present date it is necessary to establish the groups over which the aggregation should be made. As in the case of the non-user benefits an estimated income elasticity of 0.258 and a higher elasticity of 1.0 are taken to obtain the estimated benefits. Table 4 indicates the key assumptions and calculations[58].

[58] It should be noted that there are two distinct groups of users: those living within 0.5 kilometer of the river who amount to a few hundred thousand and those visiting it for religious purposes, who amount to around five million. There is little likelihood double counting of benefits to include both groups.

Table 4: User Benefits for WTP for Bathing Water Quality in the Ganga

	In 1995	In 2018	Comment
Households Living Near the River			
No of Urban Literate HH (Mn.) living within 1 km	74,400	149,700	The same increase as for all urban households has been assumed
Average HH income	27,771	491,783	Increase in 2018 over 1995 is based on WDR data for all urban households
Using Income Elasticity of 0.258			
Mean WTP per HH (Rs. pa.)	582	3,690	Applying elasticity of 0.258 on HH income and adjusting for inflation
Total WTP (Rs. Mn. pa.)	43	553	Mean WTP times no of households
Total WTP (US$ Mn.)	1.2	8.1	
Pilgrims			
No of pilgrims Mn.	5.0	5.0	Some information on the increase is needed but as a lower bound the numbers are unchanged.
Average HH income	97,353	1,723,976	Increase in 2018 over 1995 is based on WDR data for all urban households
Mean WTP Per Person (Rs. pa.)	1,564	7,006	Applying elasticity of 0.258 on HH income and adjusting for inflation
Total WTP (Rs. Mn. pa.)	7,820	35,029	Mean WTP times no of persons
Total WTP (US$ Mn.)	222	514	
Total WTP for both groups (US$Mn.)	223	522	
Using Income Elasticity of 1.0			
Mean WTP Per HH (Rs. pa.)	582	10,299	Applying elasticity of 0.258 on HH income and adjusting for inflation
Total WTP (Rs. Mn. pa.)	43	1,542	Mean WTP times no of households

Total WTP (US$ Mn.)	1.2	22.5	
Pilgrims			
No of pilgrims Mn.	5.0	5.0	Some information on the increase is needed but as a lower bound we assume the numbers are unchanged.
Average HH income (Rs. P.a.)	97,353	1,723,976	Increase in 2009 over 1995 is based on WDR data for all urban households
Mean WTP Per Person (Rs. P.a.)	1,564	59,103	Applying elasticity of 1 on HH income and adjusting for inflation
Total WTP (Rs. Mn. P.a.)	7,820	295,517	Mean WTP times no of persons
Total WTP (US$ Mn.)	222	4,319	
Total WTP for both groups (US$Mn.)	223	4,297	
Exchange Rate Rs. / US$	35.2	48.8	

Note: The aggregation for resident households was done for those living within one km of the river, after comments from reviewers to say that 0.5 km, which was used for the survey was too limiting.

The figures indicate an increase in user benefits in terms of rupees of a factor of between 5 and 37, depending on which income elasticity we take. Of this inflation accounts for a factor of around 4 and increases in real income most of the rest. In US dollar terms the benefits of bathing water quality increases by a factor of between 2.3 and 19.3, depending on the income elasticity that is used. As before the difference between the increase factor in US$ terms and in rupee terms reflects the greater inflation in rupee terms relative to the devaluation of the rupee in terms of the US dollar.

As for the non-user case the next step is to estimate the user benefits in terms of the change in water quality from its present level to the level that will be achieved through the program. As for the non-user benefits case, a preliminary step is to calculate the value associated for different levels of user benefits. This is done in Table 5. Assuming an initial value of 43, representing the condition in 2019, an improvement to bathing standard throughout the river would yield a benefit of between US$361 mn. (i.e. US$480-US$119mn.) and US$3,012 mn. (i.e. US$4,006-US$994mn.).

Table 5: Use Value of Water Quality Index for Different Values

Value for Different Quality Levels		
Quality	US$Mn.	
	Low	High
43	119	994
45	128	1,072
50	153	1,275
55	179	1,493
60	206	1,723
65	236	1,967
70	266	2,223
75	298	2,491
80	332	2,771
85	367	3,063
90	403	3,366
95	441	3,680
100	480	4,006

IV. Extending the Benefits to Other Groups

Benefits other than to users and non-users

The results presented above are based on estimated use and non-use benefits only and furthermore on these benefits as expressed by the urban literate population of India. In the original study on which this report is based other benefits estimated included[59]:

- Health benefits in terms of less working days lost as a result of better water quality including sewerage farm workers who suffer less from worm and protozoal infections
- Benefits to farmers estimated as value of incremental farm output due to irrigation and savings in the cost of conventional fertilisers from making use of the partly treated water from sewage treatment plants.

The relative values of these benefits in that study were as follows: user benefits (33.6%); non-user benefits (60.9%); health benefits (3.5%), agricultural benefits (2.1%)[60]. Thus nearly 95% of the benefits of the project are from the user and non-user groups and these have been reevaluated for

[59] Estimates of possible benefits in terms of lower treatment costs were discussed but these were not considered reliable enough to be included in the analysis.
[60] The study also looked at distributional benefits from the project, in particular the benefits of employment creation among unskilled workers. These are not included in the figures given here.

the purposes of this study. It was not possible to transfer the health and agricultural benefits without a more detailed update and assessment of the current situation with respect to sewerage farm workers and other groups close to the river whose health may be impacted. The same applies to the possible irrigation benefits, where updated estimates of the amounts of sludge that could be provided from the STPs would be needed.

V. Envelope of Benefits and Costs of the Clean Up Program

In this sub-section the benefits of a clean-up program are provided, based on the changes in the water quality indicator, over the period 2021-2040 and compared to the costs.

In order to estimate the impact of the program on the new quality index constructed for the river the following data are used and assumptions made:

1. The current BOD loading of the river is 9,114 mld. Gross amounts are estimated at 12,000mld but existing STP remove 2,886mld.
2. These loadings would grow in line with population if no further treatment was introduced.
3. The new projects will remove a further 4,857mld when fully operational. Initially, in 2023, 70% of the capacity will be operational, building up in stages to 100% by 2035.
4. The index of quality at each monitoring station will improve proportional to the reductions in mld loadings throughout the river, subject to a minimum of 1mg/litre concentration of BOD. This is an approximation and should be replaced by modelling water concentrations as function of BOD loadings when data are available to do that.

