International Development Association

Project Appraisal Document

On a Proposed Grant

In the amount of SDR 11.1 million (US$15 million equivalent)

To the Republic of Kiribati

For a South Tarawa Water Supply Project

November 19, 2019

Water Global Practice
East Asia And Pacific Region

This document is being made publicly available prior to Board consideration. This does not imply a presumed outcome. This document may be updated following Board consideration and the updated document will be made publicly available in accordance with the Bank’s policy on Access to Information.
CURRENCY EQUIVALENTS

(Exchange Rate Effective September 30, 2019)

Currency Unit = Australian Dollar (AU$)

AU$1.00 = US$0.68

US$1.36331 = SDR 1

FISCAL YEAR
January 1 - December 31

Regional Vice President: Victoria Kwakwa
Country Director: Michel Kerf
Regional Director: Benoît Bosquet
Practice Manager: Sudipto Sarkar
Task Team Leader(s): Stephane Raphael Dahan
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
</tr>
<tr>
<td>APA</td>
<td>Alternative Procurement Arrangement</td>
</tr>
<tr>
<td>BP</td>
<td>Bank Procedure</td>
</tr>
<tr>
<td>CAPEX</td>
<td>Capital Expenditure</td>
</tr>
<tr>
<td>CSO</td>
<td>Community Service Obligation</td>
</tr>
<tr>
<td>DBO</td>
<td>Design Build Operate</td>
</tr>
<tr>
<td>DA</td>
<td>Designated Account</td>
</tr>
<tr>
<td>DFAT</td>
<td>Department of Foreign Affairs and Trade</td>
</tr>
<tr>
<td>EBCR</td>
<td>Economic Benefit-Cost Ratio</td>
</tr>
<tr>
<td>EIRR</td>
<td>Economic Internal Rate of Return</td>
</tr>
<tr>
<td>ESIA</td>
<td>Environmental and Social Impact Assessment</td>
</tr>
<tr>
<td>ESMP</td>
<td>Environmental and Social Management Plan</td>
</tr>
<tr>
<td>FIRR</td>
<td>Financial Internal Rate of Return</td>
</tr>
<tr>
<td>FM</td>
<td>Financial Management</td>
</tr>
<tr>
<td>FNPV</td>
<td>Financial Net Present Value</td>
</tr>
<tr>
<td>GAP</td>
<td>Gender Action Plan</td>
</tr>
<tr>
<td>GBV</td>
<td>Gender-Based Violence</td>
</tr>
<tr>
<td>GCF</td>
<td>Green Climate Fund</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GEF</td>
<td>Global Environment Facility</td>
</tr>
<tr>
<td>GHG</td>
<td>Greenhouse Gas</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information System</td>
</tr>
<tr>
<td>GoK</td>
<td>Government of Kiribati</td>
</tr>
<tr>
<td>GRS</td>
<td>Grievance Redress Service</td>
</tr>
<tr>
<td>HIES</td>
<td>Household Income and Expenditure Survey</td>
</tr>
<tr>
<td>IDB</td>
<td>Inter-American Development Bank</td>
</tr>
<tr>
<td>IFRs</td>
<td>Interim Financial Reports</td>
</tr>
<tr>
<td>IPF</td>
<td>Investment Project Financing</td>
</tr>
<tr>
<td>KAP</td>
<td>Kiribati Adaptation Program</td>
</tr>
<tr>
<td>KFSU</td>
<td>Kiribati Fiduciary Service Unit</td>
</tr>
<tr>
<td>KNAO</td>
<td>Kiribati National Audit Office</td>
</tr>
<tr>
<td>KPIs</td>
<td>Kiribati Performance Indicators</td>
</tr>
<tr>
<td>KUSRP</td>
<td>Kiribati Utility Services Reform Project</td>
</tr>
<tr>
<td>LPCD</td>
<td>Liters Per Capita per Day</td>
</tr>
<tr>
<td>MELAD</td>
<td>Ministry of Environment, Lands and Agricultural Development</td>
</tr>
<tr>
<td>MFAT</td>
<td>Ministry of Foreign Affairs and Trade</td>
</tr>
<tr>
<td>MFED</td>
<td>Ministry of Finance and Economic Development</td>
</tr>
<tr>
<td>MHMS</td>
<td>Ministry of Health and Medical Services</td>
</tr>
<tr>
<td>MISE</td>
<td>Ministry of Infrastructure and Sustainable Energy</td>
</tr>
<tr>
<td>NISDC</td>
<td>National Infrastructure Development Steering Committee</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
</tr>
<tr>
<td>NRW</td>
<td>Non-Revenue Water</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>NWSCC</td>
<td>National Water and Sanitation Coordinating Committee</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>Operation and Maintenance</td>
</tr>
<tr>
<td>OP</td>
<td>Operational Policy</td>
</tr>
<tr>
<td>OPEX</td>
<td>Operational Expenditure</td>
</tr>
<tr>
<td>PBA</td>
<td>Performance-Based Allocation</td>
</tr>
<tr>
<td>PBC</td>
<td>Performance-Based Contract</td>
</tr>
<tr>
<td>PCR</td>
<td>Physical Cultural Resources</td>
</tr>
<tr>
<td>PDO</td>
<td>Project Development Objective</td>
</tr>
<tr>
<td>PIA</td>
<td>Project Implementation Arrangement</td>
</tr>
<tr>
<td>PMU</td>
<td>Project Management Unit</td>
</tr>
<tr>
<td>PO</td>
<td>Private Operator</td>
</tr>
<tr>
<td>POM</td>
<td>Project Operations Manual</td>
</tr>
<tr>
<td>PPA</td>
<td>Project Preparation Advance</td>
</tr>
<tr>
<td>PPIAF</td>
<td>Public Private Infrastructure Advisory Facility</td>
</tr>
<tr>
<td>PPSD</td>
<td>Project Procurement Strategy for Development</td>
</tr>
<tr>
<td>PPTA</td>
<td>Project Preparation Technical Assistance</td>
</tr>
<tr>
<td>PUB</td>
<td>Public Utilities Board</td>
</tr>
<tr>
<td>PV</td>
<td>Photovoltaic</td>
</tr>
<tr>
<td>RF</td>
<td>Resettlement Policy Framework</td>
</tr>
<tr>
<td>RP</td>
<td>Resettlement Plan</td>
</tr>
<tr>
<td>RPF</td>
<td>Regional Partnership Framework</td>
</tr>
<tr>
<td>RERF</td>
<td>Revenue Equalization Reserve Fund</td>
</tr>
<tr>
<td>SA</td>
<td>Social Assessment</td>
</tr>
<tr>
<td>SIDS</td>
<td>Small Island Development State</td>
</tr>
<tr>
<td>SOE</td>
<td>State Owned Enterprise</td>
</tr>
<tr>
<td>SPC</td>
<td>Secretariat of the Pacific Community</td>
</tr>
<tr>
<td>STSISP</td>
<td>South Tarawa Sanitation Improvement Sector Program</td>
</tr>
<tr>
<td>STWSP</td>
<td>South Tarawa Water Supply Project</td>
</tr>
<tr>
<td>WACC</td>
<td>Weighted Average Cost of Capital</td>
</tr>
<tr>
<td>WAP</td>
<td>Water Awareness Program</td>
</tr>
<tr>
<td>WASH</td>
<td>Water, Sanitation and Hygiene</td>
</tr>
<tr>
<td>WESU</td>
<td>Water Engineering and Sanitation Unit</td>
</tr>
</tbody>
</table>
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BASIC INFORMATION

