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The World Bank

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Report No: PAD5319

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT PAPER

ON A

PROPOSED ADDITIONAL CREDIT

IN THE AMOUNT OF EUR 123 MILLION (US\$135 MILLION EQUIVALENT)

TO THE

REPUBLIC OF SENEGAL

FOR THE

STORMWATER MANAGEMENT AND CLIMATE CHANGE ADAPTATION PROJECT 2

June 7, 2023

Urban, Resilience, and Land Global Practice
Western and Central Africa Region

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CURRENCY EQUIVALENTS

(Exchange Rate Effective April 30, 2023)

Currency Unit = EURO (EUR);
CFA Franc (CFAF)

US\$1= EUR 0.9105

US\$1= CFAF 597

FISCAL YEAR

January 1 - December 31

Regional Vice President: Ousmane Diagana

Country Director: Keiko Miwa

Regional Director: Simeon Kacou Ehui

Practice Manager: Sylvie Debomy

Task Team Leaders: Isabelle Celine Kane, Cécile A Lorillou

ABBREVIATIONS AND ACRONYMS

ADM	Municipal Development Agency (<i>Agence de Développement Municipal</i>)
AF	Additional Financing
AFD	French Development Agency (<i>Agence française de développement</i>)
AfDB	African Development Bank
AM	Accountability Mechanism
ANSD	National Statistics and Demography Agency (<i>Agence Nationale de la Statistique et de la Démographie</i>)
CERC	Contingent Emergency Response Component
CIF	Cost, Insurance, and Freight
CFAF	African Financial Community franc (<i>Communauté Financière Africaine franc</i>)
COLIGEP	Local Committees for Flood Control
CPF	Country Partnership Framework
DGPRES	General Directorate of Water Resources Planning (<i>Direction Générale de Prévision des Ressources en Eau</i>)
DGUA	General Directorate of Town Planning and Architecture (<i>Direction Générale de l'Urbanisme et de L'Architecture</i>)
DRM	Disaster Risk Management
DSCOS	Directorate of Land Use Monitoring and Control (<i>Direction de la Surveillance et du Contrôle de l'Occupation du Sol</i>)
ERR	Economic Rate of Return
ESCP	Environmental and Social Commitment Plan
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standards
FOB	Free on Board
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GoS	Government of Senegal
GRM	Grievance Redress Mechanism
GRS	Grievance Redress Service
IDA	International Development Association
IMDC	International Metastatic RCC Database Consortium
IRR	Internal Rate of Return
ISR	Implementation Status and Results Report
LRBV	Lac Rose Watershed (<i>Bassin Versant du Lac Rose</i>)
LMP	Labor management procedures
M&E	Monitoring and Evaluation
NBS	Nature-Based Solution
NDF	Nordic Development Fund
NPV	Net Present Value
O&M	Operation and Maintenance
OHS	Occupational Health and Safety

ONAS	National Office of Sanitation of Senegal (<i>Office National de l'Assainissement du Sénégal</i>)
PACASEN	Municipal and Agglomeration Support Program (<i>Programme d'Appui aux Communes et Agglomérations du Sénégal</i>)
PAP	Project-Affected Person
PDD	Drainage Master Plan (<i>Plan Directeur de Drainage</i>)
PDO	Project Development Objective
PPSD	Project Procurement Strategy for Development
PROGEP	Stormwater Management and Climate Change Adaptation Project (<i>Projet de Gestion des Eaux Pluviales et d'Adaptation au Changement Climatique</i>)
PROGEP2	Stormwater Management and Climate Change Adaptation Project 2 (<i>Projet de Gestion des Eaux Pluviales et d'Adaptation au Changement Climatique 2</i>)
PTC	Project Technical Committee
PUD	Detailed Urban Plan (<i>Plan d'Urbanisme de Détail</i>)
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
SEA/SH	Sexual Exploitation and Abuse and Sexual Harassment
SEP	Stakeholder Engagement Plan
SERRP	Saint-Louis Emergency Recovery and Resilience Project
STEP	Systematic Tracking of Exchanges in Procurement
UEMOA	Western African Economic and Monetary Union (<i>Union Economique et Monétaire Ouest Africaine</i>)
UNESCO	United Nations Educational, Scientific, and Cultural Organization
VAT	Value Added Tax
VSL	Value of Statistical Life
WACA	West Africa Coast Areas project

Senegal

Additional Financing to Stormwater Management and Climate Change Adaptation Project 2

Table of Contents

I. BACKGROUND AND RATIONALE FOR ADDITIONAL FINANCING	8
II. DESCRIPTION OF ADDITIONAL FINANCING	15
III. KEY RISKS	28
IV. APPRAISAL SUMMARY	30
V. WORLD BANK GRIEVANCE REDRESS	35
VI SUMMARY TABLE OF CHANGES.....	35
VII DETAILED CHANGE(S).....	36
VIII. RESULTS FRAMEWORK AND MONITORING	43
ANNEX 1: ECONOMIC ANALYSIS.....	57



BASIC INFORMATION – PARENT (Stormwater Management and Climate Change Adaptation Project 2 - P175830)

Country Senegal	Product Line IBRD/IDA	Team Leader(s) Isabelle Celine Kane		
Project ID P175830	Financing Instrument Investment Project Financing	Resp CC SAWU1 (9354)	Req CC AWCF1 (6550)	Practice Area (Lead) Urban, Resilience and Land

Implementing Agency: Municipal Development Agency (Agence de Développement Municipal - ADM)

Is this a regionally tagged project? No	
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Bank/IFC Collaboration No

Approval Date 28-May-2021	Closing Date 31-Jul-2026	Expected Guarantee Expiration Date	Environmental and Social Risk Classification Substantial
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Financing & Implementation Modalities

<input type="checkbox"/> Multiphase Programmatic Approach [MPA]	<input checked="" type="checkbox"/> Contingent Emergency Response Component (CERC)
<input type="checkbox"/> Series of Projects (SOP)	<input type="checkbox"/> Fragile State(s)
<input type="checkbox"/> Performance-Based Conditions (PBCs)	<input type="checkbox"/> Small State(s)
<input type="checkbox"/> Financial Intermediaries (FI)	<input type="checkbox"/> Fragile within a Non-fragile Country
<input type="checkbox"/> Project-Based Guarantee	<input type="checkbox"/> Conflict
<input type="checkbox"/> Deferred Drawdown	<input checked="" type="checkbox"/> Responding to Natural or Man-made disaster
<input type="checkbox"/> Alternate Procurement Arrangements (APA)	<input type="checkbox"/> Hands-on Expanded Implementation Support (HEIS)

Development Objective(s)



To reduce flood risks in peri-urban areas of Dakar and improve capacity for integrated urban flood risks planning and management for selected cities in Senegal.

Ratings (from Parent ISR)

	Implementation			Latest ISR
	30-Aug-2021	01-Mar-2022	07-Sep-2022	01-Apr-2023
Progress towards achievement of PDO	S	S	S	S
Overall Implementation Progress (IP)	S	MS	MS	MS
Overall ESS Performance	MS	MS	MS	MS
Overall Risk	S	S	S	S
Financial Management	S	MS	MS	MS
Project Management	S	MS	MS	MS
Procurement	S	MS	MS	MS
Monitoring and Evaluation	S	S	S	S

BASIC INFORMATION – ADDITIONAL FINANCING (Additional Financing for Stormwater Management and Climate Change Adaptation Project 2 - P180203)

Project ID	Project Name	Additional Financing Type	Urgent Need or Capacity Constraints
P180203	Additional Financing for Stormwater Management and Climate Change Adaptation Project 2	Scale Up	No
Financing instrument	Product line	Approval Date	
Investment Project Financing	IBRD/IDA	29-Jun-2023	
Projected Date of Full Disbursement	Bank/IFC Collaboration		



30-Nov-2029	No		
Is this a regionally tagged project?			
No			

Financing & Implementation Modalities

<input type="checkbox"/> Series of Projects (SOP)	<input type="checkbox"/> Fragile State(s)
<input type="checkbox"/> Performance-Based Conditions (PBCs)	<input type="checkbox"/> Small State(s)
<input type="checkbox"/> Financial Intermediaries (FI)	<input type="checkbox"/> Fragile within a Non-fragile Country
<input type="checkbox"/> Project-Based Guarantee	<input type="checkbox"/> Conflict
<input type="checkbox"/> Deferred Drawdown	<input type="checkbox"/> Responding to Natural or Man-made disaster
<input type="checkbox"/> Alternate Procurement Arrangements (APA)	<input type="checkbox"/> Hands-on Expanded Implementation Support (HEIS)
<input checked="" type="checkbox"/> Contingent Emergency Response Component (CERC)	

Disbursement Summary (from Parent ISR)

Source of Funds	Net Commitments	Total Disbursed	Remaining Balance	Disbursed	
IBRD				<div style="width: 0%;"></div>	%
IDA	155.00	24.50	116.93	<div style="width: 17%;"></div>	17 %
Grants				<div style="width: 0%;"></div>	%

PROJECT FINANCING DATA – ADDITIONAL FINANCING (Additional Financing for Stormwater Management and Climate Change Adaptation Project 2 - P180203)

FINANCING DATA (US\$, Millions)

SUMMARY (Total Financing)

	Current Financing	Proposed Additional Financing	Total Proposed Financing
Total Project Cost	172.40	145.70	318.10
Total Financing	172.40	145.70	318.10
of which IBRD/IDA	155.00	135.00	290.00



Financing Gap	0.00	0.00	0.00
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DETAILS - Additional Financing

World Bank Group Financing

International Development Association (IDA)	135.00
IDA Credit	135.00

Non-World Bank Group Financing

Counterpart Funding	10.70
Borrower/Recipient	10.70

IDA Resources (in US\$, Millions)

	Credit Amount	Grant Amount	SML Amount	Guarantee Amount	Total Amount
Senegal	80.00	0.00	55.00	0.00	135.00
National Performance-Based Allocations (PBA)	80.00	0.00	55.00	0.00	135.00
Total	80.00	0.00	55.00	0.00	135.00

COMPLIANCE

Policy

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

Yes No

Does the project require any other Policy waiver(s)?

Yes No



Environmental and Social Standards Relevance Given its Context at the Time of Appraisal

E & S Standards	Relevance
Assessment and Management of Environmental and Social Risks and Impacts	Relevant
Stakeholder Engagement and Information Disclosure	Relevant
Labor and Working Conditions	Relevant
Resource Efficiency and Pollution Prevention and Management	Relevant
Community Health and Safety	Relevant
Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Relevant
Biodiversity Conservation and Sustainable Management of Living Natural Resources	Relevant
Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	Not Currently Relevant
Cultural Heritage	Relevant
Financial Intermediaries	Not Currently Relevant

NOTE: For further information regarding the World Bank’s due diligence assessment of the Project’s potential environmental and social risks and impacts, please refer to the Project’s Appraisal Environmental and Social Review Summary (ESRS).

INSTITUTIONAL DATA

Practice Area (Lead)

Urban, Resilience and Land

Contributing Practice Areas

Water

Climate Change and Disaster Screening

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

**PROJECT TEAM****Bank Staff**

Name	Role	Specialization	Unit
Isabelle Celine Kane	Team Leader (ADM Responsible)	Disaster Risk Management	SAWU1
Cecile Lorillou	Team Leader	Disaster Risk Management	SAWU1
Haoussia Tchaoussala	Procurement Specialist (ADM Responsible)	Procurement	EAWRU
Djibril Diagne	Procurement Specialist	Procurement	EAWRU
Laurent Mehdi Brito	Procurement Specialist	Procurement	EAWRU
Fatou Fall Samba	Financial Management Specialist (ADM Responsible)	Financial Management	EAWG1
Mamadou Moustapha Ndoye	Social Specialist (ADM Responsible)	Social Development	SAWS4
Sophie Lo Diop	Environmental Specialist (ADM Responsible)	Environment	SAWE1
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Anta Tall Diallo	Procurement Team	Program Assistant Procurement	AWCF1
Batouly Dieng	Team Member	Team Assistant	AWCF1
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Fadi M. Doumani	Team Member	Economist	SAWU1
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Extended Team			
Name	Title	Organization	Location



I. BACKGROUND AND RATIONALE FOR ADDITIONAL FINANCING

Introduction

1. This Project Paper seeks the approval of the Board of Executive Directors for a proposed additional credit from International Development Association (IDA) in the amount of US\$135 million equivalent to the Stormwater Management and Climate Change Adaptation Project 2 (PROGEP 2, P175830).

2. **The proposed Additional Financing (AF) entails several key changes:** (a) scaling up Component 1 by adding US\$1.3 million to support the operationalization of urban planning activities; (b) scaling up Component 2 by adding US\$132 million to support the geographical extension of drainage and flood mitigation investments in the Mbeubeuss watershed and Lac Rose watershed (bassin versant du Lac Rose, LRBV); (c) restructuring the project to include a three year-extension of the closing date to July 31, 2029, and changes to the Results Framework to reflect the scale up; and (d) increasing the allocation for Component 4: Project management, by US\$1.7 million to support the extension of project duration and new activities.

Rationale for Additional Financing and Proposed Changes

A. Country Context

3. **Senegal is located at the westernmost point of Africa and the Sahel along the Atlantic Ocean, with a land area of 197,000 km² and an unevenly distributed population of about 15.7 million.** The climate is both arid and tropical with two seasons—the dry season (October to May) and the rainy season (June to September). Dakar, its capital city, is located at the westmost tip of the country on the Cap-Vert Peninsula, in a geographic transition zone and with a hot semi-arid climate influenced by the ocean. The wet season, in concordance with the Intertropical Convergence Zone migration and the West African Monsoon Jump, brings heavy rainfall that can translate into floods, especially in urban and peri-urban areas. Rainfall is highly variable at interannual and interdecadal time scales, being influenced by climate oscillations such as the El Niño-Southern Oscillation.¹

4. **Senegal is increasingly vulnerable to floods and droughts, as well as coastal erosion and land degradation, which can jeopardize development gains and livelihoods, affect productivity, and threaten social stability.** Climate-related disasters are exposing both urban and rural poor population to growing risks of stress and poverty. The vulnerability of Senegal to natural hazards and climate change-related disasters is largely linked to its 700 km coastline open to the Atlantic Ocean, its latitudinal position in a transition zone between the Sahelian and the Guinean climate which causes significant rainfall variations within the country, and high groundwater levels during the rainy season. The country ranks 9th in the world in terms of the share of its urban population living in low elevation coastal zones.²

5. **Climate change will likely increase erratic and delayed rainfall pattern, causing deferred rainy seasons in the sub-region,** resulting in longer drought on the one hand and more frequent and intense storms on the other, affecting rising sea levels and exacerbating hazard risk in Senegal. In response to rising greenhouse gas (GHG) concentrations, air temperature in Senegal is projected to increase by 1.8°C up to

¹ ENSO phenomenon.

² Dakar, Saint-Louis, Thiès, Matam, Kaolack, Kolda, and Kaffrine.



3.6°C (very likely range) by 2080. Compared to pre-industrial levels, the median temperature increase according to climate models in Senegal, is likely to reach 1.7°C in 2030 and 2.1°C in 2050 depending on the different GHG emission scenarios. In response to global warming, heavy precipitation events are projected to rise in intensity; as the atmosphere becomes warmer, its capacity to hold water vapor increases. As a result, the number of days with heavy precipitation is expected to jump from up to 8.8 days in 2000 to up to 10.7 days in 2080 in the range of high probability.³

6. **Faced with the scale and recurrence of floods, accentuated by a changing rain pattern due to climate change, the Government of Senegal (GoS) implemented the US\$121.3 million ‘Stormwater Management and Climate Change Adaptation Project (PROGEP)’ from 2012 to 2020, co-financed by the World Bank and the Nordic Development Fund (NDF).** PROGEP was designed to support the implementation of the Ten-Year Flood Risk Management Plan (2012–2022), aligned with the objectives of the Emerging Senegalese Plan (*Plan Senegal Emergent*), the Decentralization Act, and the Drainage Master Plan (*Plan Directeur de Drainage*, PDD) of the Dakar peri-urban region. PROGEP could however not cover all the hydraulic works targeted in the PDD. The GoS has sought funding from several development partners. The African Development Bank (AfDB)⁴ and Islamic Development Bank have agreed to explore opportunities for additional interventions in flood-prone areas not covered by the World Bank. An AfDB identification mission in mid-March 2023 confirmed a first phase of funding for the design of drainage infrastructure potentially for areas not covered by PROGEP2 in the Dakar region, while planning an intervention for physical investments in a second phase.