Under these assumptions the projected quality index will take the path shown in Figure 3.

The present value of the benefits from the program at a 10% discount rate, from 2020 to 2040 are given in Table 6 for the two elasticity assumptions. In addition, future annual benefits are assumed to increase as the population who benefits from the river clean up increases, and as their real incomes of increase. Population projections to 2040 by state were taken from the Population Foundation of India[61]. Real per capita income growth to 2040 is taken as 4% per annum. Total benefits over the 20-year period are about US$5bn with the lower elasticities and US$17 billion with the higher elasticities. User benefits are between 13% and 31% of the total. The higher share for user benefits is in the case where the higher elasticities are applied, as in that case the WTP of pilgrims increases substantially given the increase in their incomes. Overall, however, non-user benefits dominate the benefits. If growth rates of per capita income are assumed to be zero the benefits decline by about 12%; if on the other had growth goes up to 6% per annum, they increase by about 6%.

[61] See: *https://assets.prb.org/pdf07/FuturePopulationofIndia.pdf*.

Figure 3: Index of River Quality Under the NGRBP Program

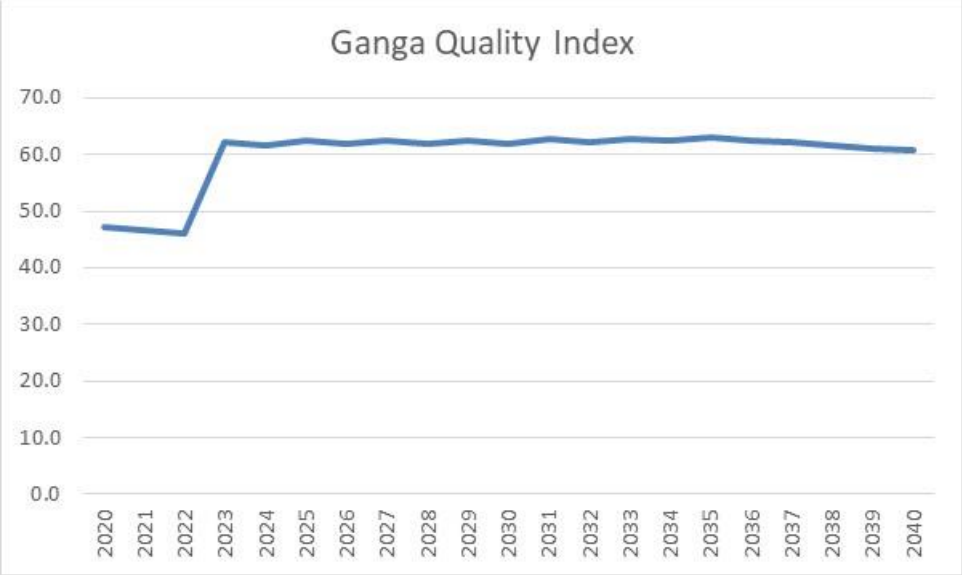


Table 6: NPV of Benefits of the Proposed Program (US$Mn.)

Base Case Income Elasticities of WTP			Higher Income Elasticities of WTP		
Non-User	User	Total	Non-User	User	Total
4,368	645	5,013	11,729	5,382	17,111

On the cost side the program involves 152 projects with a capital cost of Rs15,069 Crores (US$2.2 billion) and annual operating costs of RS832 Crores (US$119 million) when operating at full capacity. Construction under the current program in 2020 and units will start to be operations in 2023. Further details can be found in NMCG website.

A comparison of the costs and benefits is given in Table 7 for the two elasticities of benefits with respect to income. The detailed spreadsheet is included as an annex. The data show that benefits are well in excess of costs in both cases, particularly so in the case of the higher income elasticities. The benefit to cost ratio is 2.5 in the base case and 8.5 in the high elasticity case and the internal rates of return (i.e. the rates of discount at which the net benefits would be zero) are 32% and 90% for the two elasticities.

Given the uncertainties associated with the calculations it is important to conduct some sensitivity analysis. The following are considered:

A. A delay in completion of the projects, so the benefits do not start until 2025.
B. An increase in the capex cost and opex costs.
C. The operations of the STPs are not able to operate at desired capacity due to financial constraints. In that case how would the benefits change is they could only operate at less than planned capacity

Table 7: Net Benefits of the Current Program

	Base Case Income Elasticities of WTP	Higher Income Elasticities of WTP
NPV of Costs US$Mn.	2,006	2,006
NPV Benefits US$Mn.	5,013	17,111
NPV Net Benefits US$Mn.	3,190	15,288
Benefit Cost Ratio	2.5	8.5
IRR	32%	90%

In the case of a delay of two years, from 2023 to 2025, the benefit cost ratios fall to 2.0 (from 2.5) and to 6.8 (from 8.5). If capex costs rise by 25%, this would still only lower the base case benefit cost ratio from 2.5 to 2. A doubling of the opex costs would also only lower the benefit cost ratio from 2.5 to 2.2. The biggest impact is from STP plants operating at under capacity. If they operate at 75% capacity the base case benefit cost ratio falls from 2.5 to 1.58. The plants have to operate at least at 60% of capacity to give a base case benefit cost ratio of greater than 1.

VI. Further work

Further work is needed in the following areas (in order of importance):

a. Improved understanding of water quality, flows and distribution of pollution sources. The water quality index is a function of data on BOD concentrations at 52 monitoring stations. When loadings change the concentrations will change depending on where the STP plants are located, and characteristics of river flow, climate etc. This should be modelled to make a better estimate of the change in quality than has been done here.

b. Better understanding of which characteristics of river quality people will be willing to pay for. The fact that the major share of the benefits (60%) relate to non-use benefit, highlight the need to understand precisely what characteristics people value. This is in particular important since different projects (with similar impact on BOD) may impact these characteristics very differently. Given the study is still based on updating primary data that is more than 25 years old, it would be worth undertaking a new set of WTP surveys.

c. Estimates of possible benefits from health and agriculture.