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<th>Country(ies)</th>
<th>Project Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiribati</td>
<td>South Tarawa Water Supply Project</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Project ID</th>
<th>Financing Instrument</th>
<th>Environmental Assessment Category</th>
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</thead>
<tbody>
<tr>
<td>P162938</td>
<td>Investment Project Financing</td>
<td>B-Partial Assessment</td>
</tr>
</tbody>
</table>

Financing & Implementation Modalities

- [ ] Multiphase Programmatic Approach (MPA)
- [ ] Series of Projects (SOP)
- [ ] Disbursement-linked Indicators (DLIs)
- [ ] Financial Intermediaries (FI)
- [ ] Project-Based Guarantee
- [ ] Deferred Drawdown
- [✓] Alternate Procurement Arrangements (APA)
- [ ] Contingent Emergency Response Component (CERC)
- [✓] Fragile State(s)
- [✓] Small State(s)
- [ ] Fragile within a non-fragile Country
- [ ] Conflict
- [ ] Responding to Natural or Man-made Disaster
- [ ] Hands-on Enhanced Implementation Support (HEIS)

Expected Approval Date | Expected Closing Date
-----------------------|------------------------
12-Dec-2019            | 30-Jun-2027

Bank/IFC Collaboration

No

Proposed Development Objective(s)

The proposed PDOs are to increase access to and quality of water supply services, and to improve the operational performance of the water supply services provider, in South Tarawa.
## Components

<table>
<thead>
<tr>
<th>Component Name</th>
<th>Cost (US$, millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement of Water Supply Services</td>
<td>30,280,000.00</td>
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<tr>
<td>Institutional Strengthening and Implementation Support</td>
<td>12,130,000.00</td>
</tr>
<tr>
<td>Water, Sanitation and Hygiene Awareness</td>
<td>2,210,000.00</td>
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<tr>
<td>Project Management Unit</td>
<td>2,150,000.00</td>
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<tr>
<td>Sanitation Pilots</td>
<td>1,240,000.00</td>
</tr>
<tr>
<td>Contingencies</td>
<td>10,110,000.00</td>
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</table>

## Organizations

- **Borrower:** Republic of Kiribati
- **Implementing Agency:** Ministry of Infrastructure and Sustainable Energy

## PROJECT FINANCING DATA (US$, Millions)

### SUMMARY

<table>
<thead>
<tr>
<th></th>
<th>Cost (US$, Millions)</th>
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<tbody>
<tr>
<td>Total Project Cost</td>
<td>58.12</td>
</tr>
<tr>
<td>Total Financing</td>
<td>58.12</td>
</tr>
<tr>
<td>of which IBRD/IDA</td>
<td>15.00</td>
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<tr>
<td>Financing Gap</td>
<td>0.00</td>
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### DETAILS

#### World Bank Group Financing

<table>
<thead>
<tr>
<th>Source</th>
<th>Cost (US$, Millions)</th>
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<tbody>
<tr>
<td>International Development Association (IDA)</td>
<td>15.00</td>
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<tr>
<td>IDA Grant</td>
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#### Non-World Bank Group Financing

<table>
<thead>
<tr>
<th>Source</th>
<th>Cost (US$, Millions)</th>
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<tbody>
<tr>
<td>Counterpart Funding</td>
<td>1.49</td>
</tr>
<tr>
<td>Borrower/Recipient</td>
<td>1.49</td>
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</table>
Other Sources

Asian Development Bank 41.63

<table>
<thead>
<tr>
<th>IDA Resources (in US$, Millions)</th>
<th>Credit Amount</th>
<th>Grant Amount</th>
<th>Guarantee Amount</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiribati</td>
<td>0.00</td>
<td>15.00</td>
<td>0.00</td>
<td>15.00</td>
</tr>
<tr>
<td>National PBA</td>
<td>0.00</td>
<td>15.00</td>
<td>0.00</td>
<td>15.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>0.00</strong></td>
<td><strong>15.00</strong></td>
<td><strong>0.00</strong></td>
<td><strong>15.00</strong></td>
</tr>
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<table>
<thead>
<tr>
<th>Expected Disbursements (in US$, Millions)</th>
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<tbody>
<tr>
<td>WB Fiscal Year</td>
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<tr>
<td>Annual</td>
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<tr>
<td>Cumulative</td>
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</tbody>
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<table>
<thead>
<tr>
<th>INSTITUTIONAL DATA</th>
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</thead>
<tbody>
<tr>
<td><strong>Practice Area (Lead)</strong></td>
</tr>
<tr>
<td>Water</td>
</tr>
</tbody>
</table>

**Climate Change and Disaster Screening**
This operation has been screened for short and long-term climate change and disaster risks

**Gender Tag**

Does the project plan to undertake any of the following?