7. **The 2020 catastrophic floods in several Senegalese localities, notably in Keur Massar-Jaxaay and the Sangalkam-Kounoune-Tivaouane-Peulh area, led the GoS to trigger a National Emergency Response Plan.** Consequently, and acknowledging the success of PROGEP for the peri-urban area of Dakar, the GoS requested the financing support of the World Bank in a letter dated October 28, 2020, for a follow-up operation to improve the capacity to manage urban flood risks in an integrated way. The follow-up operation extends PROGEP’s integrated flood risk management approach to new sites in Dakar’s peri-urban at-risk areas while planning further phased interventions in the rapidly urbanizing Greater Dakar region and in Saint-Louis, Mbour, and Thiès. The new project was approved in May 2021 and addresses persistent issues related to (a) operation and maintenance (O&M) of drainage infrastructure, notably the need to clarify institutional arrangements as well as establish sustainable financial mechanisms for stormwater management and investments, and (b) the need to review urban management regulatory and policy instruments to better address climate hazard and climate change and urban resilience challenges in a context of increasing urban demographic pressure.

8. **From August 5 to 7, 2022, the cities of Dakar, Thiès, and Matam located in the northern part of the country recorded exceptionally heavy rainfall equaling almost 500 mm for the three regions,⁵ while the country’s average annual rainfall⁶ is 1,200 mm⁷ and that in the northern part of Senegal, which is an arid zone, between 300 mm/year and 500 mm/year. These exceptional conditions led to massive floods which affected close to 20,000 people and destroyed 170 houses. Out of the eight departments affected**

³ German Agency for International Cooperation (*Deutsche Gesellschaft für Internationale Zusammenarbeit, GIZ*). 2022. *Senegal Climate Risk Profile*.

⁴ The AfDB is currently in the identification stage and may be able to secure financing of €60– €70 million for future drainage projects.

⁵ National Agency of Civil Aviation and Meteorology.

⁶ United Nations Human Settlements Program Urban Resilience Hub. <https://urbanresiliencehub.org/>.

⁷ <https://climateknowledgeportal.worldbank.org/country/senegal/climate-data>.



throughout the country, five were located in the Dakar region, with 8,249 persons affected,⁸ including in the Mbeubeuss watershed (northern part of Keur Massar- 28.6 km²)⁹ and the LRBV of the Greater Dakar region (180 km²).¹⁰

9. **The Keur Massar Nord in the Mbeubeuss watershed and Kounoune-Sangalkam in the LRBV are the main peri-urban expansion of the Greater Dakar.** These areas are located between the Dakar suburb and the city of Diamniadio which is at the heart of a governmental priority agenda to attract domestic and international investments, reduce the overwhelming urban management challenges of Dakar, and accelerate economic growth. While these two areas are expected to play an important role for the extension of the Greater Dakar and linked economic activities, they were the epicenters of flooding during the 2022 rainy season, representing 71 percent of the flooded area. The conjunction of rapid and uncontrolled urbanization, lack of drainage infrastructures, and an increase in rainfall and stormwater runoff caused serious damage to public infrastructures, private properties, and economic activities. The impact of these devastating 2022 floods led to the tourism and salt extraction industry decline in the Lake Rose area which is an important economic zone and the most significant touristic area of the country. The GoS identified these two priority areas, which experience a booming population growth, for urgent intervention to tackle flood risk exposure in the main urban extension zones of the Greater Dakar. Urban expansion is expected to reach a projected population by 2035 of 38,000 inhabitants in Keur Massar Nord and 74,000 inhabitants for the western part of the LRBV. The projected population by 2050 will be 56,000 inhabitants for Keur Massar Nord and 110,500 inhabitants for the western part of the Lac Rose making coherent and structured urbanization all the more necessary¹¹.

10. **Consequently, on August 10, 2022, the President of Senegal announced, during the Council of Ministers, the need for an emergency intervention in these two areas, along with the urgency to develop a new national decennial program against flood** (Flood Risk Management Plan 2023–2033). This decision builds on the successful interventions under the first Ten-Year Flood Risk Management Plan (2012–2022), which was supported by PROGEP 1 and 2 interventions, and lasting challenges specifically in Dakar due to rapid and uncontrolled urbanization requiring an urgent update of urban planning tools while making up for the still insufficient drainage infrastructures in new urban extension zones of the Greater Dakar. The President also appointed a new minister under the Ministry of Water and Sanitation (*Ministère de l'eau et de l'assainissement*) to lead national flood prevention and management. It is in this context that the GoS submitted a request for an US\$135 million AF to PROGEP 2 on February 15, 2023.

B. Parent Project's Development Objectives (PDO)

11. **The PROGEP 2 PDO** is to reduce flood risks in peri-urban areas of Dakar and improve capacity for integrated urban flood risk planning and management for selected cities in Senegal.

⁸ <https://reliefweb.int/report/senegal/senegal-floods-dakar-thies-and-matam-emergency-plan-action-epoa-dref-operation-ndeg-mdrsn019>.

⁹ https://www.ansd.sn/ressources/ses/chapitres/5-Assistance-sociale_2009.pdf.

¹⁰ 22 percent of the total surface of the Lac-Rose watershed is considered flood-prone.

¹¹ Projected population figures provided by ADM



C. Project Components and Costs

12. The total parent project cost is US\$172.4 million equivalent, including US\$155.0 million equivalent from IDA, US\$8.7 million equivalent from NDF, and US\$8.7 million equivalent from the GoS.

13. The parent project (P175830) is structured along the following components:

Component 1: Integrated urban planning and management accounting for climate risk and sustainability (total US\$10.7 million equivalent, of which US\$4.0 million equivalent IDA; US\$6.7 million equivalent NDF)

14. This component supports the integration of climate risk and sustainability in urban planning and management through three subcomponents:

- **Subcomponent 1.1: Integrated urban planning and management**, aims to improve urban space development through a long-term, climate- and risk-informed vision of sustainable urban development closely coordinated with floodplain and stormwater management by promoting synergies between urban planning tools.
- **Subcomponent 1.2: Urban legislation and regulatory framework**, supports national and local authorities in developing the concepts of an urban policy in line with SDG¹² 11 and accounting for the worsening effects of climate change, particularly flooding.
- **Subcomponent 1.3: Promoting good practices for integrated urban management including resilience and sustainability**, provides support to enhance the capacity of the central and local governments to design and implement urban projects informed by innovative and integrated approaches in terms of sustainability, climate adaptation, and resilience.

Component 2: Drainage investment and management, community engagement, environmental and social management (total US\$155.1 million equivalent, of which US\$146.1 million equivalent IDA; US\$1.3 million equivalent NDF; US\$7.7 million equivalent GoS)

15. This component supports flood reduction investments in select peri-urban areas of Dakar through the following four subcomponents.

- **Subcomponent 2.1: Temporary emergency pumping and drainage infrastructure construction and management** includes infrastructure investments and emergency pumping supporting the areas that were affected by the 2020 and 2021 heavy floods in Mbeubeuss and Mbao watersheds and selected urban areas.
- **Subcomponent 2.2: Drainage infrastructure O&M**. This subcomponent aims at ensuring sustainability of drainage infrastructure through (a) O&M campaigns; (b) equipment; (c) knowledge transfer; (d) a road map for the financing and management of drainage infrastructure; and (e) update of the collaboration arrangements across stakeholders.
- **Subcomponent 2.3: Community projects and engagement** supports the development of consultative, gender-focused, and participatory community subprojects linked to drainage

¹² SDGs = Sustainable Development Goals.



works, local urban infrastructure construction, neighborhood sanitation activities, and active involvement in stormwater management.

- **Subcomponent 2.4: Environmental and social management.** This subcomponent finances the elaboration of the environmental and social instruments.¹³

16. **Component 3: Contingent emergency response component (CERC) (US\$0 million)** allowing for rapid reallocation of uncommitted project funds in the event of a natural or man-made crisis in the future.

17. **Component 4: Project management (total US\$6.6 million equivalent, of which US\$4.9 million equivalent IDA; US\$0.7 million equivalent NDF; US\$1.0 million equivalent GoS).**

D. Project Status and Performance

18. **The Stormwater Management and Climate Change Adaptation Project 2 (PROGEP 2) - P175830 was approved on May 28, 2021, became effective on August 11, 2021, and will close on July 31, 2026.**

19. A Level II restructuring was conducted in September 2021 to replace the Ministry of Territorial Development and Land Management (*Ministère des Collectivités territoriales, du Développement et de l'Aménagement des Territoires*) with the Ministry of Water and Sanitation (*Ministère de l'eau et de l'assainissement*) as President of the Steering Committee. No other changes were made in this restructuring.

20. **The overall implementation progress was found to be moderately satisfactory during the last implementation support mission that took place in December 2022.** As of June 8, 2023, the project has disbursed US\$24.5 million (17 percent) and committed US\$47.39 million (28.96 percent) of the IDA credit. The parent project is expected to disburse an additional US\$22.14 million, of which US\$20.37 million for drainage investments by December 2023. Most dated covenants have been met to date except for the adoption of the road map for the urban sanitation reform and financing mechanisms. A first draft of the roadmap has been reviewed by the World Bank and comments shared with the Borrower. The final version approved by the minister of water and sanitation is expected by mid-July 2023. The recruitment of the internal auditor is ongoing, the contract was signed and is under registration.

21. **In preparation for and in response to the 2021 and 2022 flooding events, the parent project has financed critical interventions to mitigate the impact of the disaster.** The parent project supported the implementation of an emergency flood prevention plan during the 2021 and 2022 rainy seasons, which included (a) emergency pumping to evacuate about 24 million m³ rainwater in more than 20 districts and protect these areas before the construction of the planned drainage networks and (b) the cleaning of all existing drainage channels under PROGEP and PROGEP 2 target areas, ahead of the rainy seasons to allow optimal evacuation of stormwater. As of December 2022, 13.93 km of primary and secondary channels have been built protecting 55,000 people and 345 ha from floods. Citizen engagement and social facilitation activities are successfully ongoing with 10 Local Committees for Flood Control (COLIGEPs) already set up and operational in the project intervention areas.

¹³ This includes an Environmental and Social Management Framework (ESMF), a Resettlement Policy Framework (RPF), a Stakeholder Engagement Plan (SEP), a grievance redress mechanism (GRM), and an Environmental and Social Commitment Plan (ESCP).



22. **The project is experiencing delays in mobilizing the Government counterpart funding for the payment of compensation to project-affected persons (PAPs).** This situation affects the project disbursement rate because civil works cannot start in areas where PAPs are not compensated. While the technical and fiduciary team has the required capacity to design and implement drainage and urban resilience works, delays in mobilizing counterpart funding and long procurement processes¹⁴ remain the main challenge for project implementation. As a mitigation measure, the team is closely monitoring with the Ministry of Finance (*Ministère des finances*) to advocate for the timely payment of compensations. In addition, the Procurement Plan has been revised to consolidate contracts and streamline procurement processes. The project has also developed a new monitoring and evaluation (M&E) strategy aiming at strengthening the overall project coordination and reducing delays in the implementation of the planned activities.

23. **The GoS is undertaking a reform of the sanitation management system to establish and operationalize a sustainable O&M mechanism.** The ‘Water Security and Sanitation Project’ (P178673) under preparation (by the World Bank) and PROGEP 2 both support this reform. For the projected reform on the stormwater management sub-sector, the Government is exploring solutions for the sustainable O&M financing mechanism relying on public-private partnerships and contributions from different sectors including charges on water supply bills, cement price, road maintenance funds, and so on. The recruitment of the firm to support the overall reform process is ongoing under the preparation of the Water Security and Sanitation Project. PROGEP 2 includes an allocation of US\$8 million to support the National Office of Sanitation of Senegal (*Office National de l'Assainissement du Sénégal*, ONAS) in the sustainable maintenance of drainage infrastructures built under the project¹⁵ through capacity building, acquisition of equipment, and the setup of a geographic information system-based monitoring. The transfer of the PROGEP drainage network management to ONAS is almost completed. An action plan for a viable and sustainable stormwater management and O&M mechanism is currently pending validation from the Water and Sanitation Ministry and is supported at the sectoral and presidential levels, which are both involved in the reform process.

E. Lessons Learned from the Parent Project

24. **The sustainability of investments in O&M is critical for the success of the investments.** The AF will continue to promote the transfer of drainage facilities to ONAS for operation and to strengthen ONAS’ capacity to ensure sustainable maintenance of these facilities. The AF includes investments in consolidation works to reinforce the existing drainage network and O&M and strengthen a sustainable management and financing mechanism and a viable system.

25. **Community participation, communication, and awareness-raising activities.** The AF builds on the successful experience from COLIGEPs and civil society participation in PROGEP and PROGEP 2 that have shown that involving the beneficiaries ensures a sustainable engagement and changes in public behavior. Community efforts to prevent flooding will rely on the framework established for COLIGEP by bringing together elected officials, municipality services, and neighborhood communities. Gender inequality will also be addressed through a representation of women in all decision-making committees to promote activities that would enhance women's socioeconomic conditions. Lessons learned from the community-based involvement found that participatory approaches enabled women and men to discuss social and

¹⁴ Delays are mostly experienced at the ministry level and Central Procurement Directorate.

¹⁵ Both PROGEP and PROGEP 2.



economic issues, increased the understanding of the roles of women and men in resilience as well as climate change adaptation, and reduced sociocultural barriers.

26. **Planning is key to an integrated management of flood risks.** The PDD informed the design of flood risk management infrastructure for PROGEP and PROGEP 2. It also provided municipalities with a comprehensive plan for managing stormwater, a clearer understanding of flood issues in the region, and various flood management options using an integrated approach including structural and non-structural measures, nature-based solutions (NBS), and drainage by gravitation to minimize maintenance cost and maximize environmental and adaptation co-benefits. The AF will follow the same approach relying on planning documents and supporting the development and implementation of a new Ten-Year Flood Risk Management Plan.

27. **Developing a consolidated approach based on the complementarity between the stormwater management system and the national local disaster risk management (DRM) system is necessary.** One lesson learned from the parent project relates to the establishment and use of early warning systems, prevention measures, and capacity-building efforts toward first responders at national and local levels. Customized climate adaptation activities should consider local circumstances, including the informal sector and land regulation. The AF will address vulnerabilities to climate change through risk assessments, mapping, mitigation measures, and infrastructure specifically designed to withstand future extreme climate conditions using the most updated models. Investments in drainage works and urban resilience with a sustainability angle will allow to integrate urban planning with climate change adaptation and mitigation objectives through inclusive planning, awareness raising, and support to community organizations.

F. Justification for the Additional Financing and Consistency with the Country Partnership Framework and corporate priorities

28. **During the 2022 rainy season, while serious floods occurred,** the flood protection infrastructure financed under PROGEP, and the emergency pumping and cleaning interventions financed under PROGEP 2 proved to be efficient to protect the areas of the upstream Mbaou watershed and upstream Mbeubeuss watershed from heavy impacts of floods. However, the northern part of Keur-Massar and the catchment area of Lac Rose, which both lack drainage networks, were the epicenters of flooding, thus becoming the priority areas identified by the GoS, requiring urgent intervention to tackle flood risk exposure and restore livelihoods. The extent of the damage and population affected by the 2022 floods in the areas not covered by a drainage network nor emergency pumping activities confirmed the relevance of the stormwater drainage investments ongoing under PROGEP 2 and also highlighted the urgency to scale up these investments, along with technical assistance for urban planning, to cover additional vulnerable areas at great risk.

29. **These interventions are particularly critical given the evidence-based likelihood of future heavier and more intense precipitation events due to climate change and the booming demographic trends of the region.** The AF is timely in these two high-priority flood-prone zones to support extremely vulnerable populations' ability to adapt to climate change by scaling up already identified flood mitigation activities. The AF will also assist the Government in its initiatives to strengthen the region's capacity to manage urban planning and disaster risk as well as in aspects of preparedness through raising awareness and involvement of citizens to improve the maintenance of the drainage network.



30. The AF will support the Focus Area 3 of the World Bank Group Country Partnership Framework (CPF) for the Republic of Senegal (FY20-24; Report No. 143333-SN):¹⁶ ‘Increase Resilience and Sustainability in the context of growing risks’, and particularly Objective 3.1: ‘Promote and protect resilient livelihoods and ecosystems in the face of climate change’.

31. The AF is consistent with Senegal’s Nationally Determined Contributions and the country’s National Adaptation Plan for Action which identifies the protection of vulnerable areas and/or displacement of populations vulnerable to disaster risk as a priority action for the country. It will also contribute to the implementation of the Senegal’s National Climate Change Adaptation Program of Action by supporting the mitigation of floods impact, strengthening urban resilience to climate change in the Greater Dakar region, and developing risk-informed urban planning tools for secondary cities to better protect future urban infrastructure investments against climate disasters. The proposed activities are aligned with climate adaptation goals, as they include (a) urban development comprising reforms in risk-informed urban spatial planning and (b) DRM comprising reforms in emergency preparedness and response, and disaster risk reduction, which do not increase GHG emissions and do not introduce barriers to the country’s ability to pursue a low-emissions development pathway.