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Appendix 1

BENEFIT COST ANALYSIS WITH LOWER ELASTICITIES FOR BENEFIT ESTIMATION																
NEW PROGRAM								1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Construction of Reduction in Loading				**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2040**	
Population Projection				**100**	**101.1**	**102.3**	**103.4**	**104.6**	**105.8**	**107.0**	**108.2**	**109.4**	**110.7**	**111.9**	**123.1**	
MLD				9114.00	9217.38	9321.94	9427.68	9534.62	9642.78	9752.16	9862.78	9974.66	10087.81	10202.24	11222.46	
Removal	4857			0.00	0.00	0.00	3399.90	3399.90	3642.75	3642.75	3885.60	3885.60	4128.45	4128.45	4857.00	
Percentage				0.00%	-1.13%	-2.28%	33.86%	32.69%	34.17%	32.97%	34.42%	33.19%	34.61%	33.36%	30.16%	
E-Rate INR to USD	**70**															
							0.7	0.7	0.75	0.75	0.8	0.8	0.85	0.85	1	
Year				**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2040**	
COSTS DATA IN 2019 US$																
Volume Waste		Ml/day		9,114	9,217	9,322	6,028	6,135	6,000	6,109	5,977	6,089	5,959	6,074	6,365	
Capital Costs	NPV	US$ Mn.	$1,784.49		$717.57	$717.57	$717.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
O&M Costs	NPV	US$ Mn.	$221.15	-	-	-	$27.45	$27.45	$29.41	$29.41	$31.37	$31.37	$33.33	$33.33	$39.22	
Total Costs	NPV	US$ Mn.	$2,005.65	-	717.6	717.6	745.0	27.5	29.4	29.4	31.4	31.4	33.3	33.3	39.2	
BENEFITS in 2019 US$Mn.																
CPCB Data																
Non-use	NPV	US$ Mn.	$4,368.28	0.00	-19.57	-39.69	625.61	617.49	660.00	651.72	695.24	686.64	731.24	722.06	801.52	
Use	NPV	US$ Mn.	$644.70	0.00	-2.84	-5.74	92.98	91.60	97.90	96.49	102.92	101.45	108.02	106.46	116.62	
Total	NPV	US$ Mn.	$5,012.98	0.00	-22.40	-45.43	718.59	709.09	757.90	748.20	798.16	788.09	839.26	828.52	918.15	
NET BENEFITS in 2019 US$Mn.																
	NPV	US$ Mn.	$3,189.66	0.00	-739.97	-763.01	-26.43	681.64	728.49	718.79	766.78	756.72	805.93	795.19	878.93	
	BCR		2.50													
	IRR	32%														

ANNEX 5: Financial Management

This Annex describes the financial management (FM) and disbursement arrangements for the proposed Project.

1. The FM arrangements for proposed SNGRBP are based on the implementation experience of the ongoing NGRBP.

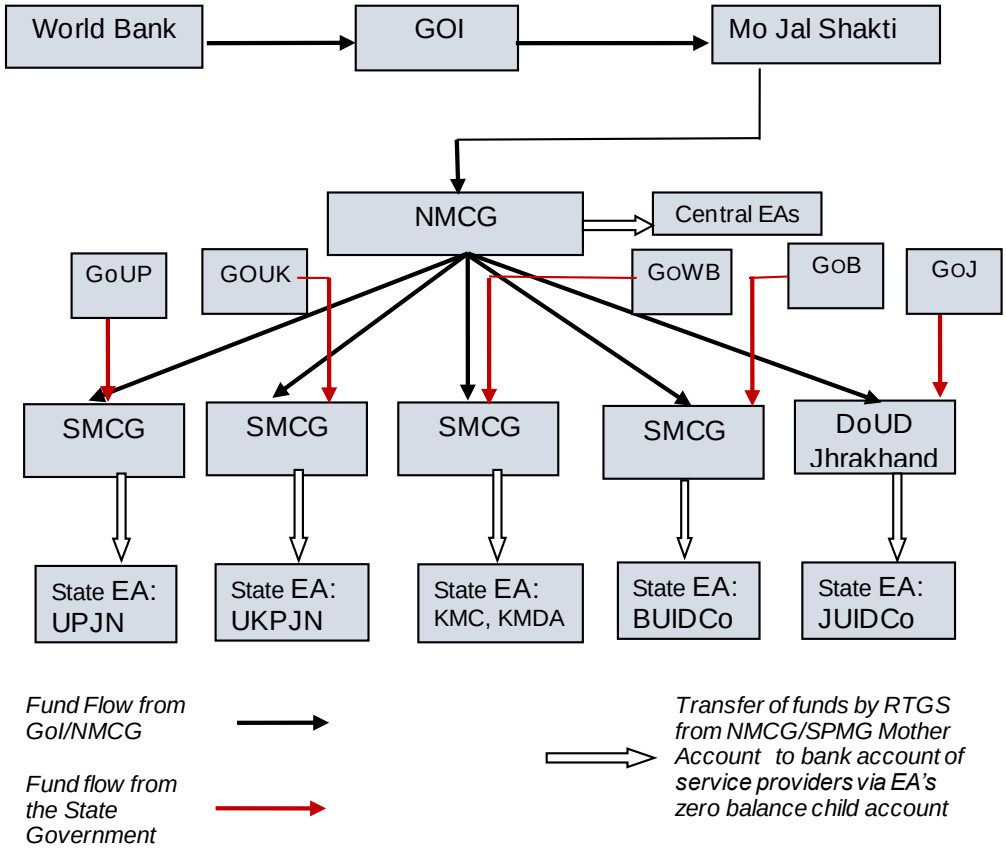
2. **FM Manual:** An FM Manual was prepared for the NGRBP which laid down the detailed financial management processes of the Project including budgeting, funds flow, internal control framework, accounting, financial reporting and audit. The Manual has been revised during the Project preparation of the proposed SNGRBP to incorporate necessary changes and improvements in the processes.