| a. Analysis to identify Project-relevant gaps between males and females, especially in light of country gaps identified through SCD and CPF | Yes |
| b. Specific action(s) to address the gender gaps identified in (a) and/or to improve women or men's empowerment | Yes |
| c. Include Indicators in results framework to monitor outcomes from actions identified in (b) | Yes |
### SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

<table>
<thead>
<tr>
<th>Risk Category</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Political and Governance</td>
<td>⬤ Substantial</td>
</tr>
<tr>
<td>2. Macroeconomic</td>
<td>⬤ Moderate</td>
</tr>
<tr>
<td>3. Sector Strategies and Policies</td>
<td>⬤ High</td>
</tr>
<tr>
<td>4. Technical Design of Project or Program</td>
<td>⬤ Moderate</td>
</tr>
<tr>
<td>5. Institutional Capacity for Implementation and Sustainability</td>
<td>⬤ High</td>
</tr>
<tr>
<td>6. Fiduciary</td>
<td>⬤ Substantial</td>
</tr>
<tr>
<td>7. Environment and Social</td>
<td>⬤ Substantial</td>
</tr>
<tr>
<td>8. Stakeholders</td>
<td>⬤ Moderate</td>
</tr>
<tr>
<td>9. Other</td>
<td></td>
</tr>
<tr>
<td>10. Overall</td>
<td>⬤ High</td>
</tr>
</tbody>
</table>

### COMPLIANCE

**Policy**

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

[ ] Yes    [✓] No

Does the project require any waivers of Bank policies?

[ ] Yes    [✓] No

**Safeguard Policies Triggered by the Project**

<table>
<thead>
<tr>
<th>Safeguard Policies Triggered by the Project</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Assessment OP/BP 4.01</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Performance Standards for Private Sector Activities OP/BP 4.03</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Natural Habitats OP/BP 4.04</td>
<td>✓</td>
<td></td>
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<tr>
<td>Forests OP/BP 4.36</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Pest Management OP 4.09</td>
<td>✓</td>
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</tbody>
</table>
Legal Covenants

Sections and Description
Financing Agreement, Schedule 2, Section I.A., para 1(a). To ensure proper oversight, coordination and guidance of the Project implementation, the Recipient shall maintain until completion of the Project the National Infrastructure Development Steering Committee chaired by Cabinet Secretary – and comprising inter alia the secretaries of the Ministry of Infrastructure and Sustainable Energy and the Ministry of Finance and Economic Development, which shall be responsible for providing general oversight, coordination as well as strategic direction and guidance of the Project implementation.

Sections and Description
Financing Agreement, Schedule 2, Section I.A., para 1(b). To ensure adequate management and monitoring of the Project, the Recipient shall maintain until completion of the Project the Project Management Unit (PMU) in the Ministry of Infrastructure and Sustainable Energy which shall be responsible for the management and monitoring of the Project.

Sections and Description
Financing Agreement, Schedule 2, Section I.A., para 2(a). The Recipient shall: (i) recruit and retain such consultants, as may be needed to support the functions of the entities referred to in Section I.A.1, all with qualifications, experience and under the terms of reference acceptable to the Association; and (ii) ensure that the Project Management Unit is supported by KFSU on financial management and accounting arrangements and functions under the Project, all as further detailed in the Project Operations Manual.

Sections and Description
Financing Agreement, Schedule 2, Section I.A., para 2(b). By not later than three (3) months after the Effective Date (or such other date which the Association has confirmed in writing to the Recipient is reasonable and acceptable under the circumstances, as determined by the Association in its sole discretion), the Recipient shall recruit or appoint: (i) a manager, a procurement specialist and a safeguard manager in the Project Management Unit; and (ii) an accountant in KFSU, all with qualifications, experience and under the terms of reference acceptable to the Association, to support Project implementation, and thereafter maintain such positions (or ensure that such respective support functions are made available) until the completion of the Project.

Sections and Description
Financing Agreement, Schedule 2, Section I.A., para 3. Recipient shall provide, or cause to be provided to, each of
the National Infrastructure Development Steering Committee and the Project Management Unit at all times with adequate funds and other resources, mandate/functions, and with qualified and experienced personnel in adequate numbers, as shall be necessary to accomplish Project objectives as further detailed in the Project Operations Manual.

<table>
<thead>
<tr>
<th>Sections and Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financing Agreement, Schedule 2, Section I.B, para. 1. No later than one (1) month after Effective Date, the Recipient shall adopt a Project Operations Manual, in form and substance satisfactory to the Association, for the purpose of ensuring proper implementation of the Project.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sections and Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financing Agreement, Schedule 2, Section II, para 1. The Recipient shall furnish to the Association each Project Report not later than one month after the end of each calendar quarter, covering the calendar quarter.</td>
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</table>

<table>
<thead>
<tr>
<th>Sections and Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financing Agreement, Schedule 2, Section II, para 2. Not later than later than three (3) years after the Effective Date, or such other date as the Association shall agree in writing, the Recipient shall: (i) carry out jointly with the Association, a mid-term review of the Project, which shall cover the progress achieved in the implementation of the Project; and (ii) following such mid-term review, act promptly and diligently to take any corrective action as shall be recommended by and agreed with the Association.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sections and Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financing Agreement, Schedule 2, Section IV.B, para 2. The Project Management Unit shall undertake a study – under the terms of reference acceptable to the Association – to review water tariffs of PUB (including a focus on affordability aspects) and furnish the completed study to the Association no later than June 30, 2020.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sections and Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financing Agreement, Schedule 2, Section IV.B, para 1. Without limitation to the provisions of Section 5.03 of the General Conditions, the Recipient shall ensure, until the completion of the Project, that its Cabinet issues a resolution on an annual basis to allocate sufficient budget or subsidy to meet any funding shortfalls for the operations and maintenance of the PUB water supply assets.</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Effectiveness</td>
</tr>
<tr>
<td></td>
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</tbody>
</table>
I. STRATEGIC CONTEXT

A. Country Context

1. **The Republic of Kiribati is one of the smallest, most remote and geographically dispersed countries in the world.** The country consists of 32 low lying coral islands and one raised coral island in three main island groups - namely the Line Islands, Phoenix Islands and Gilbert Islands. Most islands are no more than two meters above mean sea level and only a few hundred meters wide. As such, they are at the forefront of climate change. The capital, South Tarawa, is about 4,000 kilometers from the major trade markets of Australia and New Zealand. The total population of Kiribati, estimated at 106,000 in 2015, is spread amongst 167 rural villages and one urban area on 21 islands across some three million square meters. Forty five percent of the country’s population lives in rural areas.