32. In terms of adaptation, although climate risks are likely to have a material impact on the operation, measures have been incorporated in the design to reduce those risks to an acceptable level. Those measures include (a) providing technical assistance on contingency and emergency response planning to cope with climate emergencies; (b) supporting urban decision-makers to plan for and cope with impacts of floods; (c) promoting climate resilient design such as expanding drainage networks to prevent flooding; and (d) changing the operating procedures of ONAS to improve maintenance practices and proactively reduce the impact of floods.

33. In addition, the AF is in strategic alignment with the World Bank Group Global Crises Response Framework Pillar 3 ‘Strengthening resilience’ as activities proposed under this AF are closely linked to DRM and climate resilience notably through the core activities included in Component 2 which represent the largest share of this AF and address climate resilience of the Dakar region. The activities from Component 1 include support to risk-informed urban planning, promotion of good practices for integrated and resilient urban management, and contingency planning at the local level, which are all relevant in the realm of DRM. Activities in Subcomponent 1.3 are directly aiming at providing tools to the GoS for a more efficient DRM through a framework for contingency planning. Activities proposed under Component 2 will include flood protection infrastructure such as drainage networks and retention basins and fall under the category of climate resilience activities.

II. DESCRIPTION OF ADDITIONAL FINANCING

34. **This Project Paper seeks the approval of the Board for an additional credit in the amount of US\$135 million to PROGEP 2 (P175830) to be financed under the IDA national country allocation (of which US\$55 million equivalent on shorter maturity loan terms).**

¹⁶ CPF was discussed by the Board of Executive Directors on March 5, 2020.



35. **The AF will maintain the original PDO:** “To reduce flood risks in peri-urban areas of Dakar and improve capacity for integrated urban flood risks planning and management for selected cities in Senegal.” The project components will remain the same.

36. **The AF will allow to scale up key project activities.** Specifically, the AF will support the Government to (a) add approximately US\$1.3 million for new urban development planning activities under Component 1: Integrated urban planning and management accounting for climate risk and sustainability; (b) cover approximately US\$132 million in scale-up activities under Component 2: Drainage investment and management, community engagement, environmental and social management; and (c) cover an additional US\$1.7 million in related project management activities due to the scale-up, under Component 4: Project management. Table 1 summarizes the costs of the parent project and proposed AF activities.

37. **The AF will allow to extend the area covered by flood risk mitigation infrastructure in the peri-urban expansion zone of Dakar:** (a) the remaining part of the Mbeubeuss watershed that has not yet been covered by the parent project and (b) the Kounoune-Sangalkam sub-watershed of the LRBV including the communes of Sangalkam, Bambilor, and partially Tivaouane Peulh Niaga (Figure 2).

- The Keur Massar North area belongs to the Mbeubeuss catchment perimeter and is the only flood-prone area in the PDD that has not yet been covered under PROGEP 1 and 2 (Figure 1 presents the area covered by both projects and the AF). It is located in the extreme northeast of the Keur Massar Nord Commune on the way to Tivaouane Peul (covering about 15,000 inhabitants). This area is devoid of rainwater drainage networks and has experienced significant flood damage during the summer of 2022.
- The LRBV constitutes the main peri-urban expansion zone of Dakar, with an area of about 17,000 ha, subdivided into five sub-watersheds, with a main thalweg that extends over 9 km. The Kounoune-Sangalkam sub-watershed (6,042 ha) is the most urbanized area of the LRBV and was the most affected by floods, with 71 percent of the area flooded during the 2022 rainy season.



Figure 1. Areas of PROGEP1-Thiourour, Yeumbeul et Mbeubeuss Watersheds (green), PROGEP 2-Mbeubeuss and Mbao Watershed (pink) and AF - Keur Massar North and Kounoune Sangalkam Watersheds (orange)¹⁷

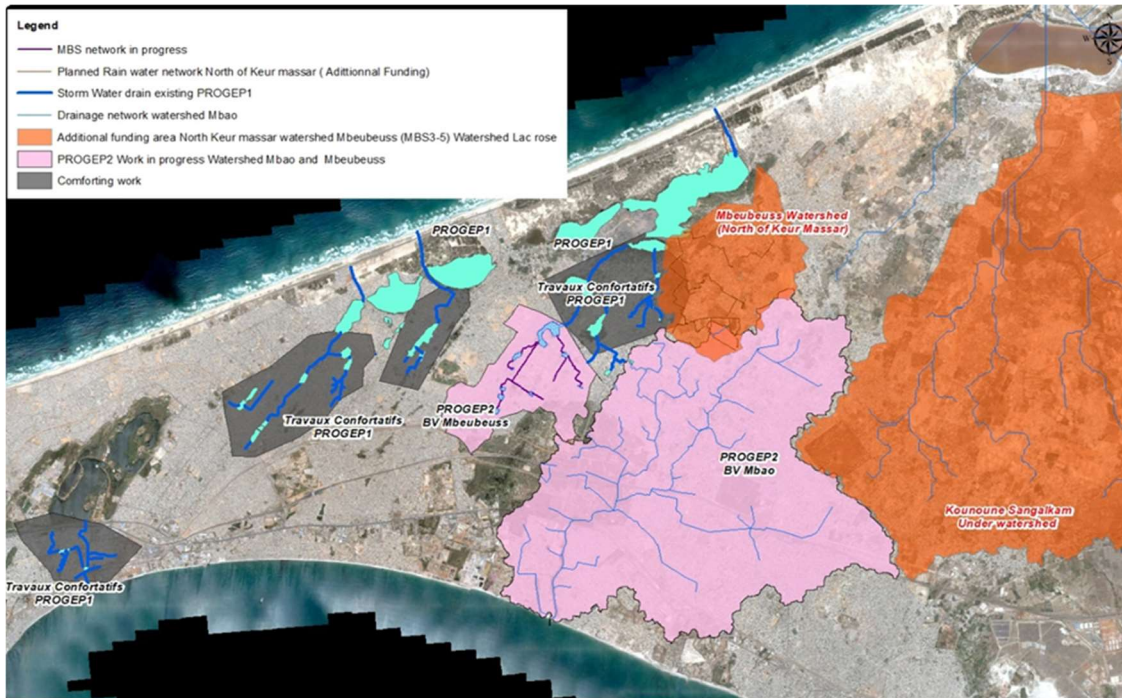
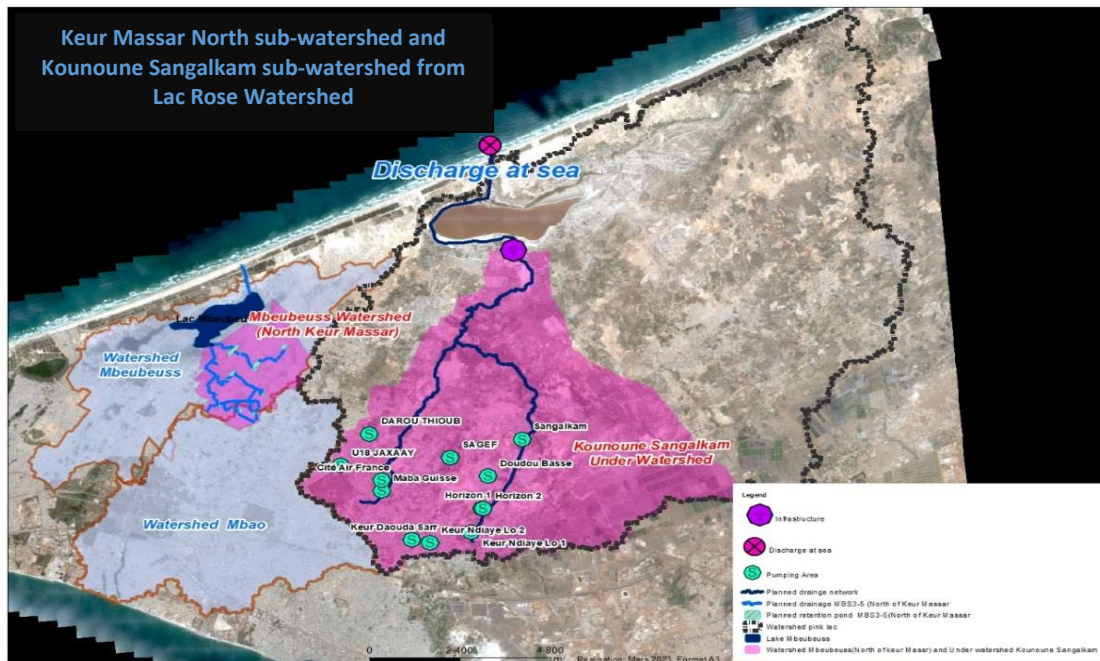


Figure 2. Keur Massar Nord and Kounoune Sangalkam Sub-Watershed from LRBV (pink)



¹⁷ Maps produced by the Municipal Development Agency (Agence de Développement Municipal, ADM)



38. **Project Results Framework.** The Results Framework has been revised to reflect scaled-up activities, notably in terms of the end targets, and is presented in section VIII.

39. **With the AF, the project closing date will be extended by three years, until July 2029, based on the detailed work schedule established during the project preparation.** The closing date of the parent credit retains its original closing date of July 31, 2026. A chronogram of the activities planned over the three years for the AF highlighting the key milestones has been prepared by the Municipal Development Agency (*Agence de Développement Municipal, ADM*).

Summary of Proposed Changes

A. Changes in Beneficiaries and Target Areas

40. The project will benefit the populations living in the flood-prone areas of two targeted watersheds, including rapidly urbanizing areas of Keur Massar Nord and Kounoune-Sangalkam sub-watershed of the LRBV. The scaled-up activities will protect from flooding approximately 13,000 additional people in the Mbeubeuss Keur Massar Nord watershed covering 200 ha and 56,000 people in LRBV covering 6,000 ha, including 2,574 ha of area protected from floods. At least half of the beneficiaries are expected to be female. These numbers are expected to increase due to continuing rapid urban growth.

B. Changes in Results Framework

41. The Results Framework has been revised to reflect the changes and the scaled-up activities as well as to reflect the new end target dates. The proposed adjustments to the indicators include the following:

- (a) Increasing the end target of PDO indicator 'Area in peri-urban Dakar protected against recurrent flooding through drainage works (ha)' from 826 ha to 3,600 ha to include the two areas that will be protected with the infrastructure constructed under the project.
- (b) Increasing the end target of PDO indicator 'Direct beneficiaries, of which female (50 percent)(Number)' from 120,000 to 189,000.
- (c) Increasing the end target of the PDO indicator 'Institutional actors in the project intervention areas who have adopted the planning tools for integrated flood risk management (Number)' from 200 to 350.
- (d) Increasing the end target of the intermediate results indicator 'Integrated urban flood risks management tools and guidance notes developed (Number)' from 8 to 9.
- (e) Increasing the end target of intermediate results indicator 'Key stakeholders trained in integrated urban flood risk management, climate change resilience and territorial planning (Number)' from 600 to 750.
- (f) Increasing the end target of the intermediate results indicator 'Primary drainage system in Keur Massar/Mbao catchment put in place (Meter)' from 45,200 meter to 88,150 meter to indicate the length of the additional drainage infrastructure.
- (g) Increasing the gender-disaggregated intermediate results indicator 'Number of people reached by information, education and communication strategy in flood risk management and resilience (80,000 to 120,000, of which 50 percent women)'.



- (h) Increasing the end target of the intermediate results indicator ‘Number of Local flood management committees (COLIGEP) created in Keur Massar/Mbao catchment and strategy for sustainability designed and implemented (Number)’ from 3 to 6 as the extension of the intervention zone to new localities will result in more community dynamic and citizen commitment in the municipalities.
- (i) Increasing the end target of the intermediate results indicator ‘Eligible flood risk community investment projects completed in Keur Massar/Mbao catchment (Number)’ from 80 to 120 in correlation with the extension of the intervention areas and additional citizen engagement activities.
- (j) Increasing the end target of the intermediate results indicator ‘Women and girls trained and engaged in flood risk management activities at a community level (EWS, solid waste management, awareness, and education system) (Number)’ from 42,000 to 57,500 as the new communes supported in setting up COLIGEP will allow for additional activities of participatory planning involving more women and girls in flood risk management at the community level.

C. Detailed Component Descriptions

42. The US\$135 million IDA equivalent and US\$10.7 million equivalent from the GoS will finance the scale-up of original project activities as follows:

(a) Scale-up of Original Project Activities under Component 1 (AF US\$1.28 million equivalent IDA)

43. **Subcomponent 1.1: Integrated Urban Planning and Management Accounting for Climate Risk and Sustainability (AF US\$0.91 million equivalent IDA).** Technical assistance and training will support capacity building to the General Directorate of Town Planning and Architecture (*Direction Générale de l’Urbanisme et de L’Architecture*, DGUA) for the development and implementation of urban and spatial planning tools on climate change adaptation, resilience and sustainability that (a) include climate risk management for future urban expansion zones; (b) promote more compact urban development leading to lower GHG emissions; and (c) restrict settlements in flood-prone areas. Assistance will be provided to local authorities, private and public urban actors, and elected officials for the implementation of the urban planning documents¹⁸ in a ‘learning-by-doing’ approach. The idea is to help all stakeholders involved in urban planning to take ownership of the newly created tools in a practical way. The AF will assist local authorities, deconcentrated services, the Directorate of Land Use Monitoring and Control (*Direction de la Surveillance et du Contrôle de l’Occupation du Sol*, DSCOS), the DGUA, and other urban actors by building their capacity for the hands-on implementation of climate risk-informed urban planning documents and the operationalization of the PUDs developed under the parent project. The subcomponent will also provide equipment and dedicated software to strengthen the technical capacities of the DGUA in the operationalization of urban planning documents.

44. The AF will also finance activities aimed at improving the management of land use and ensuring adherence to the urban planning guidelines developed by PROGEP 2. To achieve this, the project will (a) establish a memorandum of understanding and provide institutional and technical assistance to DSCOS to develop tools and applications for land use control and (b) support the DGUA in setting up and

¹⁸ Particularly the detailed urban plans, drainage master plans, and integrated flood risk management plans



operationalizing urban planning and control offices in the municipalities covered by the project. The AF will also support the Government in the development of a new Ten-Year Flood-Risk Management Plan (2023–2033) which will help inform and prioritize future investments.

45. **Sub-component 1.2:** No additional activities regarding Urban legislation are foreseen in the scope of the AF.

46. **Subcomponent 1.3: Promoting Good Practices for Integrated Urban Management including Resilience and Sustainability (AF US\$0.36 million equivalent IDA).** This component will support the development of a manual for the preparation of contingency plans by municipalities and capacity building for local stakeholders in emergency response. The AF will provide funding for the project's capitalization, which includes incorporating the lessons and experiences gained throughout the project's entire duration. This will allow to enhance the Recipient's capacity at the central and local levels to design and implement innovative and integrated approaches and investments in urban projects in terms of sustainability, climate change adaptation and resilience notably assessments, pilots, design of activities in relation to urban planning and legislation, flood-risk, waste management, rainfall harvesting, disaster preparedness and response, knowledge management, to develop outreach activities and training.

(b) Scale-up of Original Project Activities under Component 2 (AF total US\$142.28 million equivalent; of which US\$131.98 million equivalent IDA and US\$10.30 million equivalent GoS)

47. **Subcomponent 2.1: Temporary Emergency Pumping and Drainage Infrastructure Construction and Management (US\$119.41 million equivalent IDA).** The AF will finance (a) temporary emergency pumping activities to address immediate needs during a flood event and (b) design and drainage investments in the two targeted intervention zones. Detailed climate-informed studies including the most up-to-date scientific data will be conducted to fully assess the best possible design to ensure infrastructure has a positive impact on the ecological balance of the LRBV while being resilient to the future climate scenario. The activities under this AF subcomponent will be implemented in two phases.

Phase 2.1.1 will finance the following:

- (a) Drainage works (US\$38 million equivalent IDA) in Keur Massar Nord area in the Mbeubeuss watershed including 11.7 km of primary and secondary collectors, 10 rainwater harvesting basins with a storage capacity of 165,200 m³, and additional road and pavement rehabilitation along drainage network infrastructure. Technical studies and safeguards instruments were already prepared under the parent project and are ready, so the works could start at project effectiveness.
- (b) Temporary emergency pumping systems (US\$7 million equivalent IDA) for the next rainy seasons in selected areas of the two intervention areas of Keur Massar Nord and Kounoune-Sangalkam, respectively, in the Mbeubeuss and Lac rose watersheds, while the drainage civil works are ongoing or not yet launched.
- (c) Feasibility studies, engineering design, and environmental and social studies for the drainage works (US\$1.5 million equivalent IDA) in the LRBVs. It is expected that during the 18 first months of the AF implementation, Phase 2.1.1 activities and investments will represent the biggest share of disbursements while studies for Phase 2.1.2 are conducted.