3. **Fund Flow Arrangements:** NMCG, which is registered as a Society, will receive Project funds in an earmarked Project bank account from the budget of DoWR, under the Ministry of Jal Shakti. NMCG will transfer funds quarterly to each SMCG based on demand for funds submitted by respective SMCGs. The NMCG will release installment to each SMCG only on receipt of expenditure statements for previous release and after adjustment of unspent balance. The State Government will release its share of funds to the SMCG within two months of the receipt of the installment from the NMCG.

4. In order to streamline fund-flow arrangements, each SMCG, will have a Project bank account (the "mother account") where funds received from the NMCG along with the State contribution, if any, will be held. Each EA in a State will have Project-specific zero balance bank account (the "child account"), in the same bank as the SMCG. The EA will have the authority to issue instructions to pay contractors/ suppliers' invoices approved by EA for undertaking Project activities within the scope of the approved investments. As soon as a payment instruction is issued by the EA, SMCG will advise its banker to transfer the amount payable to the EA child account which will then be transferred to the supplier/contractor's account on the same day. This transfer of funds from the SMCG account to the supplier/contractor/service provider account will happen through Real Time Gross Settlement (RTGS)[62]. Thus, at the end of any given day, the EA child account will always have a zero balance. The above-mentioned fund flow arrangements will mitigate the risks of delay in releasing payments to contractors once the invoices are approved as well as diversion of funds to other schemes.

[62] RTGS is a funds transfer system where money is moved from one bank to another in 'real-time', and on gross basis. When using the banking method, RTGS is the fastest possible way to transfer money. 'Real-time' means that the payment transaction isn't subject to any waiting period. The transaction will be completed as soon as the processing is done, and gross settlement means that the money transfer is completed on a one to one basis without clustering with another transaction.

Figure 4.1: Fund Flow Diagram



5. As required by GoI, NMCG has switched over to Public Financial Management System (PFMS) in 2017, which is a standard system of fund flow and primary book-keeping designed for centrally sponsored schemes like the *Namami Gange* Program. Under the ongoing NGRBP, all project bank accounts of NMCG, SMCGs and EAs are registered with PFMS and payments at all levels are happening through the PFMS system.

6. **Interim Unaudited Financial Reports (IUFRs):** Each SMCG will submit quarterly IUFRs to the NMCG in agreed formats. The NMCG will consolidate the IUFRs received from the SMCGs along with its own and submit a quarterly consolidated IUFR to the World Bank within 45 days from the end of each quarter.

7. **External Audit:** Annual External audit of NMCG and SMCGs will be conducted by the C&AG and State AGs respectively under Standard Terms of Reference agreed between the C&AG, DEA and the World Bank for audit of Bank financed projects. The annual audited Project financial statements of the NMCG and SMCGs will need to be submitted to the Bank within 9 months from the end of each Financial Year, namely by December 31 each year. The following table presents the audit reports which will be tracked in the Bank's system.

Audit Reports to be tracked in Bank's system

Entity	Responsibility	Due Date
NMCG	C&AG	December 31
SMCG Bihar	State AG	December 31
SMCG Jharkhand	State AG	December 31
SMCG UP	State AG	December 31
SMCG UK	State AG	December 31
SMCG West Bengal	State AG	December 31

8. Pursuant to the World Bank Policy on Access to Information, Bank will require that the NMCG discloses the audited financial statements on the Project website. Upon formal receipt of these statements from the borrower, the Bank will make them available to the public in accordance with the World Bank Policy on Access to Information. The Bank normally makes these statements available to the public through its external website.

9. **Internal Audit:** The NMCG and each SMCG will also have internal audits to assess effectiveness of internal controls and to provide independent assurance on the adequacy of internal controls. Internal audit will also assess compliance with Bank procurement guidelines. Internal auditors will work in close coordination with technical supervision or quality assurance consultants for investments to obtain assurance that the contracts are managed prudently as per the terms of the contracts. In the ongoing NGRBP, internal auditors were appointed very late in the Project although internal audit was a requirement according to the Financing Agreement and the Program FM Manual. Also, in the ongoing NGRBP, a few SMCGs appointed their respective Internal Auditors. In the proposed SNGRBP, the appointment of Internal auditors of all SMCGs will be appointed by NMCG which will ensure independence of auditor. The scope of internal auditors will be extended to EAs, which will help improve quality of internal audits.

10. **Due diligence of EAs:** The EAs of the proposed SNGRBP are the same parastatals as those of the ongoing NGRBP. The EAs have adequate accounting and reporting systems to account for project resources and expenditures.

11. **Disbursements and Eligible Expenditures:** The total Project cost is US$1,119 million. The IBRD Loan will finance 100 percent of the Central share of eligible Project expenditures up to US$381 million. The method to be used for disbursement of funds by the Bank will be "Reimbursement".

12. Expenditures of SMCGs under the Project Management Support (Sub-component 4.2) will be shared by GoI and the States using a 70:30 cost sharing ratio. This cost sharing ratio will also be used for three infrastructure investments under Sub-component 2.2, namely Buxar, Begusarai and Munger in the State of Bihar, which are being carried forward from the ongoing NGRBP. For all activities under other Project components and sub-components, the Central Government (GoI) will bear 100 percent of the costs. In particular, this will be the case for the HAM PPP contracts under Sub-component 2.1 and for the two HAM PPP contracts to be carried forward from the ongoing NGRBP under Sub-component 2.2. The Bank will finance 100% of the GoI share for all components/sub-components subject to a maximum limit

for IBRD financing for each sub-component as laid down in the Table "Project Cost by Component" in Annex 3. Under Sub-component 2, the Bank will finance 100 percent of the GoI's share of eligible expenditures excluding land acquisition and rehabilitation/resettlement (R/R) costs.

13. The sanctioned amount for each infrastructure investment will include the estimated costs of works, goods and services required for that investment including actual costs for preparing FR, DPR, RAP, and other incremental operating and contingency costs[63] of the EA for executing that particular investment.

14. Under Component 2, no infrastructure investment can be undertaken unless sanctioned by the NMCG. All variations in contracts awarded by EAs under the Project will have to be approved by the NMCG. In case of prior review contracts variation orders are also required to be approved by the World Bank as per the Bank's Procurement guidelines. These controls will improve accountability in contract management.