2. **These geographical features create significant human development and economic growth challenges.** Kiribati has a limited economic base, dominated by (i) investment income from its sovereign wealth fund, the Revenue Equalization Reserve Fund (RERF), (ii) the sale of fishing license fees, (iii) remittances, and (iv) aid flow. Only around 20 percent of the country’s population is formally employed in the cash economy, with 80 percent of the jobs provided by the public sector. Food security relies largely on subsistence agriculture and fisheries. Despite improvements in revenues in recent years, Kiribati’s Human Development Index (HDI) ranking is 134 out of 189, and Human Capital Index (HCI) ranking is 106 out of 157, both amongst the lowest in the Pacific region. According to the last available Household Income and Expenditure Survey (HIES) conducted in 2006, poverty was widespread in Kiribati.

3. **Despite its relatively privileged position as gateway to international markets, South Tarawa suffers from major development challenges.** Located on the atoll of Tarawa, South Tarawa, the country’s only urban center, spans a string of very densely populated coral islets connected by several causeways. Its population is expected to grow further from 58,000 in 2016 to 96,000 in 2040. Per the 2006 HIES, the country’s basic needs poverty was concentrated in South Tarawa, where the rate reached about 24 percent. However, South Tarawa provides opportunities for cash employment and consumption, as well as access to higher education and specialized social services that is not available elsewhere in Kiribati. This has made the district a magnet for internal migration from the outer islands, further increasing population density and related urban development challenges. In 2012, it was estimated that half of South Tarawa’s population was living in informal areas.

4. **The country’s development aspirational statement (Kiribati 20-year Vision 2016-2036), views fisheries and sustainable tourism as key productive sectors on the long term.** The provision of adequate water supply and sanitation services, and as a result the cleaning of urban and coastal environments, will be critical to the development of sustainable tourism. Kiribati’s Government Development Plan (2016-2019) commits to improve access to quality climate change resilient infrastructure in urban and rural areas. The strategies to achieve this goal include (i) the improvement of water security for communities through development of water supplies from ground resources and rainwater harvesting, and the exploration of solar-powered seawater desalination by reverse osmosis; and (ii) the promotion and implementation of sanitation programs.

5. **Gender differences are strongly embedded in Kiribati’s culture and tradition.** Kiribati society is generally patriarchal. Women perform the vast majority of unpaid domestic work, and husbands hold considerable
authority over the types of activities their wives can exercise and women’s reproductive health rights are limited.\textsuperscript{1} Overcrowding in many areas of South Tarawa is contributing to stresses faced by women and girls. Women’s involvement in political, social and economic activities is promoted through many gender equality commitments by the government. Kiribati is a signatory to the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) and has committed to achieve gender equality and advance women, including through the Kiribati Development Plan 2016-2019. A National Women’s Policy is currently under development.

B. Sectoral and Institutional Context

6. **Access to safe water supply and improved sanitation is a major issue in Kiribati.** Per recent data (WHO/UNICEF JMP, 2017), 64 percent of the population in Kiribati has access to a basic water supply service while only 40 percent have access to basic sanitation services. There are wide disparities in access between urban and rural areas: 90 percent of the urban population in Kiribati (which mostly overlaps with South Tarawa population) has access to a basic water supply service,\textsuperscript{2} about twice the level of access across rural areas, i.e. Kiribati’s outer islands. Outside of South Tarawa and Kiritimati island, there is minimal formal water and sanitation infrastructure and people mostly rely on household-based provision. Improved sanitation coverage represents only 49 percent in urban areas, and 32 percent in rural areas. Open defecation on beaches is widely practiced across the country.

7. **Despite the presence of a centralized water supply system, access to safely managed water supply services remains very limited in South Tarawa.** South Tarawa’s reticulated water supply system covers about two thirds of its population and is operated by the Public Utility Board (PUB).\textsuperscript{3} However, water is only supplied up to two hours every 48 hours and at very low pressure, and connected households consume an average of 10 liters per capita per day (lpcd) of PUB water. Water is chlorinated in various points of the system, but negative pressures in the distribution pipelines lead to groundwater infiltration and recurrent bacteriological contamination. Consequently, many households rely on multiple water sources, including rainwater collected from roofs and local groundwater from household wells, from which per capita consumption is estimated to represent about 22 liters per capita per day. In most cases, PUB water, harvested rainwater and groundwater show high levels of bacterial contamination.\textsuperscript{4} A baseline survey carried out by the World Bank in 2018 found that two thirds of households spend more than half an hour a day on water collection tasks.\textsuperscript{5}

8. **Inherent limitations in freshwater resources and continuous population growth are exposing South Tarawa to a growing water supply deficit.** Per capita freshwater availability\textsuperscript{6} across South Tarawa has dramatically declined over recent decades primarily due to a six-fold population increase over the last 50 years. Freshwater availability now hovers around the absolute water scarcity threshold,\textsuperscript{7} and it reached an all-time low of 277 lpcd

\textsuperscript{1} ADB, 2017a. TA-9200 KIR: South Tarawa Water Supply Project (49453-001) – Project Preparatory Technical Assistance (PPTA) Gender and Social Inclusion Action Plan
\textsuperscript{2} A household has access to basic water supply service when a water point is available with a collection time is no more than 30 minutes for a roundtrip, including queuing (SDG definition)
\textsuperscript{3} The PUB is also responsible for electricity service provision.
\textsuperscript{4} ADB, *Economic Costs of Inadequate Water and Sanitation, South Tarawa, Kiribati*, Pacific Studies Series, 2014
\textsuperscript{5} The survey was carried out in June 2018 and collected baseline information from 292 households in South Tarawa.
\textsuperscript{6} Ratio between the internally generated surface water annual runoff and groundwater recharge derived from precipitation falling within South Tarawa’s boundaries.
\textsuperscript{7} Absolute water scarcity relates to areas whose freshwater availability is below 500 lpcd, according to the Water Stress Index (a.k.a. the Falkenmark Indicator).
in 2018. The rainfall-fed groundwater lenses located in the Bonriki and Buota water reserves are the only available freshwater sources suitable for drinking water production and have a combined sustainable yield of approximately 2,000 cubic meter per day. The estimated sustainable freshwater yield of the urban water lens in Betio is marginal, at 25 cubic meters per day.\(^8\) Even with a major reduction of water losses and consumption limited to basic needs, the water supply deficit would reach 2,500 cubic meter per day in 2020, increasing to a range of 3,300 cubic meter per day to 4,800 cubic meter per day in 2040.\(^9\)