Phase 2.1.2 will finance the following:

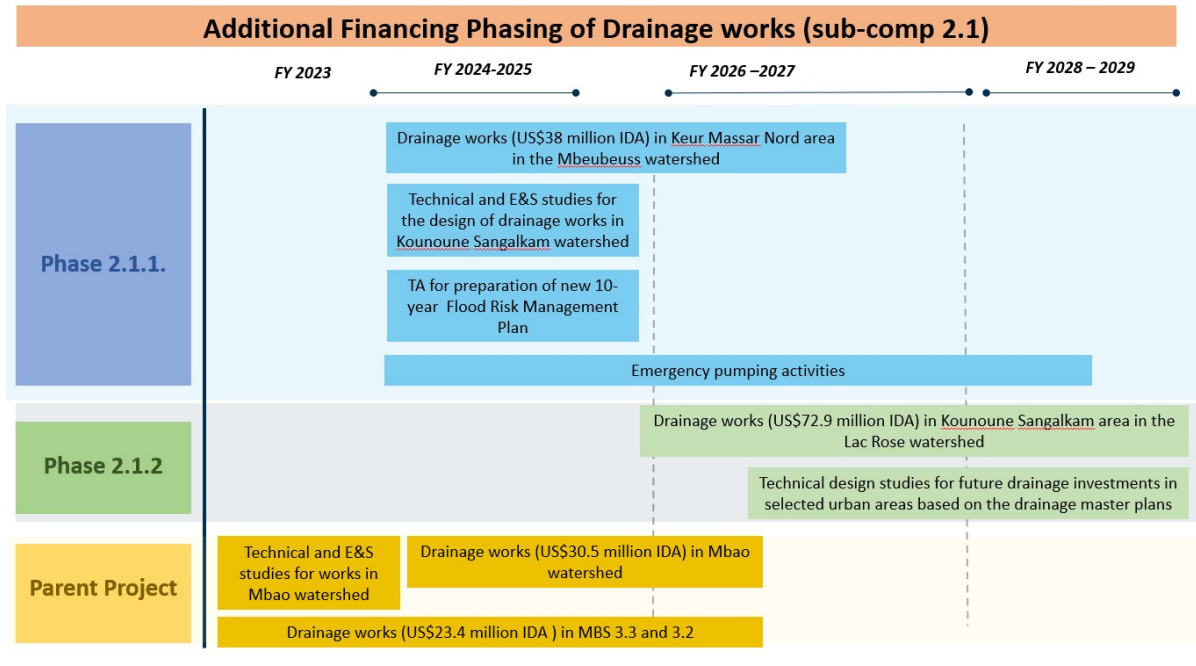
- (a) Drainage works in the Kounoune-Sangalkam sub-watershed of the LRBV (US\$72.9 million equivalent IDA) including design and construction of a primary drainage network of 27.35 km with associated road and secondary network as well as the construction of the outlet to the sea six retention basins for a total capacity on 120,000 m³. Two of the basins' rights-of-way have already been secured by the Directorate of Flood Planning and Management, and Resettlement Action Plans (RAPs) will be implemented for the four other basins¹⁹. The AF will also finance technical design studies for future drainage investments in selected urban areas based on the drainage master plans and detailed urban master plans prepared under the parent project. Overall, the design and environmental and social studies conducted under Phase 2.1.1 are expected to be finalized by mid-FY25 and civil works launched by April 2025. The rapid implementation of this second phase will help limit the compensations in the context of RAPs in an area of rapid and uncontrolled urbanization.

48. **To the extent possible, the AF will promote public amenities and NBS** such as green corridors or reservation for tree planting, in all associated roadworks along urban drainage network construction or around the retention basins. The public green infrastructure along roads and waterbodies will allow to reduce stormwater runoff and provide cooling urban landscaping in the vicinity of flood protection grey infrastructure providing climate adaptation co-benefits.

¹⁹ Land acquisition and payment of compensation are not covered



Figure 3. Suggested Phasing of Subcomponents 2.1.1 and 2.1.2 for the AF Activities



49. **Subcomponent 2.2: Drainage Infrastructure Operation and Maintenance (AF US\$5.91 million equivalent IDA).** While the stormwater drainage network is expected to increase under the new Flood Risk Management Plan (2023–2033), the AF will reinforce ONAS’ capacity to operate and maintain drainage infrastructure through the acquisition of O&M equipment, network monitoring tools, and training. This support will complement the parent project’s efforts for the development of an institutional and sustainable financial mechanism for the stormwater drainage network O&M. More specifically, the AF will finance the drainage investments’ maintenance before the transfer of responsibility to ONAS and the acquisition of new maintenance equipment as well as capacity building for the sustainability and financing of stormwater management O&M based on the sectoral reform road map.

50. **Subcomponent 2.3: Community Projects and Engagement (AF US\$5.60 million equivalent IDA).** The subcomponent includes investments to develop community subprojects around built drainage works to promote social cohesion and socioeconomic activities. This will include the building of urban infrastructure, neighborhood sanitation activities, and outreach to mobilize and engage local stakeholders to ensure their active involvement in stormwater management, elaboration of community guides, drainage network O&M, and in flood prevention at the community level, through a consultative and participatory process. The activities will include organizing solid waste collection at the local level (in collaboration with the Senegal Municipal Solid Waste Management Project (*Projet de Promotion de la Gestion intégrée et de l’Economie des Déchets Solides au Sénégal*)) and related educational activities including awareness raising on the effect of climate change, the role of solid waste management in mitigating GHG emissions, and the importance of infrastructure maintenance to improve adaptation to extreme climate-related events in the future. Solid waste collection campaigns will also support the recovery of eligible materials for reuse or recycling, including the recovery and valorization of biowaste. The community subprojects will also



contribute to promote the improvement of public space such as (a) energy-efficient public lighting and (b) greening initiatives and tree planting which will contribute to reduce urban heat islands and improve livability of public spaces.

51. **Subcomponent 2.4 Environmental and Social Management (AF US\$12.70 million equivalent total; of which US\$1.05 million equivalent IDA and US\$10.30 million equivalent GoS).** This subcomponent will finance the preparation and implementation of the environmental and social instruments to manage and address environmental and social aspects of the project for the new investments. This includes the update of the project ESMF, the RPF, the SEP, the GRM, and the ESCP.

52. In addition, all activities initiated within the project will undergo Environmental and Social Impact Assessments (ESIAs) and will require the preparation of a RAP including all mitigation measures necessary before and during construction work.

(c) Scale-Up of Original Project Activities under Component 4 (AF total US\$2.14 million equivalent; of which US\$1.74 million equivalent IDA and US\$0.40 million equivalent GoS).

53. **Component 4: Project management (US\$1.74 million equivalent IDA and US\$1.00 million equivalent GoS).** The AF will finance project management cost for the additional 36 months after extension of the original project closing date (closing in July 2029). This includes implementing and technical agency operating costs, financial and technical audits, M&E (including gender-disaggregated data), and so on.

54. **The AF proposes to increase the GoS counterpart funding requirement by US\$10.70 million** including US\$10.30 million for the complementary compensation expenses related to the works of Component 2 and US\$0.40 million for the support to the operation of the project. The total amount of counterpart funding for the parent project and AF represents US\$19.38 million. The GoS financial counterpart will be reflected in the Financing Agreements of the AF.

55. The project description in the Financing Agreement of the parent project will be aligned with the description above but expenditures allocated to component 2.1.2 shall only be eligible under the AF. The Legal covenant related to the roadmap for the urban sanitation reform, including financing and management mechanisms has been modified.



D. Summary of Component Changes and Costs

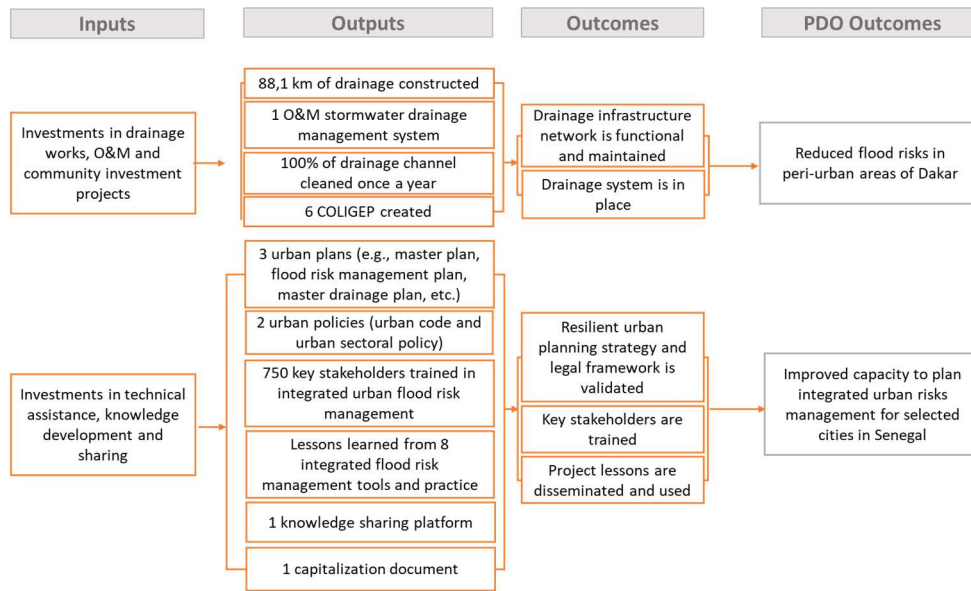
Table 1. Project Costs (US\$ millions)²⁰

COMPONENTS	Parent Project (IDA)	AF (IDA)	TOTAL (IDA)	Parent project (NDF)	GoS Counterpart Parent Project	GoS Counterpart AF	GoS Counterpart Parent Project + AF
PROJECT COST	155.00	135.00	290.00	8.70	8.70	10.70	19.40
Component 1: Integrated urban planning and management accounting for climate risk and sustainability	4.00	1.28	5.28	6.70	—	—	—
<i>Subcomponent 1.1: Integrated urban planning and management</i>	<i>0.74</i>	<i>0.91</i>	<i>1.65</i>	<i>4.00</i>	—	—	—
<i>Subcomponent 1.2: urban legislation and regulatory framework</i>	<i>0.35</i>	—	<i>0.35</i>	—	—	—	—
<i>Subcomponent 1.3: Promoting good practices for integrated urban management, resilience and sustainability</i>	<i>2.90</i>	<i>0.36</i>	<i>3.26</i>	<i>2.70</i>	—	—	—
Component 2: Drainage investment and management, community engagement, environmental and social management	146.14	131.98	278.12	1.30	7.70	10.30	18.00
<i>Subcomponent 2.1: Temporary emergency pumping and drainage infrastructure construction and management</i>	<i>126.63</i>	<i>119.41</i>	<i>246.04</i>	<i>1.30</i>	—	—	—
<i>Subcomponent 2.2: Drainage infrastructure Operation and maintenance</i>	<i>8.20</i>	<i>5.91</i>	<i>14.11</i>	—	—	—	—
<i>Subcomponent 2.3: Community Projects and Engagement</i>	<i>9.96</i>	<i>5.60</i>	<i>15.56</i>	—	—	—	—
<i>Subcomponent 2.4: Environmental and Social Management</i>	<i>1.35</i>	<i>1.05</i>	<i>2.40</i>	—	<i>7.70</i>	<i>10.30</i>	<i>18.00</i>
Component 3: CERC Component	—	—	—	—	—	—	—
Component 4: Project Management	4.86	1.74	6.60	0.7	1.00	0.4	1.4

²⁰ The figures are rounded and are not necessarily adding up precisely to the totals



E. Theory of change



F. Institutional Arrangements

56. **The institutional arrangement will remain the same as in the parent project.** The parent project is implemented through the ADM that will continue to act as the Project Implementation Entity and fiduciary agency responsible for the overall project implementation and coordination while ONAS will be in charge of Subcomponent 2.2: ‘Drainage Infrastructures Operation and Maintenance’, as implementing partner. Specifically, the ADM will coordinate the overall project implementation, ensure timely payments to contractors, assume the responsibility for the relevant environmental and social due diligence, ensure continuous community outreach and consultation, maintain project accounts, produce financial reports, undertake M&E activities, ensure functional and accessible GRM, and report results to various stakeholders. The Project Steering Committee chaired by the Ministry of Water and Sanitation will continue to provide overall strategic and policy oversight. The Project Technical Committee (PTC) will provide technical guidance at both strategic and operational levels and be responsible for ensuring efficient and effective technical decision-making and resolving implementation challenges. It will be co-chaired by the DGUA and the Directorate of Sanitation (*Direction de l’Assainissement*), while the ADM functions as the secretariat of the PTC.

57. **The ADM is the implementing agency with a fiduciary role for several donors’ project including several World Bank-financed projects;** the Local Authorities Development Program (*Programme de renforcement et d’équipement des collectivités locales*, PRECOL; P084022), the Stormwater Management and Climate Change Adaptation Project (PROGEP, P122841), the Municipal and Agglomerations Support Program (*Programme d’appui aux Communes et Agglomérations du Sénégal*, PACASEN; P157097), the Saint-Louis Emergency Recovery and Resilience Project (SERRP, P166538), and PROGEP 2, P175830. The ADM is well experienced and has been implementing complex projects, in particular, urban resilience projects, for several years and is also adequately staffed with a skilled team both at the technical and fiduciary levels.



G. Cross-Cutting Priorities

Climate Co-benefits

58. **The proposed AF will have substantial climate change adaptation and mitigation co-benefits.** Activities proposed under this AF are designed to provide effective solutions to mitigate, manage, and respond to current and future climate and disaster risks. Subcomponent 1.1 will support the GoS in managing and reducing climate urban risks through the development and implementation of climate-informed urban planning instruments to guide the urban expansion of the municipalities in the areas covered by the AF. These urban planning tools will be based on the most recent flood risk assessments provided through the project and will allow to better protect flood-prone areas against illegal encroachments. These plans will also allow to develop efficient mobility plans and optimal urban spatial use, hence providing the foundation for reduction of GHG emissions in cities of Senegal for the next decade. Support to contingency planning in Subcomponent 1.3 will enhance the ability of the GoS to prepare and respond adequately in the event of a climate-induced disaster, hence providing adaptation co-benefits.

59. Subcomponent 2.1 will support emergency pumping and rehabilitation, and expansion of drainage and flood risk reduction infrastructure. The infrastructure will be designed to withstand future extreme events and will be calibrated according to climate projections. Associated green infrastructure will be designed to help reduce urban heat islands and provide shaded urban amenities to the population. The AF will also allow the participatory development of the new national decennial program against floods (2023–2033), including elements of awareness on climate change impacts and good practice for mitigating them, aimed at public stakeholders and urban communities. The outreach toward communities will also allow for greater awareness of population on the impact of climate change and best practices to mitigate and adapt to climate change. These activities will include trainings for better management of solid waste as well as waste collection campaigns in communities, which will have a direct impact on GHG reduction through a decrease of uncontrolled dumping sites and adaptation benefits through the reduction of drainage networks clogging allowing for a lesser impact on the population of heavy rains and floods.

Gender

60. **Although, some progress has been made toward reducing the gender gap, more efforts need to be deployed to reduce women’s vulnerability in disaster management and in inclusive urban management.** Senegal has a Gender Inequality Index score of 0.521, slightly above the average for Sub-Saharan Africa. The percentages of women with secondary education and employed women are below the regional average. Literacy rates are 66 percent for men and 40 percent for women. In general, income-generating strategies are reshaped by disasters in the context of highly monetized urban living; informal employment such as domestic services, street vending, home-based work, or waste picking is more likely to be available to women; it is often time and energy demanding, low pay, insecure, and most prone to disruption in time of flooding or any other emergencies. For instance, after flooding, domestic work becomes often further discounted and taken for granted. Often, women’s role in nurturing and childcare intersects with other responsibilities, which positions women as income earners, food producers, and consumers. It makes them highly susceptible to urban environmental degradation and shortage of risk-reducing services. Those responsible for food preparation, childcare, cleaning, and grooming face a daily burden of having to resolve issues of health (quality and access to services), schooling, neighborhood safety, impact of local environmental hazards on children, and access to safe water. Lower levels of education reduce the ability of women and girls to access information including early warning mechanisms,



and resources or to make their voices heard. This is a challenge when women want to make innovative changes in their livelihoods. On the other hand, women and girls’ untapped potential and capacities remain too often unleveraged in resilience-building processes. Yet, their full participation and leadership in climate change and environmental and disaster risk reduction policies and programs are critical to making these more effective for all. A gender-transformative approach will ensure that women are included as beneficiaries and decision-makers, with economic opportunities and strengthened capacities that give them a stronger voice and improve their position in society.

61. **To address the gender gap, the AF will build on the PROGEP 2’s existing activities** in (a) women’s access to income opportunities and (b) voice and agency in urban planning and flood risk management. The AF will (a) ensure women’s labor by safeguarding their inclusion in labor-intensive public works (Subcomponent 2.1) and (b) grant leadership roles to women in COLIGEP and promote gender equality through capacity-building activities with the Government and other partners. (Subcomponent 2.3).