[63] Subject to a maximum of 4% of project cost for preparation activities and another 4% for project supervision

ANNEX 6: Procurement

1. **Project Procurement Strategy for Development (PPSD):** Extensive market analysis has been carried out for different packages of procurement and based on the findings, decision on packages (HAM/DBOT) is finalized for I&D, STP and Sewerage works to ensure adequate participation of bidders. The HAM for sewage infrastructure under SNGRBP is based on key principles of PPP which aims to allocate risks and responsibilities to parties which are best capable to handle and have the highest incentive to perform so that the Project is implemented and operated at high standards.

2. In the HAM PPP approach, Works are partly financed by the private sector. Under the HAM model, the contractor has to design, build and operate & maintain for 15 years. NMCG would contribute about 40 percent of construction cost while the remaining 60 percent of the construction cost would be contributed by private sector through debt and equity. NMCG would pay the private sector quarterly annuity over an O&M period of 15 years. More details of this contracting model are available at Section III: Technical Analysis.

3. Consultancy contracts are also framed based on market research, and packaging of the same in terms of scope of services and period are decided. Based on risk and market analysis, the Procurement Plan for the first 18 months of Project implementation has been prepared to set out the selection methods to be followed by the borrower for procurement of goods, works, and consulting services financed by the World Bank.

4. **Procurement Plan:** The Project shall use the Bank's online procurement planning and tracking tools (viz. STEP) to record all procurement actions under IPF operations, including preparing, updating and clearing its Procurement Plan, and seeking and receiving the Bank's review and No-objection to procurement actions as required. The NMCG staff have been trained by the World Bank in use of STEP. The NMCG has so far identified following three discrete HAM investments to be taken up under SNGRBP (refer Project Components description)

5. **Procurement Types, Method and Prior Review Threshold**

Type of Procurement	Method Threshold (US$, millions)	Prior Review Threshold
Works (including Turnkey, Supply & Installation of Plant and equipment, and PPP)	Open International > 40 Open National < 40 National Request for Quotation < 0.1	All contracts more than US$15 million equivalent
Goods, Information technology and Non-Consulting Services	Open International > 3 Open National < 3 National Request for Quotation < 0.1	All contracts more than US$4 million equivalent

Consulting firms	Selection Based on Consultants' Qualifications < 0.3 Least Cost Selection and Fixed Budget Selection - in justified cases Quality- and Cost-based Selection and Quality-based Selection - in all other packages National market approach (As per paragraph 7.25 of the Procurement Regulations) < 0.8	All contracts more than US$2 million equivalent
Consulting - individuals	No threshold	All contracts more than US$400,000 equivalent
Direct selection	No threshold	With prior agreement based on justification • For goods/works/non-consulting services: As per paragraphs 6.8–6.10 of the Procurement Regulations. • For consultants: As per paragraphs 7.13–7.15 of the Procurement Regulations.

The above thresholds are for the initial 18-month implementation period. Based on the procurement performance of the Project, these thresholds may be subsequently modified. Even for post review cases, the inputs of World Bank on TORs / Technical Specifications will be obtained by the Project.

6. **Complaint handling mechanism.** To address procurement complaints received by the proposed Project, the borrower will implement a complaint handling mechanism. The NMCG is required to ensure recording of procurement-related complaints in the STEP system. Both the World Bank and borrowers will use STEP to track complaints. The borrower will be responsible for performing the following actions in STEP: (a) promptly record all complaints relating to procurement process in IPF operations; (b) for procurement process complaints received on contracts subject to the World Bank's prior review, submit the borrower's proposed response to each complaint before issuing it to the complainant(s); (c) record the borrower's response to the procurement process complaints upon issuance to the complainant(s); and (d) promptly register requests for debriefings and update STEP with the record of the debriefings to interested parties.

7. **Oversight and monitoring by the World Bank.** All contracts not covered under prior review by the World Bank will be subject to post review during ISMs and/or special post review missions, including missions by consultants hired by the World Bank. To avoid doubts, the World Bank may conduct, at any time, independent procurement reviews of all the contracts financed under the loan.

8. **National Procurement Procedures**: National competition for the procurement of goods, works and non-consulting services according to the established thresholds will be conducted in accordance with paragraphs 5.3 – 5.6 of Section V of the Regulations and the following provisions:

1. Only the model bidding documents for National Competitive Procurement (NCP) agreed with the GOI Task Force (and as amended for time to time), shall be used for bidding.
2. Invitations to bid shall be advertised on a widely used website or electronic portal with free open access at least 30 days prior to the deadline for the submission of bids, unless otherwise agreed in the approved procurement plan.
3. No special preference will be accorded to any bidder either for price or for other terms and conditions when competing with foreign bidders, State-owned enterprises, small-scale enterprises or enterprises from any given State.
4. Except with the prior concurrence of the Bank, there shall be no negotiation of price with the bidders, even with the lowest evaluated bidder.
5. Government e-Marketplace (GeM)* set-up by Ministry of Commerce, Government of India will be acceptable for procurement under Request for Quotations (RFQ) method.
6. At the Borrower's request, the Bank may agree to the Borrower's use, in whole or in part, of its electronic procurement system, provided that the Bank is satisfied with the adequacy of such system.
7. Procurement will be open to eligible firms from any country. This eligibility shall be as defined under Section III of the Procurement Regulations. Accordingly, no bidder or potential bidder shall be declared ineligible for contracts financed by the Bank for reasons other than those provided in Section III of the Procurement Regulations.
8. The request for bids/request for proposals document shall require that Bidders/Proposers submitting Bids/Proposals include a signed acceptance in the bid, to be incorporated in any resulting contracts, confirming application of, and compliance with, the Bank's Anti-Corruption Guidelines, including without limitation the Bank's right to sanction and the Bank's inspection and audit rights.
9. The Borrower shall use an effective complaints mechanism for handling procurement related complaints in a timely manner.
10. Procurement Documents will include provisions, as agreed with the Bank, intended to adequately mitigate against environmental, social (including sexual exploitation and abuse and gender-based violence), health and safety ("ESHS") risks and impacts.