9. **The sustainability of Bonriki and Buota groundwater lenses is threatened on the long-term by human encroachment on the water reserves.** There are currently close to 100 unauthorized dwellings on the two water reserves. Encroachment by settlers and squatters is continuously increasing despite existing regulations, because of South Tarawa’s rapidly growing population and scarcity of land. Human settlement and activity on the reserves poses long-term threats to water quality through sand and gravel mining, digging of wells, use of graveyards, raising of pigs, growing crops which use animal manure and fertilizers, and direct pollution of the fresh water lenses through poor sanitation practices. It is worth noting that South Tarawa’s two other water reserves in Betio and Teoraereke were abandoned in the past due to similar encroachment issues. Conserving the two water lenses is therefore critical to guarantee the long-term security and sustainability of South Tarawa water supply. Efforts to relocate the unauthorized dwellers under the Kiribati Adaptation Program (KAP) III\(^10\) in 2015 were not conclusive, and despite preparatory activities launched in early 2019 to evict these people from the water reserves, the Government of Kiribati (GoK) has decided in June 2019 not to proceed with these evictions.

10. **Climate change is likely to further affect the water resources of South Tarawa.** Its effects are expected to include variations in rainfall,\(^11\) higher evapotranspiration (due to increasing temperatures), rise in sea-levels and the resulting increase in saltwater intrusion, and more frequently occurring extreme events such as droughts, in particular during El Niño–Southern Oscillation. A 10 percent decline in rainfall could be expected to cause a 14 percent reduction in groundwater recharge. In addition, inundation caused by sea level rise and storm surges could temporarily reduce yields from the Bonriki and Buota aquifers used for South Tarawa water supply by about 20 percent by 2030.\(^12\) Further analyses\(^13\) suggest that climate change induced overtopping and/or drought could lead in the long-term to periods of complete collapse of lenses’ available yield. Moreover, the groundwater supply in South Tarawa depends on the size of the land area and, as this diminishes due to rising sea levels and coastal erosion, so does the size of the water lens.\(^14\)

11. **This deepening water deficit and the anticipated impacts of climate change call for the consideration of new water resources for South Tarawa’s potable water supply.** GoK adopted in 2008 the National Water Resources Policy. Demonstrating the importance attached to this sector, GoK further developed the Tarawa Water

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\(^10\) P112615. Co-financed by Australia, Japan, GFDRR, the Government of Kiribati and the World Bank (GEF-LDCF) in a total amount of US$10.8 million. The project closed in end-December 2018.
\(^11\) Most global climate models point for the project area to an increase in average rainfall but the level of uncertainty is high and predictions span between a decrease by up to 11 percent and an increase by up to seven percent by 2050.
Master Plan 2010-2030 and the Tarawa Water and Sanitation Roadmap 2011-2030. Considering all water production options and the potential for physical losses reductions, these plans stress the importance of demand management and efficiency in the network, but identified the use of non-conventional water sources, such as desalination, as the only option to meet South Tarawa’s water demand, along with the diversification of sources such as urban groundwater and rainwater harvesting for risk mitigation and increased resilience. These studies encouraged the use of rainwater but recognized that it cannot be relied upon during prolonged droughts.

12. **South Tarawa faces significant insufficiencies in the availability and quality of sanitation services.** While about half of South Tarawa has access to basic sanitation services, the remaining population use shared sanitation facilities, on-site unimproved sanitation systems such as pit latrines without a slab or platform, or practice open defecation in the sea (nearshore), to which 60 percent of the population resort at least occasionally. South Tarawa has three sewerage systems coupled with seawater supply networks for flushing in the historical settlement centers. These centers have expanded, and other centers have grown in recent years. As a result, about 25 percent of the population is presently connected to these sewerage systems. Sewage is discharged, untreated, through an ocean outfall currently being upgraded. Except in sewered areas, households generally discharge greywater locally, taking advantage of the high infiltration capacity of coral sand. Appreciation of the importance of good hygiene in South Tarawa is low, with only 57 percent of households reportedly having a fixed place for handwashing. The island’s low elevation, high population density, lack of available space and high water table represent significant challenges to the implementation of safe and effective on-site sanitation solutions.

13. **Those inadequate water supply and sanitation services entail, in a densely populated context, negative health consequences.** Kiribati’s infant mortality rate is among the highest in the Pacific at 44 per 1,000 live births and is partly attributable to infantile diarrhea. In 2012, one in every two persons was treated for a waterborne disease in a hospital or clinic in South Tarawa. The link between diarrhea and child undernutrition and other enteric infections has been documented. Environmental enteric dysfunction, a gut disorder caused in part by chronic ingestion of pathogenic microorganisms, results in nutrient malabsorption and is hypothesized to be the primary causal pathway between poor water, sanitation and hygiene, and child growth. Stunting is widely understood to be caused by multiple underlying factors, including food insecurity, poor child care practices, and lack of access to health services, water, and sanitation.

14. **Gender disparities persist in the water and sanitation sector.** Women, children, and the elderly bear a disproportionate share of the burden of inadequate water and sanitation services in South Tarawa. An observational study and household survey carried out during project preparation found that the burden of collecting PUB water (for drinking and cooking) every other day is generally shared equally between males and females, but that women tend to be responsible for a larger share of water-related household tasks such as cleaning and washing, and so spend a significant amount of time fetching well water for these uses. Women are not only affected by the burden of collecting water, but also to a great extent by the health issues resulting from

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15. 3,600 inhabitants per square kilometer, almost entirely on ground level.
17. **ADB 2014, Economic costs of inadequate water and sanitation**
19. **The Economic Costs of Poor Water and Sanitation South Tarawa study (ADB 2014)**
20. **This was observed for stay-at-home mothers as well as women in paid employment.**
inadequate water supply in South Tarawa: as the collectors and carriers, they tend to be more exposed to harmful pathogens in water and risk being ill themselves, and they bear the brunt of caring for the other members of the household who are sick due to unclean water. Female children are reported to have a higher likelihood of suffering from diarrhea and dysentery than males. Girls face significant challenges when managing their menstruation at school, due to a lack of available Water, Sanitation and Hygiene (WASH) facilities, lack knowledge about menstruation and reproductive health and negative cultural perceptions associated with menstruation.