62. **Women’s participation in COLIGEP and key stakeholder meetings to design and implement project activities** can help ensure that (a) urban public spaces, infrastructure, and services are designed in a gender-sensitive manner; (b) the project offers significant opportunities for women employment, including activities around the maintenance of green spaces; and (c) specialized training in constructions and urban planning are tailored to increase opportunities for women. Measures to ensure that women’s specific needs to participate in COLIGEP and key stakeholder meetings will be met (for example, place and timing of meetings and facilitation techniques). To support women to engage in jobs and other activities and to fully include women in all DRM phases, a few options are possible. For instance, offering support to women’s care work responsibilities so they have time and opportunity to participate in remunerative activities and materially compensating women for the time and skills they contribute to households.

63. **Collecting and monitoring gender-disaggregated data is central to the proposed project.** In addition to the PDO level indicator 2: Direct beneficiaries of whom female (50 percent), the following intermediate indicators are gender specific: (a) women are consulted and involved in the development of policies, strategies, and plans in local and national level; (b) numbers of women trained and employed in flood risk management works (EWS, solid waste management, public spaces, and so on); and (c) percentage of women participating in/leading management committees for the COLIGEP.

Table 2.: Gender Gap Action Plan

Gender Gap	Action	Indicators
<ul style="list-style-type: none"> Women are disproportionately affected economically by floods (loss of revenue, reduced accessibility to jobs). Women are underemployed compared to men²¹. Women’s representation in decision-making process is 	<ul style="list-style-type: none"> Ensure all-weather revenue opportunities by reducing flood in select areas. Create employment opportunities with labor-intensive public works related to flood adaptation civil works, including green public space enhancement. 	<ul style="list-style-type: none"> Women are consulted and involved in the development of policies, strategies, and plans at local and national levels (Percentage). Women trained and engaged in flood risk management works (for example, EWS, solid waste management, public space).

²¹ The combined rate of underemployment and unemployment in Senegal has hovered around 31 percent (42.4 percent among women and 23.4 percent among men) in recent years. Senegal and Decent Work (2018) - International Labour Organization.



Gender Gap	Action	Indicators
low, especially with urban planning and flood risk management.	<ul style="list-style-type: none"> Enhance the participation of women in the management of the COLIGEP as well as leadership role and urban planning tailored to increase opportunities for women and incorporate gender consideration in infrastructure design. 	<ul style="list-style-type: none"> Women participating in/leading management committees for the COLIGEP (Percentage).

Citizen Engagement

64. **The AF will apply the citizen engagement mechanisms that were developed under the PROGEP 2 and which are now under implementation.** These mechanisms ensure an inclusive and participatory decision-making approach throughout processes, from selecting specific sites and ensuring the adequate targeting of vulnerable people and communities to establishing solid management mechanisms that contribute to sustainability of investments and prevent future possible conflicts. The specific citizen engagement interventions that will be implemented include (a) support for community engagement in determining local investments through consultations, including targeting and enhancing the voice of the vulnerable beneficiaries in the communities targeted by the project (COLIGEP/Project of community interest/ PIC) and (b) project-level feedback and grievance mechanism, designed to process complaints, concerns, and questions from beneficiaries and other stakeholders at various levels (regional to local), with the aim to resolve issues within the GRM-specified time frame. The GRM will be updated and upgraded in the context of the AF.

65. The AF will include activities to engage with communities and stakeholders to discuss the sequencing of the AF interventions as well as the type of work planned to reduce flooding impacts to manage expectations surrounding Lac Rose. This will involve creating a comprehensive social communication and citizen engagement strategy, which includes information and awareness campaigns about upcoming short and medium-term interventions. Additionally, community relays will be established in the intervention zone of both the LRBV and Keur Massar Nord.

66. Periodic consultations will also address the findings of the social and environmental assessments conducted for the project, incorporating discussions on the impacts and benefits derived from project activities and measures to avoid, minimize, and mitigate potential risks of exclusion and/or adverse impacts.

III. KEY RISKS

67. **The overall risk rating of the project remains Substantial,** given that the AF is used for scaling up ongoing project activities and through the assessment of the specific risks associated with the new areas covered. The risks rated as Substantial are described below, as well as the proposed mitigation measures.

68. **Macroeconomic risk is rated Substantial.** The ongoing Russia’s invasion of Ukraine could prolong inflation and put a strain on government finances. In addition the government’s fiscal context and macro-economic challenges are leading to discontent and political turmoil. The fluctuation of commodity prices



poses both potential benefits and risks to Senegal as both an oil importer and gold exporter. These macroeconomic risks could have an impact on project implementation due to worsening fiscal conditions and changes in Government priorities during the recession and an expected global economic downturn reducing the Government's fiscal space to mobilize counterpart funding on time. Senegal also faces challenges such as subregional insecurity, increasing global tensions, and tighter international funding conditions. Additionally, Senegal is highly vulnerable to climate-related events such as floods, droughts, and associated health hazards. Despite these challenges, the Senegalese Government has shown a commitment to address climate-related risks and the project aligns with the Government's priorities. The project also includes a CERC which could provide direct disbursements in emergency situations.

69. **Sectors Strategies and Policies risk is rated Substantial.** Many sectors are involved in the management of flood risk mitigation and urban development, with often overlapping mandates. At the local level, less than 20 percent of Senegalese cities and municipalities have urban plans and most of those are obsolete. The AF activities will require strong coordination among sectorial actors and territorial levels (national, and municipal), which can be difficult in the Senegal context. To mitigate this risk, the project's steering committee will ensure integrated, cross-sectoral guidance for the project coordination. Project activities will be in line with sector policies, as well as urban development and planning policies and tools, building on coordination mechanisms put in place in the PROGEP 1 and 2.

70. **Fiduciary risk is rated Substantial.** The overall financial management risk for the project is rated as Moderate. It is considered that the financial management arrangements satisfy the World Bank's minimum requirements and therefore are adequate to provide, with reasonable assurance, accurate and timely financial management information on the status of the project. With the New Procurement Framework, the ADM is also implementing the SERRP. The ADM is familiar with the World Bank rules and procedures and the staff have an acceptable background in World Bank procedures and the use of the World Bank's standard bidding documents. The ADM has a procurement specialist with acceptable skills and experience in managing World Bank-financed projects, and ONAS also has experience in World Bank rules and procedures because it is involved in an ongoing World Bank-financed project (PROGEP-2).

71. **Environmental and social risk is rated High, changed from Substantial.** Impacts and risks are linked to the activities of construction and operating structures and equipment, which may possibly have effects on certain biophysical environments. In addition to the area of Keur Massar North, the project will intervene in the LRBV which is a sensitive area both from an ecological and socioeconomic standpoint. The complex Lac Rose ecosystem, which relies on a specific salinity and gives an outstanding color to the water of the lake, plays an important role in the industry of tourism as well as provides important revenues in terms of agriculture and the salt industry. The risks associated with civil engineering works, consisting mainly of drainage works, are nuisances such as dust, noise, and the poor management of construction waste. In addition, there are health and safety problems for the populations (risk of accidents with company equipment and risk of drowning with retention basins) living near the intervention areas but also for workers during the construction phase. The identification and management of environmental risks will be included in the main environmental and social documents to be developed, the ESIA, which will be based mainly on hydrological and hydraulic modeling studies via technical studies to calibrate the structures and the volumes of flow toward the sea and the lake. This work will be accompanied by a vast resettlement program with two main risks to monitor: (a) forced evictions and (b) excessive delay in the mobilization of GoS compensation funds.



72. **Other risks (climate-related) are rated Substantial (new).** In addition to the above risks, there are climate-related risks which are rated Substantial due to the frequency of floods, drought, and erratic rainfall. The mitigation measures will primarily promote climate resistant design and coping mechanisms leading to a reduction in the damage from climate change-induced adverse events.

IV. APPRAISAL SUMMARY

A. Economic Analysis

73. In line with PROGEP 2, the AF is mainly funding public goods in terms of intangibles (capacity building, urban master planning, and so on) and tangible investments that build on PROGEP 2 to flood-proof additional areas of Greater Dakar. Hence, there is no need to carry out a financial analysis because no private goods are considered in the project. While the parent project's relevance of the public sector and the World Bank added value remain pertinent for the AF, a detailed economic analysis of the impacts is quantitatively valued through a cost/benefit analysis for the entire AF and appended in Annex 4.

74. Two economic analyses were carried out: (a) AF economic analysis and (b) aggregated parent project and AF economic analysis. Economic analyses were carried out using a 6 percent social discount rate over 15 years for the AF analysis and 17 years for the aggregated parent project and AF analysis, respectively, based on the opportunity cost of capital and country risk over the project period. A sensitivity analysis was performed under a pessimistic scenario (a 10 percent increase in economic costs and a 10 percent decrease in benefits over the base case and an 8 percent discount rate) and an optimistic scenario (a 10 percent decrease in cost and a 10 percent increase in benefits over the base case and a 4 percent discount rate). In addition, project viability switch-off points were computed for (a) equal cost increment and benefit decrement; (b) cost increment, and (c) benefit decrement.

75. The AF as well as the parent and AF are viable under all three scenarios. The base-case scenario has, respectively, (a) positive net present value (NPV) of US\$156.5 million and US\$239 million; (b) robust internal rate of return (IRR) 29 percent and 23 percent; and (c) positive present value benefit-cost of 2.5 and 2.0 as the Greater Senegal flood-proofing areas under the aggregated parent project and the AF is significantly larger though with lower density. The AF and the parent project, which remain viable under the optimistic and pessimistic scenarios, are both more sensitive to a decrease in benefits than to an increase in costs under the viable scenarios that are reflected by the switch-off points.

B. Technical

76. The technical justification for the original activities remains valid under the AF. The scale-up of activities in the two new watersheds of Mbeubeuss and Lac Rose have the same technical justification as the parent project as they correspond to the original activities, that is, (a) capacity building for urban planning activities; (b) drainage infrastructure; and (c) citizen engagement activities. The AF will cover the technical studies for the drainage system and retention basin based on the most updated version of the PDD, for the watershed of Mbeubeuss and Kounoune Sangalkam, and will allow a holistic approach to the Lac Rose ecosystem. The projected drainage system will restore the natural flow of the stormwater to the extent possible and will include artificial and natural retention ponds allowing to minimize the size of the drainage channel downstream hence reducing investment costs. Regarding the drainage network for the Mbeubeuss watershed, a pumping station was built on Lake Mbeubeuss under PROGEP 1 and connected



to a sea outlet structure. This technical option was taken so as not to empty Lake Mbeubeuss, which has an important ecological and economic function. Various similar types of design will be explored and assessed in the technical studies conducted for the Lac Rose outlet options to protect the hydrological dynamic of the lake.

77. To account for the fragile ecosystem of the LRBV, the technical design will consider safeguards requirements related to the preservation of its outstanding biodiversity and unique characteristics. The design of the stormwater management infrastructure will comprise drainage networks combined with retention basins and adequate size discharge structures to the sea. The storage basins will allow to reduce the upstream volume of water to be drained. It is also planned to install bar screens at the inlets and outlets of the ponds to block solid waste. A regulation valve will be placed at the level of Lake Rose to regulate the volumes of water released into the lake and to drain the surplus into the sea. A memorandum of understanding will be signed with the General Directorate of Water Resources Planning (*Direction Générale de Prévision des Ressources en Eau*, DGPRE) to ensure the quality of the water released into the lake. The design will be based on technical studies informed by most up-to-date scientific knowledge on the lake biochemical and ecological balance and will rely on the (a) updated Strategic Environmental Assessment of the Lac Rose watershed; (b) updated master plan for stormwater drainage; (c) detailed urban planning documents to preserve the drainage axes and vulnerable areas of the watershed; (d) in-depth technical studies to find viable solutions for the sea outlet; and (e) construction of stormwater drainage works and retention basins to capture run-off water upstream of the lake, allowing to regulate water releases and flows to the lake via the upstream retention basin, a system of bypass to the sea, and a system of valves to feed the lake when necessary.

78. A transitional pumping system will be installed in the Keur Massar Nord area and LRBV for the 2023 winter rainy season to protect and provide relief to the populations living in these regions. The installation will be carried out in two stages. First, the water table will be lowered in June, then continuous pumping will take place from July to October during winter rainfall peaks. The Keur Massar Nord system will consist of a dozen electric pumps installed in natural depressions. The water will be pumped back to Lake Mbeubeuss, which already has an outlet to the sea. Before installing the electric pumps, each depression will be delimited and secured for the right-of-way. In the LRBV area, the pumping system will be adjacent to the Mbao watershed to avoid any risk of discharging into the Lac Rose. The pumping sites will be natural depressions interconnected by pipes. The collected water will be evacuated into the Mbao catchment area, where structures such as basins and collectors have already been built through the initial financing of PROGEP 2. In both watersheds, the natural depressions where the electric pumps will be installed are free of any settlement. The tender documents for the global pumping system (including the two watersheds) have been finalized, and the services are planned to start during the summer of 2023.

79. To prevent accidents and risks of drowning, the management and operation of the pumping stations, including the delimitation and security of the area with wire fencing that is at least two meters tall and the installation of night lighting, will be carried out. Workplace safety instructions will be provided, and staff will be trained on how to use drowning rescue equipment. The security of the facility and equipment will be managed along with a 24-hour security guard, electrical fire extinguishers will be installed, and electrical cabinets will be equipped with emergency stop buttons.

80. To ensure the quality of water in the project intervention zones, a memorandum of understanding with the DGPRE is being prepared. PROGEP 1 carried out a reference assessment in 2019–2020, including the water passing along the landfill, for the Mbeubeuss watershed. To monitor the quality of water in both



areas covered by AF, regular sampling, and testing, including the outlet at sea level, will be conducted, comparing the results against the baseline from 2020. Although the original plan was to conduct two samplings per year under the parent project, the AF will adopt quarterly monitoring once work begins. In addition, the NBS proposed under the AF will include phytoremediation of contaminated water through the planting and protection of natural macrophytes within the lakes and basins included in the project area.

C. Financial Management

81. The financial management arrangements for the AF will rely on the existing fiduciary arrangements in place for the parent project and for two ongoing World Bank-financed projects: SERRP and PACASEN. The overall performance of PROGEP 2 in financial management was Satisfactory at the last financial management implementation support undertaken in December 2022. The accounting system operates satisfactorily, and staffing has remained adequate to handle additional activities. The auditors have issued an unqualified opinion on the 2021 financial statements of the ongoing projects. However, the ADM should finalize the ongoing internal auditor recruitment to maintain satisfactory internal control.

D. Procurement

82. **Applicable regulations.** Project procurement activities will be carried out in accordance with the following documents: World Bank’s (a) “Procurement Regulations for Investment Project Financing Borrowers” (Procurement Regulations) dated November 2020; (b) the “Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by International Bank for Reconstruction and Development (IBRD) Loans and IDA Credits and Grants”, dated October 15, 2006 and revised in January 2011 and as of July 1, 2016; and (c) other provisions stipulated in the Financing Agreement. The Project Procurement Strategy for Development (PPSD) and the Procurement Plan were prepared and approved by the World Bank. A PPSD has been updated to ensure that the procurement activities were packaged and prepared to expedite implementation. The Procurement Plan was finalized. The details of procurement methods and thresholds are provided in Annex 2 of the parent project appraisal document. Depending on the case and context, the proposed project will make use of social considerations in contracts, in line with the World Bank’s Sustainable Procurement provisions. The procedures for Urgent Needs or Capacity Constraints will not apply to procurement.

83. **Institutional arrangements.** The ADM will have the fiduciary responsibility and will carry out procurement activities of the project. Subcomponent 2.2 (drainage infrastructure O&M) will be implemented by ONAS. The ADM will ensure the quality control of all procurement documents before submission in Systematic Tracking of Exchanges in Procurement (STEP) and/or payments.

E. Legal Operational Policies

	Triggered?
Projects on International Waterways OP 7.50	No
Projects in Disputed Areas OP 7.60	No



F. Environmental and Social

84. All Environmental and Social Standards (ESS) have been triggered for the parent project except ESS7 and ESS9.

85. In terms of the Environmental and Social Framework, the parent project prepared, consulted upon, and disclosed all required plans and established a GRM. The ESS instruments of the parent project have been disclosed at the country level and the World Bank website²² The ESIA and other environmental and social safeguard instruments developed for the emergency works of the Mbeubeuss basin and the comfort works of the parent project, which are under way, have begun to provide a sustainable solution to the recurrent flooding and will contribute to improving the quality of life, hygiene, and health of the populations living in the target area. The last environmental and social performance rating (December 2022) of the parent project was Moderately Satisfactory due to gaps noted in the implementation of the GRM, Site Environmental and Social Management Plan (ESMP), and occupational health and safety (OHS) by the contractor responsible for the civil works. The gaps are being addressed through an action plan that is being closely followed up with the ADM. It should be noted that the implementation of the measures mentioned in the Site ESMP and OHS Plan has been well budgeted and financial resources are available.