*Use of GeM will be allowed in lieu of RFQ/Shopping as per following details:

- up to INR 50,000 in catalog mode (viz. any available item could be selected by IA without further competition), provided selected Item/Supplier meeting the requisite quality, specification and delivery period.

- up to INR 3 Million from the Supplier having lowest price amongst at least three Suppliers meeting the requisite quality, specification and delivery period. The tools for online bidding and online reverse auction available on GeM may be used by the Purchaser.
- up to INR equivalent of US$100,000 from the Supplier having lowest price and meeting the requisite quality, specification and delivery period after mandatorily obtaining bids from at least three Suppliers, using online bidding or reverse auction tool provided on GeM.

Annex 7: Draft Guarantee Term Sheet

Summary of Indicative Terms and Conditions
of a Proposed IBRD Guarantee with a Letter of Credit
in Support of Governmental Payments

*This term sheet contains a summary of indicative terms and conditions of a proposed guarantee **("Guarantee")** by the International Bank for Reconstruction and Development **("IBRD")** for discussion purposes only and does not constitute an offer to provide a Guarantee. The provision of a Guarantee is subject, inter alia, to satisfactory appraisal by IBRD of the proposed Second National Ganga River Basin Project **("Project")**, compliance with all applicable policies of the World Bank, including those related to environmental and social safeguards, review and acceptance of the ownership, management, and financing structure (including in connection with shareholders, suppliers, equipment, and Project design, and contracts proposed by the winning bidder), review and acceptance of project / transaction documentation by IBRD, and the approval of the management and Executive Directors of IBRD in their sole discretion. Without limiting the generality of the foregoing, IBRD is highly selective with regard to the clients and beneficiaries it works with and is diligent on Know-Your-Customer requirements for all project participants (equity investors, ultimate shareholders, lenders, contractors, advisors) and will undertake an appraisal of the Project and the Project Company, including an assessment along these parameters.*

If the Guarantee-related legal agreements are not signed within twenty-four (24) months following approval of the Guarantee by the Board of Executive Directors of IBRD, IBRD may withdraw the offer of the Guarantee.

IBRD-Guaranteed Letter of Credit ("L/C")	
L/C Applicant:	National Mission for Clean Ganga (NMCG)[64], a Government of India ("GOI") agency, as Purchaser under selected Hybrid-Annuity Model (HAM) Public-Private Partnership (PPP) Agreements[65] for priority investment subprojects under GOI's *Namami Gange* (Homage to Ganga) Program[66] ("Concession Agreements").
L/C Beneficiaries:	Escrow Banks selected by the L/C Applicant (Purchaser), acceptable to IBRD [and _____], and concluding Escrow Agreements with the L/C Applicant (Purchaser), the relevant State Missions for Clean Ganga (SMCGs)[67], [the relevant Executive Agencies[68]], [the relevant Urban Local Bodies[69]], and the relevant Concessionaires, the latter being privately-owned special-purpose-vehicle companies selected by [the relevant Executive Agencies] to implement subprojects following a competitive process.[70]

[64] Registered as a society under the Societies Registration Act, 1860, operating under the Ministry of Jal Shakti (Water Resources)), and charged with implementation of the Homage to Ganga Program.
[65] NMCG has identified three wastewater treatment HAM-PPP investments, in the cities of Agra, Meerut, and Saharanpur, all in the State of Uttar Pradesh, to be eligible to benefit from the Guarantee.
[66] A program of actions whose objective is, inter alia, to stop the discharge of untreated municipal sewage or industrial effluents into the main stem of the Ganga River.
[67] State-level arms of the NMCG, charged with implementation of the Homage to Ganga Program in their respective states.
[68] State-level government agencies charged with implementation of priority investment subprojects under the Homage to Ganga Program in their respective states.
[69] Local / municipal governments, registered as societies under the Registered Societies Act, 1860, and whose mandate includes pollution-source prioritization and wastewater service delivery.
[70] While the Escrow Banks are the immediate beneficiaries of the L/C, the Concessionaires are the second-order beneficiaries, and NMCG / GOI is the ultimate beneficiary.

L/C Issuing Bank[71]:	A commercial bank acceptable to IBRD (as Guarantor under the Guarantee Agreement), the L/C Applicant (Purchaser)[, and the L/C Beneficiaries (Escrow Banks)]. An acceptable L/C Issuing Bank will be selected by the L/C Applicant (Purchaser), GOI, and IBRD following a competitive process.
Maximum L/C Amount:	The maximum amount available for draw under the L/C shall not exceed USD [19] million[72]. This amount may be reduced from time to time in accordance with the terms of the L/C and the Guarantee Agreement.
L/C Effective Date:	[Effective Date of Concession Agreement that is first to become effective / Date of financial close under Concession Agreement that is first to reach financial close]
L/C Validity Period:	Up to the term of the respective Concession Agreement(s), plus some additional months to cover any post-termination payment obligations.
L/C Features:	Revolving standby irrevocable L/C issued in favor of the L/C Beneficiary(ies) (Escrow Bank(s)) by the L/C Issuing Bank at the request of the L/C Applicant (Purchaser) to backstop the quarterly payment obligations of the L/C Applicant (Purchaser) under the Escrow Agreement(s), following the occurrence of a Guaranteed Event (as defined below). Any amounts drawn by the L/C Beneficiary(ies) (Escrow Bank(s)) under the L/C that are repaid by the L/C Applicant (Purchaser) to the L/C Issuing Bank within the L/C Reimbursement Period (as defined below) would be reinstated. The obligation of the L/C Applicant (Purchaser) to repay the L/C Issuing Bank amounts drawn under the L/C would be guaranteed by IBRD up to the Maximum Guaranteed Amount. Any amounts drawn by the L/C Beneficiary(ies) (Escrow Bank(s)) under the L/C that are subsequently repaid by IBRD (as Guarantor under the Guarantee Agreement) to the L/C Issuing Bank under the Guarantee would not be reinstated. That is, any principal amount repaid by IBRD would be deducted from the Maximum L/C Amount.
Permitted Drawdown under L/C (Guaranteed Event):	Failure by the L/C Applicant (Purchaser) to pay any amount due and payable to the L/C Beneficiary(ies) (Escrow Bank(s)) pursuant to the respective Escrow Agreement(s) for purposes of paying any undisputed amount due and payable to the respective Concessionaire(s) pursuant to a quarterly invoice according to the terms of the respective Concession Agreement(s).
L/C Fees:	To be payable by the L/C Applicant (Purchaser) to the L/C Issuing Bank. Level of L/C Fees must be acceptable to the L/C Applicant (Purchaser) and IBRD.
L/C Reimbursement and Credit Agreement (RCA)	

[71] While there will be multiple L/C Beneficiaries, there will be a single L/C Issuing Bank and a single state-wide L/C.