15. **The operation of water supply and sewerage services is largely inefficient.** The water distribution network is in an advanced state of disrepair. Physical non-revenue water (NRW) was estimated in 2015 to exceed 60 percent but no detailed assessment is possible given the lack of connection meters and taps. Inadequate water services quality (pressure, continuity), together with customer’s lack of willingness to pay, tampering of networks and water leakages have been self-reinforcing in a vicious cycle over the past decades, in the backdrop of increasing freshwater deficit. Water often does not reach the household anymore and needs to be collected from various formal and informal points. Facing widespread discontent by the population, PUB’s line ministry requested that it stop charging residential customers in 2013. In the absence of a residential water tariff, PUB water and sewerage revenues now mostly come from non-domestic customers and from on-demand services (delivery by tanker, septic tank emptying). Overall, from 2010-17, PUB income has been generated from electricity (85 percent), water supply and sewerage (6 percent), other income (2 percent), and water supply subsidies (7 percent) in the form of Community Service Obligation (CSO). The current average operation and maintenance (O&M) cost of water services amounts to US$1.7 per cubic meter sold, a high level given the system’s simple physical features. This is driven notably by (i) high physical losses, (ii) high electricity and chlorine supply costs (26 percent of total costs), and (iii) high labor costs (47 percent of total costs). Limited improvements in operational efficiency have been achieved since 2015 with enhanced donors support. Key PUB operational figures are provided in Annex 3.

16. **PUB’s financial viability is severely undermined by the lack of adequate revenue stream for its water supply and sewerage activities.** PUB recovered in 2015 only 34 percent of its O&M costs associated to water and sewerage (WSS) services. The financial gap has been covered by limited operational subsidies from GoK and through the non-payment to the national fuel provider (KOIL), in effect relying on cross-subsidy from its profitable power/electricity business. CSO payments have been delivered by GoK to PUB in the amounts of US$1.38 million in 2016 and US$1.01 million in 2017, mostly to cover losses in its water and sewerage activities. Improving PUB’s financial viability will require: (i) restoring adequate tariffs together with improving service quality and expanding PUB’s efficient electricity billing and customer management capacity to the water side of the company, and (ii) improving infrastructure efficiency and assets management to minimize operating costs.

17. **The institutional framework provides PUB management autonomy, but sector regulation remains weak.** The Ministry of Infrastructure and Sustainable Energy (MISE) plays a policy, planning and regulatory role within the water, sanitation and hygiene (WASH) sector. The Ministry of Health and Medical Services (MHMS) is responsible for drinking water quality monitoring, but water quality analyses are not carried out on a regular basis. The Public Utilities Board (PUB) is a state-owned enterprise (SOE) responsible for delivering power generation and distribution, water supply, and sewerage services across South Tarawa on a commercial basis. Its Board is chaired and appointed by MISE. In the absence of effective technical regulation, PUB has faced limited performance

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21 Balancing the Burden (ADB 2015)
23 This is driven by high power supply costs (US$0.5/kWh) compounded by old electromechanical equipment.
incentives and has rarely been held accountable for the quality of service delivery.

18. **The Government of Kiribati has taken some important commitments towards the establishment of reliable sector financing mechanisms.** The Cabinet approves fees and charges proposed by PUB’s Board on a case-by-case basis, since there is no regulation guiding their formulation and periodic revision. However, in the past, the policy to charge for tariffs for the supply of water and sanitation services in South Tarawa was not applied due to concern about the adverse impact of higher charges on household welfare. GoK now recognizes the need to change public attitudes toward utility payment in South Tarawa, and important progress has recently been made in this direction with the adoption of volumetric tariff charges, which has been applied since early 2018 in the pilot villages supported by KAP III, and will later be applied elsewhere across South Tarawa as improved services are rolled out. Per the SOE Act, PUB should receive CSO payments from GoK if the Cabinet wishes to lower tariffs below cost recovery level for social purposes. While GoK has provided significant financial support, this has mostly been on an unplanned basis to cover operational deficit and to help PUB meet accrued KOIL payment obligations. A Strengthening Economic Management Reform Program Policy-Based Grant financed by the Asian Development Bank (ADB) was approved in late 2017, promoting (i) continued government commitment to the payment of its CSOs, and (ii) water tariff reforms that introduce usage fees to improve access to and quality of water services in a sustainable manner, as introduced by the KAP III. MISE is currently conducting a review of the water tariff as foreseen under project Subcomponent 2.3 and with funding from the Project Preparation Advance (PPA) (see Annex 1 for further details on the PPA).

19. **PUB recently initiated positive changes in its management of water and sewerage services.** The Kiribati Utility Services Reform Project (KUSRP), a technical assistance program delivered by the Pacific Regional Infrastructure Facility (PRIF), provided in 2017 recommendations for the improvement of PUB’s operational and financial sustainability. As part of this effort, an international CEO was hired (funded by the New Zealand [NZ] Ministry of Foreign Affairs and Trade [MFAT]), and some organizational rationalization of PUB was carried out, including the creation of a NRW team and a reorganization into separately accounted profit / cost centers (Electricity, Water & Sewerage, and Central Administration). KUSRP also recommended private sector participation in PUB operations to support capacity building and performance improvement. The KAP-III, which closed in December 2018, financed leakage reductions on the water transmission line, the rehabilitation of reservoirs and, in three pilot areas, the replacement of the water distribution system which enabled the achievement of 24/7 water supply.