86. The safeguard instruments were prepared by the client and cleared by the World Bank. The implementation of the instruments after approval is ensured in general by the contractor who works in collaboration with other partners for most activities (awareness raising/training). Supervision of safeguards activities in the field is carried out by the Works Supervision Firm, which includes an environmental specialist and a social specialist. The ADM's environmental and social unit has also recruited an environmental specialist with expertise in OHS and a social specialist who also monitors activities and submits a quarterly report to the World Bank. In addition, the ADM has signed protocols with the Directorate for the Environment and Classified Establishments and the Directorate of Water and Forests, Hunting and Soil Conservation to support activities such as water quality monitoring, reforestation, and so on. This robust monitoring system should ensure satisfactory performance in managing environmental and social aspects.

87. In terms of implementation support on the World Bank's side, field visits are carried out regularly and monthly meetings are held with the ADM to monitor action plans and constant support by specialists to ensure that the project is in line with the World Bank's requirements. The Aide Memoires and Implementation Status and Results Reports (ISRs) are completed by the specialists in accordance with the data collected on the implementation of the activities.

88. No new ESS will be relevant because of AF activities. Therefore, the environmental and social risk management instruments such as the ESMF—inclusive of measures to manage OHS and risks of sexual exploitation and abuse/sexual harassment (SEA/SH)—RPF, Labor Management Procedures (LMP), and SEP which were prepared for the parent project provide sufficient guidance for the AF project. The ESMF, ESCP, RPF, and SEP have been updated and disclosed at the national level and on the World Bank site. For the activities planned in Phase 2.1.1 of the AF in Keur Massar North, an ESIA, and a RAP have been also

²² https://documents.worldbank.org/en/publication/documents-reports/documentlist?keyword_select=allwords&srt=score&order=desc&qterm=P175830&lang_exact=



disclosed both in-country and in the World Bank website²³ As for the Procurement Plan, the work will consist of primary and secondary canals for a total length of about 11.7 km, 10 retention basins for a storage capacity of 165,200 m³, and paved roads for a total length of 11.7 km.

89. As part of the AF, the project intends to intervene in LRBV, whose ecosystem has continued to deteriorate in recent years due to several factors including strong land pressure with a galloping urbanization and the development of multiple economic activities (housing project, businesses, and industries). The Lac Rose area offers a great geodiversity which supports an important biodiversity unique in Senegal. The fauna and flora are quite diverse. It is the location of many geosites including coastal dunes, interdunal depressions called Niayes, and two classified forests—the plantation of *Casuarina equisetifolia* (filaos) of Retba and the botanical ‘reserve’ of Noflaye where the Village of Turtles is located.²⁴ Following the floods of August 2022, the situation of the Lac Rose has deteriorated due to an important contribution of rainwater, drained from the upstream communes, which caused an increase in the water level which made it lose its particular pink color and induced the reduction of salt exploitation. Therefore, it is important to understand the functioning of this ecosystem and to find the most adequate solutions for its preservation while considering the need to drain rainwater to reduce the risks of flooding.

90. In this context, the ADM is preparing for the works in the LRBV watershed a public consultation workshop to collect stakeholders’ concerns and recommendations on environmental and social safeguard measures in view of the extension of PROGEP 2’s intervention area. Beyond this workshop, the ADM will initiate consultations at the local level to ensure the participation of local communities and their information on the content of safeguard instruments. It is a question of making stakeholders more sensitized; improving their understanding; creating the conditions to ensure the effective involvement of all parties affected by the AF of PROGEP 2; and collecting perceptions, opinions, expectations, fears, risks, issues, suggestions, and recommendations of the actors concerned by the AF.

91. Specific RAPs are under preparation for the LRBV and Mbao and will be validated by the World Bank. The development of Phase 2.1.1 RAP related to the work of the AF in Keur Massar Nord started on March 2023 with preliminary consultations with institutional actors. The surveys and the census of PAPs were undertaken, and the RAP has been validated and published by the GoS and the World Bank. The review and clearance of the ESIA including ESMP and the RAPs for Phase 2.1.2 (LRBV) and part 2.1 of the parent project relating to the Mbao watershed emergency works with the environmental and social audit, will be conditions for disbursement.

92. **A GRM was developed by the project and materialized by two specific plans**, including the one relating to the implementation of activities to prevent SEA/SH. In addition, the ADM has developed an Action Plan for the Prevention and Response to SEA/SH. The GRM was implemented in the first phase of the project and will be extended to the implementation localities of the additional phase. A social

²³ESMF was disclosed in-country on April 26, 2023, followed by disclosure on the World Bank website, RPF was disclosed in-country on April 20, 2023, followed by disclosure on the World Bank website, ESIA was disclosed in-country on May 8, 2023, and on the World Bank website on May 12, 2023, LMP was disclosed in-country on May 1, 2023, and on the World Bank website on May 11, 2023, SEP was disclosed in-country on April 14, 2023, followed by disclosure on the World Bank website, RAP was disclosed in-country on May 19, 2023, followed by disclosure on the World Bank website, ESCP was disclosed on the World Bank website on May 12, 2023, followed by disclosure in-country.

²⁴ Youm Cheikh Ibrahima, et al. "Le géosite du Lac Rose (NE Dakar, Senegal): Challenges of Preserving an Exceptional Geoheritage Threatened with Extinction"



facilitation structure and a Non-governmental Organization Gender-based Violence service provider will be recruited for the operationalization of the SEA/SH-sensitive GRM and the care of potential survivors as part of the project activities. This mechanism aims to operationalize the GRM; promote equity and gender equality; and contribute to capacity building of community-based organizations, women, and young people on the forms of SEA/SH and the risks related to the project, information, and sensitization of communities on the principles and procedures of reporting, support, and the management or referral of survivors' cases to the appropriate structures; providing the survivor with a safe environment in accordance with the principles of confidentiality.

V. WORLD BANK GRIEVANCE REDRESS

93. **Grievance redress.** Communities and individuals who believe that they are adversely affected by a project supported by the World Bank may submit complaints to existing project-level grievance mechanisms or the World Bank’s Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed to address project-related concerns. Project affected communities and individuals may submit their complaint to the World Bank’s independent Accountability Mechanism (AM). The AM houses the Inspection Panel, which determines whether harm occurred, or could occur, as a result of World Bank non-compliance with its policies and procedures, and the Dispute Resolution Service, which provides communities and borrowers with the opportunity to address complaints through dispute resolution. Complaints may be submitted to the AM at any time after concerns have been brought directly to the attention of World Bank Management and after Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank’s GRS, please visit <http://www.worldbank.org/GRS>. For information on how to submit complaints to the World Bank’s Accountability Mechanism, please visit <https://accountability.worldbank.org>.

VI SUMMARY TABLE OF CHANGES

	Changed	Not Changed
Results Framework	✓	
Components and Cost	✓	
Legal Covenants	✓	
Implementing Agency		✓
Project's Development Objectives		✓
Loan Closing Date(s)		✓
Cancellations Proposed		✓
Reallocation between Disbursement Categories		✓
Disbursements Arrangements		✓



Institutional Arrangements		✓
Financial Management		✓
Procurement		✓
Other Change(s)		✓

VII DETAILED CHANGE(S)

COMPONENTS

Current Component Name	Current Cost (US\$, millions)	Action	Proposed Component Name	Proposed Cost (US\$, millions)
Component 1: Integrated urban planning and management accounting for climate risk and sustainability	10.70	Revised	Component 1: Integrated urban planning and management accounting for climate risk and sustainability	12.00
Component 2: Drainage investment and management, community engagement, environmental and social management	155.10	Revised	Component 2: Drainage investment and management, community engagement, environmental and social management	297.40
Component 3: Contingent emergency response	0.00	No Change	Component 3: Contingent emergency response	0.00
Component 4: Project management	6.60	Revised	Component 4: Project management	8.74
TOTAL	172.40			318.14

Expected Disbursements (in US\$)

Fiscal Year	Annual	Cumulative
2021	0.00	0.00
2022	8,657,835.00	8,657,835.00
2023	18,889,695.00	27,547,530.00
2024	42,506,857.00	70,054,387.00



2025	67,132,735.00	137,187,122.00
2026	60,772,624.00	197,959,746.00
2027	56,711,409.00	254,671,155.00
2028	33,290,440.00	287,961,595.00
2029	2,038,405.00	290,000,000.00
2030	0.00	290,000,000.00

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Latest ISR Rating	Current Rating
Political and Governance	● Moderate	● Moderate
Macroeconomic	● Substantial	● Substantial
Sector Strategies and Policies	● Substantial	● Substantial
Technical Design of Project or Program	● Moderate	● Moderate
Institutional Capacity for Implementation and Sustainability	● Moderate	● Moderate
Fiduciary	● Substantial	● Substantial
Environment and Social	● Substantial	● High
Stakeholders	● Moderate	● Moderate
Other		● Substantial
Overall	● Substantial	● Substantial

LEGAL COVENANTS – Stormwater Management and Climate Change Adaptation Project 2 (P175830)

Loan/Credit/TF	Description	Status	Action
IDA-68890	FA, Schedule 2, Section I A.4: the Recipient shall cause the Project Implementing Entity to no later than one (1) month after the Effective Date or any later date agreed upon in writing with the Association, recruit for the Project: (a) one (1) civil engineering expert; (b) one (1) hydraulic civil engineer expert; and (c) one (1) geographic information system and database management expert; both with qualifications,	Complied with	No Change



	experience and terms of reference acceptable to the Association.		
IDA-68890	FA, Schedule 2, Section I C.1: Not later than one (1) month after the Effective Date, or any later date agreed upon in writing with the Association, the Recipient shall cause the Project Implementing Entity to: (a) prepare under terms of reference acceptable to the Association, and furnish to the Recipient and the Association, the Project Implementation Manual for the Project containing detailed arrangements and procedures for: (i) institutional coordination and day-to-day execution of the Project; (ii) Project budgeting, disbursement and financial management; (iii) procurement; (iv) monitoring, evaluation, reporting and communication; (v) environmental and social aspects; and (vi) such other arrangements and procedures as shall be required for the Project; (b) afford the Recipient and the Association a reasonable opportunity to exchange views with the Project Implementing Entity; and (c) thereafter adopt such Project Implementation Manual as shall have been approved by the Association.	Complied with	No Change
IDA-68890	FA, Schedule 2, Section I D.3: If sixty (60) days prior to the Closing Date, the Association determines that there are measures and actions specified in the ESCP which will not be completed by the Closing Date, the Recipient shall, and shall cause the Project Implementing Entity to: (a) not later than thirty (30) days before the Closing Date, prepare and present to the Association, an action plan satisfactory to the Association on the outstanding measures and actions, including a timetable and budget allocation for such measures and actions (which action plan shall deemed to be considered an amendment of the ESCP); and (b) thereafter, carry out said action	Not yet due	No Change



	plan in accordance with its terms and in a manner acceptable to the Association.		
IDA-68890	FA, Schedule 2, Section IV A.1: The Recipient shall, through the Project Implementing Entity, no later than three (3) months after the Effective Date or any later date agreed upon in writing with the Association: (a) recruit an accountant for the Project, with terms of reference, experience and qualifications satisfactory to the Association; (b) incorporate the Project into the terms of reference and mandate of the internal auditor for the Project, in a manner and substance satisfactory to the Association; and (c) assign an external auditor to the Project, in a manner and with terms of reference, experience and qualifications satisfactory to the Association.	Partially complied with	No Change
IDA-68890	FA, Schedule 2. Section I E (a): The Recipient shall cause the Project Implementing Entity to prepare and furnish to the Recipient and the Association for its approval, not later than December 15 in each Fiscal Year during the implementation of the Project, the proposed annual work plan and budget (including activities for the following fiscal year) pursuant to Section I.E. of the Schedule to the Project Agreement for the following Fiscal Year.	Complied with	No Change
IDA-68890	FA, Schedule 2, Section I G: The Recipient, through the Project Implementing Entity, shall ensure, and, if and as needed, cause ONAS to ensure, that: (a) no later than six (6) months after the Effective Date or at a later date agreed upon with the Association, a roadmap for the urban sanitation reform, including financing and management mechanisms of urban drainage systems at the national level, has been adopted, in form and manner satisfactory to the Association; (b)	Not complied with	Revised



	<p>throughout Project implementation, adequate and prompt maintenance of the drainage systems financed under the Project and, as appropriate and relevant, financed under PROGEP 1, is provided, the extent of such maintenance to be discussed and agreed with the Association during Project implementation and reflected in the Project Implementation Manual; and (c) no later than six (6) months upon the completion of civil works on drainage systems under Part 2.1 of the Project and in any event before the Closing Date, responsibility over the operation and maintenance of said systems has been transferred to ONAS, with sustainable financing mechanisms established, to be further discussed and agreed with the Association, in order to preserve the productive purpose of the Credit.</p>		
Proposed	<p>Schedule 2, Section I. G (a): The Recipient shall cause ONAS to ensure, that: no later than six months after the effective date of the FA pursuant to which the Association extended Credit no. 7372-SN and 7373-SN to the Recipient, a roadmap for the urban sanitation reform, including FM mechanisms of urban drainage systems at national level, has been adopted, in form satisfactory to the association</p>	Not yet due	
IDA-68890	<p>ESCP, ESS1, 1.1 : Recruitment two (2) months after effectiveness and, in any event, before the start of civils works, and maintained throughout Project implementation: (a) an environmental safeguard specialist with expertise in OHS (Occupational, Health and Safety); (b) two social safeguard specialists with strong experience in stakeholder engagement and operationalizing a GRM; and (c) a social facilitator and a firm to support ADM in the preparation and implementation of the Resettlement</p>	Complied with	No Change



Action Plan(s) (RAP(s)); all with qualifications, experience and under terms of reference acceptable to the Association.

LEGAL COVENANTS – Additional Financing for Stormwater Management and Climate Change Adaptation Project 2 (P180203)

Sections and Description

FA. Schedule 2. Section I. C. 1 (a) : The Recipient, through the Project Implementing Entity, shall ensure that no later than one (1) month after the Effective Date, or any later date agreed upon in writing with the Association, the Recipient shall cause the Project Implementing Entity to, update its manual for the Original Project (once updated the “Project Implementation Manual”) to take into account the activities under the Project which were not part of the Original Project, including a detailed description of the location of each activity as well as the phasing of their implementation and the obligation to complete all activities under the Original Project prior to July 31, 2026, and include the guidelines needed for the Recipient’s and the Project Implementing Entity’s obligations under this Agreement and the Project Agreement to be complied with, under terms of reference acceptable to the Association, and furnish to the Recipient and the Association, the Project Implementation Manual.

FA. Schedule 2. Section I. D (a) of the Financing Agreement: The Recipient, through the Project Implementing Entity, shall ensure that, and, if and as needed, cause ONAS to ensure, that: no later than six (6) months after the Effective Date or at a later date agreed upon with the Association, a roadmap for the urban sanitation reform, including financing and management mechanisms of urban drainage systems at the national level, has been adopted, in form and manner satisfactory to the Association.

FA. Schedule 2. Section I. D (c) of the Financing Agreement: The Recipient, through the Project Implementing Entity, shall ensure that, and, if and as needed, cause ONAS to ensure, that: no later than six (6) months upon the completion of civil works on drainage systems under Part 2.1 of the Project and in any event before the Closing Date, responsibility over the operation and maintenance of said systems has been transferred to ONAS, with sustainable financing mechanisms established, in a manner acceptable to the Association, in order to preserve the productive purpose of the Credit.

FA. Schedule 2. Section I. A. 1 (b) of the Financing Agreement: The Recipient shall, no later than one (1) month after the Effective Date, provide the evidence that the terms of reference, composition and resources of the Project Steering Committee have been revised to take into account the additional activities included in the Project, unless the Recipient has established in a manner acceptable to the Association that no change needs to be made

FA. Schedule 2. Section I. A. 2 (b) of the Financing Agreement: the Recipient shall, no later than one (1) month after the Effective Date, provide the evidence that the terms of reference, composition and resources of the Project Technical Committee have been revised to take into account the additional activities included in the Project, unless the Recipient has established in a manner acceptable to the Association that no change needs to be made.

Conditions

Type	Financing source	Description
Disbursement	IBRD/IDA	For expenditures under Category (4), the Recipient has prepared and disclosed, or caused the Project Implementing Entity to prepare and disclose, the Environmental and Social Impact Assessment for Lac Rose



		watershed, containing an Environmental and Social Management Plan in form and substance acceptable to the Association; all in accordance with the provisions of the ESCP
Type Disbursement	Financing source	Description For expenditures under Category (4), the Recipient has prepared in consultation with affected people and disclosed, or caused the Project Implementing Entity to prepare in consultation with affected people and disclose, the site-specific Resettlement Action Plans prepared in accordance with the provisions of the Environmental and Social Management Plan, in form and substance acceptable to the Association; all in accordance with the provisions of the ESCP

VIII. RESULTS FRAMEWORK AND MONITORING

Results Framework

COUNTRY: Senegal

Additional Financing for Stormwater Management and Climate Change Adaptation Project 2

Project Development Objective(s)

To reduce flood risks in peri-urban areas of Dakar and improve capacity for integrated urban flood risks planning and management for selected cities in Senegal.