[72] This amount represents two (2) rolling quarters of annuity payments for each of the three (3) selected priority investment subprojects during the fifteen (15) years of operation and maintenance of those subprojects.

Borrower (of the L/C loans):	L/C Applicant (NMCG, as Purchaser under the Concession Agreement(s))
Lender (of the L/C loans):	L/C Issuing Bank, as guaranteed lender
L/C Reimbursement Period:	Following a draw under the L/C by an L/C Beneficiary (Escrow Bank) following the occurrence of a Guaranteed Event, the amount drawn becomes a loan from the Lender (L/C Issuing Bank) to the Borrower (Purchaser). The Borrower would be obligated to repay the Lender (L/C Issuing Bank) such L/C loan, together with accrued interest thereon, within a period of twelve (12) months **(the "L/C Reimbursement Period")** from the date of each draw (L/C loan), pursuant to the RCA. In the event of a timely repayment of the L/C loan, the L/C will be reinstated by the amount of such repayment. In the event of non-payment of the L/C loan by the due date, the L/C Issuing Bank would have the right to call on the Guarantee for principal amounts plus accrued interest due by the L/C Applicant (Purchaser) under the RCA.
Principal amount of the L/C loans:	Amounts drawn down under the L/C not to exceed the Maximum L/C Amount.
Interest Rate Charged on the L/C loans:	An appropriate spread above [LIBOR] acceptable to the L/C Issuing Bank, the L/C Applicant (Purchaser), and GOI, and agreed by IBRD (as Guarantor under the Guarantee Agreement). The maturity of the selected [LIBOR] base rate should ideally be one (1) month.
IBRD Guarantee Agreement	
Guarantor:	IBRD
Guarantee Beneficiary:	L/C Issuing Bank, as guaranteed lender
Guarantee Face Value:	USD 19 million
Guarantee Support (Scope):	IBRD (as Guarantor under the Guarantee Agreement) will backstop the payment obligations of the L/C Applicant (Purchaser) under the RCA to the extent that (i) the said obligations result from a Permitted Drawdown under the L/C, and (ii) the L/C Applicant (Purchaser) has failed to repay the L/C Issuing Bank in accordance with the RCA. That is, if the amount remains unpaid after the expiry of the L/C Reimbursement Period, the L/C Issuing Bank would have the right to call on the Guarantee for the principal amount (equal to the amount drawn under the L/C) plus accrued interest due from the L/C Applicant (Purchaser).
Maximum Guaranteed Amount:	Maximum Guaranteed Principal plus accrued interest thereon in accordance with the RCA. IBRD (as Guarantor under the Guarantee Agreement) may cover compound interest, but will not cover penalty interest, default interest, or charges of a similar nature.
Maximum Guaranteed Principal:	Guarantee Face Value, i.e., USD 19 million Any principal amount paid by IBRD (as Guarantor under the Guarantee Agreement) to the L/C Issuing Bank under the IBRD Guarantee would be

	deducted from the Maximum Guaranteed Principal, and that amount would not be reinstated.
Maximum Guarantee Period:	L/C Validity Period plus fourteen (14) months.
IBRD Financial Exposure Limits:	The Maximum Guarantee Period will not exceed twenty (20) years. The financial exposure of IBRD (as Guarantor) under the Guarantee will start on the L/C Effective Date.
Signing:	If the Guarantee-related legal agreements are not signed within twenty-four (24) months following approval by the Board of Executive Directors of IBRD, IBRD (as Guarantor under the Guarantee Agreement) may withdraw the offer of the Guarantee.
Exclusions, Withholding, Limitation / Suspension, and Termination Events:	Standard exclusion, withholding, limitation / suspension, and termination events for transactions of this nature.
Substitution of Guarantee:	If IBRD (as Guarantor under the Guarantee Agreement) exercises remedies against the L/C Issuing Bank under the Guarantee Agreement for reasons attributable to the L/C Issuing Bank, then IBRD may enter into a new Guarantee Agreement with a substitute L/C Issuing Bank on substantially the same terms and conditions as the Guarantee Agreement and for the remaining term of the Maximum Guarantee Period.
Conditions Precedent to Effectiveness of the IBRD Guarantee:	Usual and customary conditions for financing of this type, including but not limited to the following: (i) firm commitment for sufficient financing, including satisfactory contribution of equity, to complete construction of the subprojects for which Concession Agreements have been concluded; (ii) execution, delivery, and effectiveness of all Project and financing agreements, in form and substance satisfactory to IBRD, in relation to all subprojects for which Concession Agreements have been concluded, and including the Indemnity Agreement and the Loan Agreement; (iii) delivery of all relevant host-country environmental approvals required for the operation of the Project, and compliance with all applicable World Bank requirements relating to Sanctionable Practices[73] and environmental and social safeguards; (iv) effectiveness of all required insurance (to include IBRD as an additional insured on third-party liability insurance); (v) satisfaction of all conditions precedent for first disbursement under the

[73] "Sanctionable Practices" means corrupt, fraudulent, collusive, coercive, or obstructive practices, as defined in IBRD's Anti-Corruption Guidelines.

	financing documents for all subprojects for which Concession Agreements have been concluded, save for any condition that requires the effectiveness of the Guarantee Agreement to have occurred; (vi) provision of satisfactory legal opinions; (vii) payment in full of the Initiation Fee, Processing Fee, Front-end Fee, the first installments of the Standby Fee and the Guarantee Fee (as applicable) and reimbursement of expenses of any IBRD's external legal counsel; and (viii) satisfactory integrity due diligence of the Escrow Bank(s), the Concessionaire(s) (and related parties), and guaranteed parties.
Subrogation:	If and to the extent IBRD (as Guarantor under the Guarantee Agreement) makes any payment under the Guarantee, IBRD (as Guarantor under the Guarantee Agreement) will have an immediate and automatic right of subrogation to the extent of such unreimbursed payment to the L/C Issuing Bank's rights under the RCA.
Governing law:	English law or New York Law