20. **Donors’ involvement in the sector.** There are currently 26 donor-funded WASH sector initiatives ongoing in South Tarawa. Most of them are Non-Governmental Organization (NGO)-driven and implemented at a very limited scale. The most significant ongoing engagement is the ADB-financed South Tarawa Sanitation Improvement Sector Project (STSISP), focusing on the rehabilitation of existing sewerage systems in three communities of South Tarawa and capacity building for MISE and PUB. In addition to the leakage reduction and pilots described above, KAP-III has financed the creation of community-based rainwater harvesting systems in South Tarawa and on outer islands. NZ MFAT is financing concept engineering designs for the expansion of sanitation services in South Tarawa. Two desalination plants, of 500 and 100 cubic meters per day, on the site of Betio Causeway and at the Tungaru Central Hospital respectively, have recently been completed with financial support from the government of New Zealand. The Secretariat of the Pacific Community (SPC) has recently supported PUB in the preparation of a drought management plan. The overall donor coordination is good, and donors are using common investment maps and policy recommendations, under the aegis of the National
Infrastructure Development Steering Committee (NIDSC)\textsuperscript{24}, which provides policy directives and coordinates and oversees the country’s infrastructure program.

C. Relevance to Higher Level Objectives

21. **The proposed project will contribute to the achievement of GoK’s higher level development objectives.** Goal 6 of the Kiribati’s Government Development Plan (2016-2019) commits to improve access to quality climate change resilient infrastructure in urban and rural areas; and the strategies to achieve this Goal include (i) the improvement of water security for communities through the development of water supplies from ground resources and rainwater harvesting, and the exploration of solar-powered seawater desalination by reverse osmosis; and (ii) the promotion and implementation of sanitation programs.

22. **The project is consistent with the World Bank Group’s Regional Partnership Framework (RPF) (Report #120479) for nine Pacific Island Countries (including Kiribati) for the period FY17-FY21.** The RPF’s objective 4.2 focuses on the increase of access to basic services and improved connective infrastructure. The development of water and sanitation services in Kiribati is one of the key activities identified to achieve this objective. Moreover, the project will reduce South Tarawa’s water stress by increasing the supply of fresh water and protecting available water resources, thereby making Tarawa’s residents more resilient to the increased incidence of droughts. Therefore, by helping to address water stress challenges which may be aggravated by the effects of climate change, the proposed project will support Objective 3.1 of the RPF, which focuses on strengthening resilience to natural disasters and climate change. The care for the sick and the responsibility for water collection and safety concerns also fall disproportionally on women and girls. Hence, improved access to water and sanitation services will help to address gender inequality, in line with Objective 2.3 of the RPF.

23. Through these various impacts on health, nutrition and education, the proposed project contributes to the World Bank Group’s twin goals of eliminating extreme poverty and promoting shared prosperity, and to the World Bank’s Human Capital Project. The Human Capital Project aims to develop people’s skills, health, knowledge, and resilience—their human capital—measured in improvements to the country’s HCI. Support for improved water and sanitation services helps (i) reduce the time and effort—especially of women and children—to collect water, (ii) reduce the incidence of waterborne diseases caused by contact with contaminated water, and (iii) diminish absenteeism from work and school and the costs associated with these, including lost income and opportunities.

II. PROJECT DESCRIPTION

A. Project Development Objective

PDO Statement

24. The proposed project development objectives are to increase access to and quality of water supply services, and to improve the operational performance of the water supply services provider, in South Tarawa.

\textsuperscript{24} Members of the PSC include Secretaries or their delegated representative from the following ministries: Office of the President (Chair); Ministry of Finance and Economic Development (Deputy Chair); Ministry of Infrastructure and Sustainable Energy, Ministry of Environment, Lands and Agriculture Development; Ministry of Communications, Transport and Tourism.
PDO Level Indicators

25. PDO indicators for the proposed project include:

(a) People provided with access to improved water sources through piped house water connections (male/female)
(b) People provided with continuous water supply (male/female)
(c) Samples testing at distribution points meeting national standards for residual chlorine (%)
(d) Non-revenue water (%)
(e) Time spent daily by households collecting water (minutes)

B. Project Components

26. To achieve the Project Development Objectives (PDOs), the proposed project will have five components. Annex 2 provides a detailed project description. The table below describes project costs by component and provides the financing plan with contributions of the various stakeholders. The project will be cofinanced with ADB and the Green Climate Fund (GCF), and will include a counterpart financing contribution. The GCF grant will be administered by ADB as an accredited entity of the GCF. All three sources of financing will be made available and implemented in parallel, throughout the eight-year implementation plan.

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<tr>
<th>Project Components</th>
<th>Project cost</th>
<th>IDA Grant*</th>
<th>ADB and GCF Grants</th>
<th>Counterpart Funding</th>
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* In US$ equivalent

25 ADB approved its grant in September 2019 and GCF confirmed its financial commitment to the project in October 2018.

27. This component will aim to improve access and quality of water supply services in South Tarawa, and to increase resilience of the services to climate change. It will include:

Subcomponent 1.1: Increase in water production capacity (Cost: US$11.73 million; Financing: IDA – US$3.90 million equivalent; ADB and GCF – US$7.83 million)

28. This subcomponent will support the construction of seawater desalination systems and the rehabilitation of existing water production facilities. This will allow for a significant increase in water use by South Tarawa population, from an average 42 lpcd in 2018 to an average 80 lpcd after project. This increase in PUB water supply capacity will also enable a decrease in the contribution of non-safe and climate dependent water sources (urban groundwater and marginally rainwater) to overall residual water use, from 78 percent in 2018 to 19 percent after the project. With a production capacity of at least 4,000 cubic meters/day, the desalination plants will, to a large extent, climate proof the South Tarawa water system, covering about two thirds of PUB production capacity up to 2030, while the rest is to be met with water abstracted from the groundwater lenses of Bonriki and Buota using existing water production systems. Design criteria take into account the expected reduction in yield of the groundwater lenses due to climate change and include selected provisions to enable its expansion up to 6,000 cubic meter/day total capacity in the future (which would be deemed sufficient until at least 2040), without the need to upgrade supporting infrastructure. Brine will be discharged through the nearby sewerage submarine outfall, currently being upgraded under STSISP to diffuse sewage 30 meters deep beyond the reef edge.