Project Development Objective Indicators by Objectives/ Outcomes

Indicator Name	PBC	Baseline	Intermediate Targets								End Target
			1	2	3	4	5	6	7	8	
Reduced flood risks in peri-urban areas of Dakar											
Area in peri-urban Dakar protected against recurrent flooding through drainage works (Hectare(Ha))		0.00	52.00	422.00	685.00	1,174.00	1,576.00	2,126.00	2,926.00	3,526.00	3,600.00
<i>Action: This indicator has been Revised</i>											
Direct beneficiaries of which female (50%) (Number)		0.00	8,000.00	65,000.00	92,000.00	116,000.00	150,000.00	163,000.00	181,000.00	186,000.00	189,000.00
<i>Action: This indicator has been Revised</i>											
Improved capacity to plan integrated urban flood risks management											



Indicator Name	PBC	Baseline	Intermediate Targets								End Target
			1	2	3	4	5	6	7	8	
Institutional actors in the project intervention areas who have adopted the planning tools for integrated flood risk management (Number)		0.00	0.00	50.00	100.00	150.00	200.00	250.00	300.00	350.00	350.00
<i>Action: This indicator has been Revised</i>											
The improved planning capacities of integrated flood risk management have allowed to increase the rate of authorized subdivisions to 80% in accordance with validated urban plans in the target areas. (Number)		0.00	0.00	0.00	60.00	70.00	80.00	80.00	80.00	80.00	80.00
<i>Action: This indicator has been Revised</i>											

Intermediate Results Indicators by Components

Indicator Name	PBC	Baseline	Intermediate Targets								End Target
			1	2	3	4	5	6	7	8	
Integrated urban planning and management accounting for climate risk and sustainability (Number)											



Indicator Name	PBC	Baseline	Intermediate Targets								End Target	
			1	2	3	4	5	6	7	8		
Planning documents related to urban resilience and sustainability including climate change, validated (Number)		0.00	0.00	0.00	1.00	2.00	3.00	3.00	3.00	3.00	3.00	3.00
Action: This indicator has been Revised												
Urban Policies related to urban resilience and sustainability including climate change validated (Text)		0.00	0.00	0.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Action: This indicator has been Revised												
Integrated urban flood risks management tools and guidance notes developed (Text)		0.00	0.00	0.00	0.00	0.00	2.00	6.00	8.00	9.00	9.00	9.00
Action: This indicator has been Revised												
A stakeholder digital knowledge sharing platform on data related to integrated flood risk management is designed and operational (Text)		No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Indicator Name	PBC	Baseline	Intermediate Targets								End Target
			1	2	3	4	5	6	7	8	
Action: This indicator has been Revised											
Key stakeholders trained in integrated urban flood risk management, climate change resilience and territorial planning (Number)		0.00	0.00	0.00	150.00	300.00	450.00	600.00	650.00	700.00	750.00
Action: This indicator has been Revised											
Women are consulted and involved in the development of policies, strategies, and plans in local and national level (Percentage)		0.00	0.00	0.00	25.00	35.00	50.00	50.00	50.00	50.00	50.00
Action: This indicator has been Revised											
Capitalization knowledge document developed and disseminated at local and national levels (Text)		No	No	No	No	No	No	No	Yes	Yes	Yes
Action: This indicator has been Revised											
Drainage Investment and Management, Community engagement, Environmental and Social Management											
Primary drainage system in Keur		0.00	1,000.00	7,000.00	28,795.00	50,380.00	67,405.00	75,595.00	82,420.00	86,150.00	88,150.00



Indicator Name	PBC	Baseline	Intermediate Targets								End Target
			1	2	3	4	5	6	7	8	
Massar/Mbao catchment put in place (Meter(m))											
Action: This indicator has been Revised											
Transfer of PROGEP 1 investments to ONAS for the O&M effective (Text)	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Action: This indicator has been Revised											
Transfer of PROGEP 2 investments to ONAS for the O&M effective (Text)	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Action: This indicator has been Revised											
Currage rate of drainage channels in areas covered by PROGEP 1 and 2 (Percentage)	30.00	30.00	30.00	50.00	80.00	100.00	100.00	100.00	100.00	100.00	100.00
Action: This indicator has been Revised											
ONAS's Remote Management System for PROGEP 1 and 2 is functional (Text)	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Action: This indicator has been Revised											



Indicator Name	PBC	Baseline	Intermediate Targets								End Target
			1	2	3	4	5	6	7	8	
People reached by information, education and communication strategy in flood risk management and resilience (of which 50 percent women) (Number)		0.00	500.00	1,500.00	15,000.00	40,000.00	65,000.00	90,000.00	105,000.00	115,000.00	120,000.00
Action: This indicator has been Revised											
Local flood management committees (COLIGEP) created in Keur Massar/Mbao catchment and strategy for sustainability designed and implemented (Text)		0.00	0.00	3.00	3.00	4.00	5.00	6.00	6.00	6.00	6.00
Action: This indicator has been Revised											
Women participating in/leading management committees for the COLIGEP (Percentage)		0.00	0.00	0.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Action: This indicator has been Revised											
Eligible flood risk community investment projects		0.00	0.00	0.00	5.00	30.00	70.00	80.00	100.00	110.00	120.00



Indicator Name	PBC	Baseline	Intermediate Targets								End Target
			1	2	3	4	5	6	7	8	
completed in Keur Massar/Mbao catchment (Number)											
<i>Action: This indicator has been Revised</i>											
Women trained and engaged in flood risk management works at a community level (EWS, Solid waste management, awareness, education system) (Number)		0.00	0.00	250.00	2,000.00	15,000.00	32,500.00	45,000.00	50,000.00	55,000.00	57,500.00
<i>Action: This indicator has been Revised</i>											
Grievances related to delivery of project addressed (Percentage)		0.00	0.00	95.00	95.00	95.00	95.00	95.00	95.00	95.00	95.00
<i>Action: This indicator has been Revised</i>											
Contingent Emergency Response Component											
CERC manual of procedures is completed (Yes/No)		No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Action: This indicator has been Revised</i>											



Monitoring & Evaluation Plan: PDO Indicators

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Area in peri-urban Dakar protected against recurrent flooding through drainage works	Total areas in hectare protected against a 10-year flood return period (decennial rain above 129mm/day as of the DMP). Calculated by drained surface and underground in all the catchments impacted by the civil works.	Annual	Progress reports	Monitoring through reports by civil works and Hydraulic engineers under the Implementing Agency and by the Quality control firm.	ADM
Direct beneficiaries of which female (50%)	This indicator measures number of people, households or groups who directly derive benefits from the project interventions (i.e. flood risk reduction, capacity building, training, sensitization, etc.) of whom 50% are female beneficiaries.	Annual	Progress report, survey report	Reports monitor by the implementing Agency through field missions and survey led by the Social Facilitation firm.	ADM
Institutional actors in the project intervention areas who have adopted the planning tools for integrated flood risk management	This indicator measures the number of institutional actors (central, decentralized, territorial and local) who have participated in the planning process of integrated flood	Annual	List of participants in the planning process, Survey based on an interview	An interview guide will be submitted to a sample of each category of actors who participated in the planning process.	ADM, DGUA, ONAS



	risk management and have understood how to use the planning tools.		guide		
The improved planning capacities of integrated flood risk management have allowed to increase the rate of authorized subdivisions to 80% in accordance with validated urban plans in the target areas.	This indicator measures the percentage of authorized subdivisions that comply with urban planning documents(number of authorized subdivisions compliant / number of authorized subdivisions)*100.	Annual	List of authorized subdivisions	Compliance of the authorized subdivision with the urban planning documents verified from a checklist on the specific urban planning regulations that accompany them.	DGUA, ADM, ONAS

Monitoring & Evaluation Plan: Intermediate Results Indicators

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Planning documents related to urban resilience and sustainability including climate change, validated	This indicator measures project performance in developing planning documents integrating appropriate urban area resilience concepts and instruments.	Annual	Planning documents related to urban resilience and sustainability including climate change, validated (number)	Data collection by agencies, urban planning documents, monitoring of reports by the implementing agency, planning reports	ADM, DGUA, DA, ONAS
Urban Policies related to urban resilience and sustainability including climate	This indicator measures project performance in	Annual	Urban planning	Monitoring of reports by the implementing	ADM



change validated	developing policy documents integrating appropriate urban area resilience concepts and instruments.		policies documents, meeting reports, progress reports	Agency, planning reports	
Integrated urban flood risks management tools and guidance notes developed	This indicator measures the project performance to develop and promote flood risk management tools and practices for quality urban and resilience planification at the local and national levels (IEWS, local contingency plans, stormwater management, Nature- based solutions, wetland management, green/smart cities, solid and water waste management, urban mobility etc.) to inform urban policies and planning documents).	Annual	Progress reports, field reports, activities report, Meeting reports	Monitoring of reports by the implementing Agency, planning reports	ADM
A stakeholder digital knowledge sharing platform on data related to integrated flood risk management is designed and operational	This indicator measures that stakeholders have efficient tools for sharing knowledge.	Annual	Progress reports	Data collections by agencies, meeting reports, supervision missions report	ADM
Key stakeholders trained in integrated urban flood risk management, climate	This indicator measures number of municipal and	Annual	Progress reports,	Training modules, training reports, surveys,	ADM



change resilience and territorial planning	national staff participating in training on sustainable city, integrated urban management, flood management and climate change resilience.		meetings reports	progress and evaluation reports	
Women are consulted and involved in the development of policies, strategies, and plans in local and national level	This indicator measures the level of women inclusion in dialogues for development policies, strategies and plans.	Annual	Progress Reports	Progress reports, meeting reports, survey reports	ADM
Capitalization knowledge document developed and disseminated at local and national levels	This indicator measures project performance to promote capitalization of lessons learnt from project experiences.	Annual	Reports	Workshops, activities report, field visits, research work support	ADM
Primary drainage system in Keur Massar/Mbao catchment put in place	This indicator measures the total length, in meters, of drainage networks established.	Annual	Progress reports	Monitoring of progress reports, on-site visits, control quality by civil work engineers	ADM
Transfer of PROGEP 1 investments to ONAS for the O&M effective	This indicator measures the effectiveness of the transfer of the investment works from PROGEP 1 to ONAS for the O&M.	Annual	Progress reports	Legal text to designate ONAS sole responsible of the O&M mechanism, budget reports, progress reports	ONAS
Transfer of PROGEP 2 investments to ONAS for the O&M effective	This indicator measures the effectiveness of the transfer of the investment works from PROGEP 2 to ONAS for the O&M.	Annual	Progress reports	Legal text to designate ONAS sole responsible of the O&M mechanism, budget reports, progress reports	ONAS



Currage rate of drainage channels in areas covered by PROGEP 1 and 2	This indicator measures resources allocation and execution of the O&M for existing drainage channels in PROGEP 1 and 2 intervention areas.	Annual	Progress reports	Reports from supervision missions, field visits and progress reports	ONAS
ONAS's Remote Management System for PROGEP 1 and 2 is functional	This indicator measures the performance of the Remote Management System for PROGEP 1 and 2 for the O&M.	Annual	Progress reports	Reports from supervision missions, field visits and progress reports	ONAS
People reached by information, education and communication strategy in flood risk management and resilience (of which 50 percent women)	This indicator measures number of individuals (at local and national levels) that participate in any consultation process and/or benefit from a sensitization session on the various themes (climate resilience, sustainable city management, flood preparedness, etc.) either through workshop or mass media. It includes also participants in consultation activities during project implementation (core indicator).	Annual	Progress reports, survey reports	Social Facilitator reports, project reports, surveys, audio-visual recording, meeting documents	ADM
Local flood management committees (COLIGEP) created in Keur Massar/Mbao	This indicator measures the level of local engagement	Annual	Progress reports	Progress reports, survey reports, COLIGEP	ADM



catchment and strategy for sustainability designed and implemented	(citizen and municipalities) in flood prevention and participatory management and the sustainability of the achievements. For each COLIGEP, the project will support the development and implementation of an action plan for the achievement of their mission using the social facilitator firm to provide needed capacity building, training and coaching. As for the PROGEP, each municipality will sign an act to integrate the COLIGEP in the municipality functioning and budget for better sustainability.			activities report	
Women participating in/leading management committees for the COLIGEP	This indicator measures the level of endowment of women of leadership role in the management committees for the COLIGEP.	Annual	Progress reports	Social facilitator reports, project reports, surveys, audio-visual recording, meeting documents	ADM
Eligible flood risk community investment projects completed in Keur Massar/Mbao catchment	This indicator measures number of community initiatives which contribute to sustainability of the stormwater drainage infrastructures built under	Annual	Progress reports	Progress reports, Survey reports, COLIGEP activities report	ADM



	the project and that have been financed and successfully implemented.				
Women trained and engaged in flood risk management works at a community level (EWS, Solid waste management, awareness, education system)	Aggregate number of women and girls engaged in promoting the flood risk management while contributing to the social inclusion process.	Annual	Progress reports, survey reports	Activities report, meeting reports, social facilitator reports progress reports monitoring	ADM
Grievances related to delivery of project addressed	This indicator measures the operationalization of the Grievances Redressal Mechanism.	Annual	Progress reports	Progress report and Grievances Redressal Mechanism	ADM
CERC manual of procedures is completed	CERC manual of procedures is available.	Annual	Implementing Agency reports	Manual of Procedures	ADM

Annex 1: Economic Analysis²⁵

COUNTRY: Senegal Stormwater Management and Climate Change Adaptation Project 2 AF

Background

1. PROGEP 1 and 2 were challenging to implement but proved to be successful as they protected 900 ha and are about to protect 826 ha, respectively, in peri-urban Dakar against recurrent flooding through the construction of drainage infrastructure. Yet, the soft investments of PROGEP 1 and 2 as well as the current AF in terms of institutional capacity building, urban planning, and drainage master planning are a prerequisite to implement the hard investments. Hence, soft investments reap intangible benefits whereas hard investments reap tangible benefits. Other significant unquantified tangible social, environmental, economic, and financial benefits were also realized, but they were not quantified in the economic analysis.
2. For PROGEP 1, the hedonic pricing method allowed to determine the land price differential between flood-prone and flood-free areas of the targeted areas of Greater Dakar. A survey allowed to derive the land prices and map flood areas. This method allowed to derive a conservative estimate of the land price differential (+34 percent) although, should time and resources permit, surveying the prices of houses and apartments could have derived a higher housing price differential that would have resulted in a higher ex post economic rate of return (ERR) than the one calculated (28 percent) for the project.
3. As PROGEP 2 builds on the success of PROGEP, it is meant to maintain the momentum of flood-proofing additional areas of Greater Dakar. However, PROGEP 2 is an emergency project to speed up the preparation and implementation process and, due to time and resource constraints, to conduct an economic analysis grounded in economic valuation methods. The current ex ante analysis relied on two realistic methods that proved robust to derive the benefits of such an intervention:

²⁵ References

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- International Monetary Fund. 2022. *Staff Country Report, Senegal*. Washington, DC.
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- Rogers, David P., and Vladimir V. Tsirkunov. 2013. "Weather and Climate Resilience: Effective Preparedness through National Meteorological and Hydrological Services." *Directions in Development*. World Bank, Washington, DC.
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- A flooding dose-response function was developed under the West Africa Coast Areas (WACA) program to determine in monetary terms the effects of flooding by severity and duration in terms of damages and forgone opportunities.
- A risk premium to determine the premature death and injuries of a storm and flood in Senegal was calculated based on past events over 18 years.

4. Like the parent project (PROGEP 2), the AF will benefit from the improvement of the enabling environment (urban planning, drainage master planning, and so on) that is essential for the hard investments to succeed. At the same time, the development of an enabling environment yields intangible assets, with benefits that are difficult to quantify. Like the parent project, the AF will also only consider the more quantifiable benefits from the AF hard investments.

Economic Analysis Process

5. The major difference between the financial and economic analysis is that the economic analysis accounts for the social costs in terms of eliminating all the distortions of prices on the inputs used for delivery of services. There is therefore a need to identify and quantify price distortions that affect the operating expenditures and the investments. The evaluation of these distortions makes it possible to rectify the financial prices and obtain the economic prices. From the corrected structure of the economic prices, the revaluation coefficients were estimated.

6. The AF economic analysis is carried out and the cost and benefit flows are added to the parent project flows to provide the results of the parent project and AF. Hence, the last section includes the AF as well as the parent project and AF economic analysis results.