Indemnity Agreement	
Parties:	IBRD and Republic of India **("Member Country")**
Indemnity:	The Member Country will reimburse and indemnify IBRD on demand, or as IBRD may otherwise direct, for all payments under the Guarantee and all losses, damages, costs, and expenses incurred by IBRD relating to or arising from the Guarantee.
Covenants:	Usual and customary covenants included in agreements between member countries and IBRD. Any specific covenants will be determined during the Guarantee documentation phase.
Remedies:	If the Member Country breaches any of its obligations under the Indemnity Agreement, IBRD may suspend or cancel, in whole or in part, the rights of the Member Country to make withdrawals under any other loan, credit, or grant agreement with IBRD or IDA, or any IBRD loan or IDA credit to a third party guaranteed by the Member Country, and may declare the outstanding principal and interest of any such loan or credit to be due and payable immediately. A breach by the Member Country under the Indemnity Agreement will not, however, discharge any guarantee obligations of IBRD under the Guarantee.
Governing Law:	The Indemnity Agreement will follow the usual legal regime and include dispute settlement provisions customary for agreements between member countries and IBRD.
Project Agreement	
Parties:	IBRD and the L/C Applicant (NMCG, as Purchaser under the Concession Agreement(s))
Representations and Warranties:	The L/C Applicant (Purchaser) will represent, among other standard and Project-specific provisions, as of the effective date, that: (i) it is in compliance with applicable environmental laws and the applicable World Bank guidelines and environmental and social safeguards requirements; and (ii) neither it (nor any person or organization directly or indirectly responsible for controlling or administering all or part of its activities, and any other relevant Project participants, as determined by IBRD), nor any of its affiliates has engaged in any Sanctionable Practices in connection with the Project.
Covenants:	The L/C Applicant (Purchaser) will covenant, and will cause the Concessionaires to covenant, that it / they will, among other things: (i) comply with applicable laws, including environmental laws, and the applicable World Bank environmental and social safeguards requirements; (ii) provide annual audited financial statements and other reports; (iii) provide certain notices and other information to IBRD;

	(iv) provide access to the Project; (v) not engage in (or authorize or permit any affiliate or any other Person acting on its behalf to engage in) any Sanctionable Practices in connection with the Project; (vi) comply with World Bank requirements relating to Sanctionable Practices regarding individuals or firms included in the World Bank Group list of firms debarred from World Bank Group-financed contracts; and (vii) obtain IBRD's consent prior to agreeing to any change to any transaction document which would affect the rights or obligations of IBRD under the Guarantee Agreement or any other Guarantee-related agreement.
Payment of Fees to IBRD:	Payment of fees due to IBRD is the obligation of the L/C Applicant (Purchaser). However, if the L/C Applicant (Purchaser) fails to pay any installment of such fees in full or when due, [a Concessionaire / another party][74] can elect to pay the unpaid amount of the fees corresponding to its portion of the Maximum L/C Amount and seek reimbursement from the L/C Applicant.
Initiation Fee:	15 bps of the Guarantee Face Value (but not less than USD 100,000)
Processing Fee:	50 bps of the Guarantee Face Value[75]
Front-end Fee:	25 bps of the Guarantee Face Value
Standby Fee:	25 bps per annum, charged periodically and applied to that portion of the guaranteed amount that IBRD has contractually committed and for which IBRD does not yet have financial exposure under the Guarantee. The Standby Fee is normally charged semi-annually and accrues sixty (60) days after the date of signing of the agreement providing for the Guarantee. The Standby Fee must be paid in advance on regular payment dates.
Guarantee Fee:	[50-100] bps per annum (depending on the Guarantee average life resulting from the proposal of the bidders under the Concession Agreements; refer to the pricing schedule below*). The Guarantee Fee is charged on that portion of the guaranteed amount that IBRD has contractually committed and for which IBRD has financial exposure under the Guarantee (Maximum Guaranteed Principal). The Guarantee Fee must be paid in advance semi-annually on regular payment dates. Where the Guarantee Fee is payable in installments, IBRD will have the right to terminate [the relevant portion of] the Guarantee in the event of nonpayment of any installment of the Guarantee Fee or Standby Fee in full when due. *The guarantee fee level is determined by the Maximum Guarantee Period: 50 bps up to 8 years, 60 bps from 8 to 10 years, 70 bps from 10 to 12 years, 80 bps from 12 to 15 years, 90 bps from 15 to 18 years and 100 bps from 18

[74] A bidder under a Concession Agreement may propose another party, subject to acceptance by GOI and IBRD (as Guarantor under the Guarantee Agreement).
[75] In exceptional cases, projects can be charged over 50 bps of the guarantee amount.

	to 20 years.
External Legal Costs:	Reimbursement of any IBRD external legal counsel expenses by the L/C Applicant (Purchaser).
Cooperation Agreement	
Parties:	IBRD and the L/C Applicant (Purchaser)
Cooperation Agreement:[76]	The L/C Applicant (Purchaser) will covenant, among other things, that it will: (i) comply with all its obligations under the transaction documents; (ii) obtain IBRD's consent prior to agreeing to any change to any transaction document which would materially affect the rights or obligations of IBRD under the Guarantee Agreement or any other transaction document; (iii) provide certain notices to IBRD; (iv) take all action necessary on its part, in accordance with and as required by the terms of the Project-related agreements to which it is a party, to enable the L/C Beneficiaries (Escrow Banks) to perform all of the L/C Beneficiaries' obligations under the Concession Agreements and other relevant transaction documents; and (v) cooperate with IBRD and furnish to IBRD all such information related to such matters as IBRD shall reasonably request; and promptly inform IBRD of any condition which interferes with, or threatens to interfere with, such matters.

[76] Either a Project Agreement or a Cooperation Agreement will be concluded.