7. The objective of this calculation is to determine the opportunity costs of inputs and outputs. Regarding the exchange rate, the CFA franc is pegged to the euro and the European Union is a privileged trading partner of Senegal, thus reducing the distortions of the exchange rate. Regarding the tax system, taxes, value added tax (VAT), excise, and duties constitute internal flows in the national economy. They are not subtracted or adjusted in the calculation of economic costs because they are reinjected into the economy. In this case, to facilitate calculations, taxes paid under this project are assumed not to contribute to the payment of debt service.

8. By looking at the social profitability of a project, 'shadow prices' or 'opportunity costs' are used in the economic analysis instead of market prices (real) that will help determine the social profitability of the investment. Shadow prices are adjusted in the following ways:

- **Workshops, training, and services.** The distortions are almost zero and will be adjusted by the VAT of 18 percent.
- **Equipment and consumer goods.** All equipment and consumer goods are considered imported. Thus, a conversion factor will consider insurance and transportation of equipment and consumer goods that are assumed to be borne by foreign shipping and insurance companies with almost no impact on the local economy. Thus, the cost, insurance, and freight (CIF)/free-on-board (FOB) ratio achieved for all products combined at a global level of 6.32 percent. However, the ratio of manufactured goods can reach up to 10 percent or even 15

percent. Thus, a conversion factor will consider insurance and transport of equipment and consumer goods, and the abovementioned CIF/FOB ratio of manufactured goods at the global level will be considered. The factor adjustment will consist of the import duties plus the CIF: 28.32 percent.

- **Works.** Taxes of international companies hired under the project will be paid locally. However, energy (notably gasoline and diesel), which is an imported input representing on average 20 percent of the economic prices of the works although these could increase in the future due to the increasing petroleum price trend in the future, is mostly refined in Senegal and technically not subsidized (price at the pump is African Financial Community franc [CFAF] 990 in January 2023 which is higher than the average international price of CFAF 783.7) which makes Senegal among the top 10 African countries in terms of non-subsidized energy.²⁶ Moreover, the national electricity company (SENELEC) is constantly adjusting its tariffs to avoid accumulating subsidies with the last increase happening at the end of 2022 while more than 50 percent of the electricity is generated through independent power producers; hence, energy prices are automatically adjusted according to the international prices. Thus, the adjustment factor is considered neutral. Works will be adjusted by the VAT of 18 percent.
- **Gross wages.** The wage applied for the non-qualified is the minimum wage without the social contribution. For skilled jobs, gross pay is considered while social contributions are not taken into account. In addition, for the project in general, the Project Implementation Unit and other activities, workers are expected to be hired locally. The factor adjustment will consist of the income tax of 35 percent.
- The conversion factors used are summarized in Table 1.1.

Table 1.1. Conversion Factors for the Economic Analysis

Category	Fiscal Adjustment	Senegal	
		Rate	Factor
Workshops and services	VAT	18%	1
Equipment and goods	Customs	22% + 6.32%	1
Works	VAT/Excise	18%/n.a.	1
Gross salaries without social security	Taxes	35%	1

Source: International Monetary Fund Staff Country Report, Senegal (2022); Western African Economic and Monetary Union (*Union Economique et Monétaire Ouest Africaine*, UEMOA) website.²⁷

9. The AF financial costs and corresponding economic costs are adjustment for only IDA funds amounting to US\$135 million equivalent and US\$110.14 million equivalent, respectively.

10. A few additional key assumptions were also considered for the economic analysis:

- The economic analysis assesses PROGEP 2 AF on its own merits and will consider the benefits over 15 years or until 2037.

²⁶ World Bank website. http://siteresources.worldbank.org/INTAFRICA/Resources/Africas-Pulse-brochure_Vol5-Section_2.pdf.

²⁷ UEMOA website. www.izf.net/pages/les-droits-et-taxes-douanes-en-uemoa.



- An actual discount rate of 6 percent per year recommended by the World Bank is used for the economic analysis. A sensitivity analysis and scenario analysis are conducted: a pessimistic scenario with a 10 percent decrease in benefits and a 10 percent increase in economic costs coupled with an 8 percent discount rate is compared to the baseline scenario, and an optimistic scenario with a 10 percent increase benefits and a decrease in economic costs and coupled with a 4 percent discount rate is compared to the baseline scenario. The right-of-way, including the price of land and any structures upon it, is unaccounted in the analysis.
- Flood-proofing beneficiaries are about 120,000 people for the parent project, and benefits will accrue in year 6 and 8 based on the Results Framework.
- Flood-proofing targeted areas of the AF are about 2,774 ha against 826 ha for the parent project, and benefits will accrue in year 6 and 8 based on the Results Framework.
- Beneficiaries in the targeted areas are assumed to increase based on the growth projected by the National Statistics and Demography Agency (*Agence Nationale de la Statistique et de la Démographie, ANSD*).²⁸
- The O&M costs of Component 2 were assumed to be 4 percent of all components works, equipment, and goods and include depreciation which covers equipment replacement after full amortization.
- The flood-proofing benefits would accrue every two years after the commissioning of the works as the return period (years between events) is two years in Greater Dakar over the last 18 years although the exacerbation of the flood frequency due to climate change was not considered over the next 15 years.
- Conservative Gross Domestic Product (GDP) growth of 3 percent per year is below the World Bank's forecast starting 2023 due to the worldwide commodity price crisis.

Benefit Valuation Methods

11. The benefits combine the economic damages and forgone economic activity by using the dose-response function and the averted death and injuries based on nine past events over the last 18 years in Senegal that affected Greater Dakar.

Flooding Affecting Infrastructure and Economic Activity

12. For damages and forgone opportunities, the dose-response methodology builds on the one developed under WACA for Benin, Côte d'Ivoire, Ghana, and Togo. The flood dose-response function for the area used for the targeted areas in Dakar was derived for 31 land types based on land cover, land use, land occupation, and so on.

13. For direct tangible damages to assets (for example, buildings and infrastructure), damages reflect restoration costs and are mainly dependent on flood depth. In addition, indirect tangible damages include losses of stocks and losses due to interruption of production of goods or services (for example, transport).

²⁸ ANSD website. www.ansd.sn/ressources/publications/Rapport_projection_version_12fev06.pdf.

14. Both direct and indirect tangible damages can be expressed in monetary terms and depend on the values at risk and their vulnerability. Damage functions specify the percentage loss of the total value of an asset at risk, in function of flood characteristics (flood depth, duration, and water speed). These characteristics are part of the hazard assessment, and a conservative stance was adopted by using 24 percent. Damage functions for direct damages are more certain compared to those for indirect losses, as the latter also depends on the duration of a flood event which was set at once per year.

15. The generic method used builds on the results of the more detailed models and uses average damage functions that are applied to values at risk, expressed as US dollars per ha, sometimes different for the different land use categories (residential, industry, services, agriculture, and so on).

16. Tangible assets are identified by using the GDP per ha, which is both an indicator for the assets at risk (buildings) and the impact on economic activities. GDP per ha can be estimated based on data for local GDP/capita and population density. Compared to buildings, there is little information on damage functions for impacts of floods on ecosystems.

17. For freshwater wetlands, some information on damage functions is available, which can be used to estimate the impact on ecosystems goods and services. However, compared to impacts on the economy, this estimate is much more uncertain. Freshwater ecosystems are in any case not likely to be affected by coastal flooding or erosion. In the coastal zone, freshwater and marine influences meet, resulting in a gradient from saline to brackish conditions. Purely freshwater conditions can occur only during periods of strong river floods and even in that case only in the upper reaches of the coastal zone.

18. In this economic analysis, for tangible damages in urban land uses, the values at risk include estimates of the value of the assets (buildings, infrastructure) and the value of goods and services produced. The dose-response function is a mixture of defining values at risk, based on GDP per ha, while accounting for population density, specific land use areas, and the presence of specific assets in urban areas. The midpoint of Suburban 2 and Urban 8 was used to account for the various densities in the targeted areas (Table 1.2).

Table 1.2. Dakar Land-Use Category Valuation in 2013

Ind.	Description	GDP/capita	GDP/ha	VA	Factor	Total
		US\$/ha/year	US\$/ha/year	US\$/ha		US\$/ha
U2	Suburban 2	697	26,144		2.1	54,902
U8	Urban 8	987	61,659	55.448	2.1	184,931
	Mid-point					119,917

Source: Adapted from International Metastatic RCC Database Consortium (IMDC)- Tractebel- United Nations Educational, Scientific, and Cultural Organization (UNESCO)/IHE-Vito (2017).

19. The damage functions for floods (tangible damages) are based on the review of worldwide literature on flood damage functions in (Huizinga, Moel, and Szweczyk 2017). It has to be noted that the information for Africa is limited and that the selected damage functions build on information for other continents (table 1.3). The dose retained for the dose-response function is a conservative midpoint for a short and long duration for an average water depth of 0.5 meter for each event.



Table 1.3. Damage Functions for Floods, Short to Long Midpoint Duration (few hours to several days) Adjusted for 2023 Prices

Ind.	Description	GDP/ha US\$/ha	Water depth								
			0	0.5	1	1.5	2	3	4	5	6
U2	Suburban 2	93,176	0%	23%	40%	56%	67%	86%	95%	98%	100%
U8	Urban 8	313,854	0%	23%	40%	56%	67%	86%	95%	98%	100%

Source: Adapted from IMDC- Tractebel-UNESCO/IHE-Vito (2017).

20. By applying the midpoint damage function for short to long duration of 0.5 meter flooding (23 percent) and the likelihood of yearly event occurrence (50 percent from University of Louvain disaster database), the benefits associated with flood-proofing the targeted areas in Dakar are equivalent to US\$23.404 per ha per year in 2023.

Flooding Affecting Human Health

21. The premium risk reduction was calculated for the forgone premature deaths and injuries associated with floods in the Greater Dakar area. Based on previous interventions, a two-third reduction of the premium risk associated with premature death and injury is used to derive the benefits and applied to the beneficiaries in the targeted areas.

22. A risk premium to reduce the effect of storms and floods in Dakar was calculated based on the past events over 18 years. As the calculation of damages is difficult to assess (historic data series are crude and unreliable), based on data provided, the risk reduction of death, injuries, and post-event immediate socioeconomic activity and damages will be considered as benefits. It is important to mention that event intensity in terms of death, injuries, and damages is significantly underreported and the following results should be considered as a lower-bound premium.

23. The weather hazards are the phenomenon while the risk is the likelihood of that phenomenon affecting a particular region in Dakar. The likelihood, which is based on past events with 18 return years, is estimated and refers to the percent chance or probability of a hazard happening in a specific place over a certain amount of time. The risk premium or risk in monetary terms is the likelihood multiplied by the cost. Hence, for the costs, the value of statistical life (VSL) is used for premature death, the GDP per capita for 5.48 days per event affecting people.

24. For premature death, a benefit transfer was applied to derive the VSL in Senegal. The transfer of the unit to adjust for differences in income value is as follows:

$$WP_p = WP_s \times (Y_p/Y_s)^\beta,$$

where

WP_p = willingness to pay in policy country

WP_s = willingness to pay in study country

Y_p = income in the country policy denominated in purchasing power parity dollar (PPP\$)

Y_s = income in the country of study denominated in purchasing power parity dollar (PPP\$)

β = income elasticity for different environmental goods and services, which are considered normal goods, are typically greater than 0 (perfectly inelastic which would have meant that β is

set at 1.2.

25. In this particular case, the income elasticity is assumed to be conservatively more inelastic, which means that the percentage responsiveness of quantity demanded is significantly and slightly lower to the percentage change in income, respectively. The VSL for Senegal was US\$108,289 in 2021 for each premature death and 10 percent of the VSL for each injured person (World Bank 2016).

26. Although underreported, damages are based on previous monetized damages over the last 18 years in the University of Louvain disaster database. The likelihood and risk premium of storm were calculated for Dakar over the last 18 years. Over the last 18 years (2005–2022), all nine storms and floods occurring in Dakar are accounted for in the analysis. These reported events affected about 608,982 people (the same population could be affected more than once) whereas 54 people died, and 315 people were injured. The return period or years between events amounts to 2.0 per year while the event probability stands at 50 percent. The yearly death risk valuation over the period is US\$5.8 million and the yearly injured people risk valuation is US\$3.4 million. These figures are adjusted per capita to be used in the targeted areas of the project. In other words, an insurance policy against the risk of death and injuries amounts to US\$0.6. This does not include direct effects such as productivity losses, impairment, and indirect effects such as spread of disease and so on.

27. It is assumed that the death and injuries premium should be reduced to zero, but a more conservative stance was considered where the premium will be reduced by two-thirds, equivalent to US\$0.5 per capita in 2023 with an annual growth rate of 3 percent for the direct beneficiaries in the Dakar area.

Results of the AF Benefit-Cost Analysis

28. The economic analysis was carried out and was based only on the tangible quantifiable benefits accruing under the combined four components of the project. The project will also reap tangible and intangible benefits that are not quantified.

29. The economic analysis was performed by using a 6 percent social discount rate over 15 years based on the opportunity cost of capital and country risk over the project period. A sensitivity analysis was performed under a pessimistic scenario (a 10 percent increase in economic costs and a 10 percent decrease in benefits over the base case and an 8 percent discount rate) and an optimistic scenario (a 10 increase in benefits and a 10 percent decrease over the base case and a 4 percent discount rate). In addition, project viability switch-off points for equal cost increment and benefit decrement, cost increment, and benefit decrement were computed.

Table 1.4. PROGEP 2 AF Cost/Benefit, Sensitivity, and Scenario Analysis Summary

Key Economic Indicators	Project		
	15 Years Discounted At		
Scenario	4% Optimistic	6% Base Case	8% Pessimistic
Cost/Benefit Analysis			
NPV (US\$, millions)	205.1	156.5	119.4
IRR (%)	29%	29%	29%
Present value benefit/cost ratio	2.7	2.5	2.3



Key Economic Indicators	Project		
	15 Years Discounted At		
Scenario	4% Optimistic	6% Base Case	8% Pessimistic
Viability	Yes	Yes	Yes
Sensitivity Analysis	<i>Benefit + 10%</i> <i>Cost -10%</i>		<i>Cost + 10%</i> <i>Benefit -10%</i>
NPV (US\$, millions)	250.8	156.5	87.6
ERR (%)	36%	29%	23%
Present value benefit/cost ratio	3.2	2.5	1.8
Switch-off point			
>cost = <benefit (±%)	±52.5	±41.2	±28.6
>cost (±%)	+193.5	+140.2	+80.2
<benefit (±%)	-68.8	-58.4	-44.5

30. Table 1.4 summarizes the results of the economic analysis. The AF is viable under all three scenarios. The base-case scenario has a positive NPV of US\$156.5 million as well as a robust IRR of 29 percent and positive present value benefit-cost of 2.5. The AF, which remains viable under the optimistic and pessimistic scenarios, is more sensitive to a decrease in benefits than to an increase in costs under the viable scenarios that are reflected by the switch-off points.

Results of the Parent Project and AF Benefit-Cost Analysis

31. The economic analysis was performed by using a 6 percent social discount rate over 17 years instead of 15 years based on the opportunity cost of capital and country risk over the project period as it is an emergency project. A sensitivity analysis was performed under a pessimistic scenario (a 10 percent increase in economic costs and a 10 percent decrease in benefits over the base case and an 8 percent discount rate) and an optimistic scenario (a 10 increase in benefits and a 10 percent decrease over the base case and a 4 percent discount rate). In addition, project viability switch-off points for equal cost increment and benefit decrement, cost increment, and benefit decrement were computed.

32. Table 1.5 summarizes the results of the economic analysis. The aggregated parent project and AF is viable under all three scenarios. The base-case scenario has a positive NPV of US\$238.7 million as well as a robust IRR 23 percent and positive present value benefit-cost of 2.0. The aggregated parent project and AF, which remains viable under the optimistic and pessimistic scenarios, is more sensitive to a decrease in benefits than to an increase in costs under the viable scenarios that are reflected by the switch-off points.

Table 1.5. PROGEP 2 AF Cost/Benefit, Sensitivity, and Scenario Analysis Summary

Key Economic Indicators	Project		
	17 Years Discounted At		
Scenario	4% Optimistic	6% Base Case	8% Pessimistic
Cost/Benefit Analysis			
NPV (US\$, millions)	316.8	238.7	178.6
IRR (%)	23%	23%	23%
Present value benefit/cost ratio	2.2	2.0	1.8
Viability	Yes	Yes	Yes

Key Economic Indicators	Project		
	17 Years Discounted At		
Scenario	4% Optimistic	6% Base Case	8% Pessimistic
Sensitivity Analysis	<i>Benefit + 10%</i> <i>Cost -10%</i>		<i>Cost + 10%</i> <i>Benefit -10%</i>
NPV (US\$, millions)	400.4	238.7	117.2
ERR (%)	29%	23%	17%
Present value benefit/cost ratio	2.7	2.0	1.5
Switch-off point			
>cost = <benefit (±%)	±46.1	±33.5	±19.7
>cost (±%)	+171.2	+100.6	+48.9
<benefit (±%)	-63.1	-50.2	-32.9