Subcomponent 1.2: Expand and modernize water supply network (Cost: US$10.64 million excluding contingencies; Financing: IDA – US$3.54 million equivalent, ADB and GCF – US$6.35 million and Counterpart financing – US$0.75 million)

29. This subcomponent will support the expansion and modernization of the water transmission and distribution systems to achieve full service coverage across South Tarawa through piped connections. The system will be upgraded to have adequate capacity to meet water demands up to year 2040. This upgrade, combined with the NRW reduction and water-conservation policy (more metered connections) mentioned below, will make the area residents resilient to droughts. The works will include: (i) implementation and upgrades with more energy efficient equipment of primary pumping systems at the Buota and Bonriki groundwater lenses (from which water is already being produced at an acceptable quality), and at the desalination plant(s) in West Betio and potentially McKenzie; (ii) implementation of additional ground storage; and (iii) replacement, upgrades and expansion of reticulation networks and metered connections in communities across South Tarawa. Together with the increased water production capacity (subcomponent 1.1), the modernized water network will allow for the continuous supply of all South Tarawa population with drinking water complying with water quality standards and will help substantially reduce NRW. It will also allow for a significant reduction of widespread kerosene-based water boiling practices at the household level, contributing to a net decrease of greenhouse gas (GHG) emissions of 31,991 tons of CO₂ equivalent over 20 years.

Subcomponent 1.3: Solar photovoltaic power plant (Cost: US$7.91 million excluding contingencies; Financing: ADB and GCF – US$7.91 million)

30. This subcomponent will support the construction of a solar photovoltaic power plant, energy storage and
transmission infrastructure. The proposed PV array will have of 2,500 MW production capacity will be ground mounted and associated to a Solar Smoothing Energy Storage system to be connected to the grid. It will offset up to 98 percent of the demand of the entire water system, including the desalination plant and water supply pumping systems, which would otherwise have been powered by diesel-based generation. This technical solution will allow for a net reduction of GHG emissions by the water system by 57,523 tons of CO₂ equivalent over 20 years, and a reduction by about 50 percent of PUB’s future operating costs. Across South Tarawa, the overall power generation capacity from low-emission sources is expected to increase from 27 percent in 2018 to 42 percent after the project. The proposed works also include an upgrade to the existing 11 kV power network to cater to the additional energy demand associated with the desalination plant.


31. This component is designed to contribute to the sustainability of water-related investments funded under Component 1 and to help improve the operational efficiency and financial viability of PUB. It will include:

Subcomponent 2.1: Support to water supply system O&M and utility institutional strengthening (Cost: US$7.73 million excluding contingencies; Financing: IDA – US$2.57 million equivalent, ADB and GCF – US$5.16 million)

32. This subcomponent will support the operation and maintenance of the water supply system by private operators and their auditing, the upgrade of the PUB’s management systems and capacity building activities for PUB staff. Support to the O&M of both the desalination plant(s) and the entire South Tarawa water supply network will be provided over a five-year period by private operators (POs), which will have previously carried out their design and construction through a Design-Build-Operate (DBO) contract. In addition to ensuring reliability of the plant(s) and water supply over that period, the DBO contract(s) will play a key role in building PUB capacities to undertake preventive, predictive and breakdown maintenance of the plant(s) and network, and ensure sound asset management. All these elements will ensure an uninterrupted, ample water supply to all project area residents, thereby making them resilient to water shortages. Under this subcomponent, the DBO contract will also support the delivery of utility management systems to improve NRW monitoring, asset management, billing and collection and GIS-based customer complaints management, the enhancement of customer-oriented culture in the utility and the delivery of vocational training to administration and technical staff on core technical subjects. The O&M component of this contract will include specific performance targets, such as (i) technical: water production capacity, water quality at production and at distribution and continuity of service; (ii) operational efficiency: non-revenue water, energy efficiency; (iii) commercial: billing and responsiveness to customer complaints; and (iv) utility management: staff training, implementation of utility management systems. This subcomponent will support the recruitment of an Independent Audit Body to review the PO’s achievement of performance targets. By helping maintain PUB’s energy efficiency and non-revenue levels at an optimal level throughout project implementation and beyond, this subcomponent will contribute on the long-term to the minimization of electricity consumption and related GHG emissions.

26 In implementation phase, the desalination system will be subject to the design-build arrangements, while the water network will be constructed based on provided detailed designs. Following a recent market sounding exercise undertaken by MISE, it may be decided to procure separately two DBO contracts, one relative to the desalination plant, and to the other to the water supply network, the upgrade of PUB’s management system and capacity building activities.
Subcomponent 2.2: Project implementation support (Cost: US$3.60 million excluding contingencies; Financing: ADB and GCF – US$3.13 million and Counterpart financing – US$0.47 million)

33. This subcomponent will support Project implementation through (i) infrastructure design activities, (ii) technical assistance to MISE and the PMU for Project management and supervision. This includes hiring consulting services to undertake (i) surveys to facilitate detailed design of project infrastructure; (ii) detailed design of water supply network infrastructure; (iii) procurement support to MISE, including preparation of bidding documents, bid evaluation and contract award; (iv) supervision of works; and (v) safeguards support and community engagement in preparation for project activities. A project implementation assistance (PIA) consultancy firm will be hired under this subcomponent to support the Project Management Unit (PMU) in project management and supervision, including management and safeguards coordination.

Subcomponent 2.3: Management of the groundwater reserves and sector strengthening (Cost: US$0.80 million excluding contingencies; Fully funded by IDA)

34. This subcomponent will support the management of the Bonriki and Buota Groundwater Reserves and sector strengthening through (i) the formulation and implementation of water reserves sustainable management plans, (ii) the preparation of sector studies, and (iii) the implementation of community engagement and non-revenue water management activities. The preparation and implementation of sustainable management plans will help mitigate water pollution risks to the Bonriki and Buota water lenses and conserve these resources increasingly vulnerable to climate change impacts. It will therefore contribute to the project area residents’ increased resilience to water scarcity. Management plans could include a range of measures such as: raising awareness among current occupants of the potential impacts of their activities on groundwater quality, implementing small-scale infrastructure improvements (e.g. sanitation, drainage), establishing an active surveillance and compliance regime aimed at protecting the water reserves and preventing further encroachment on the reserves, and enhancing groundwater quality monitoring. The subcomponent will also finance sector studies such as a review of the water tariff, as well as the formulation of sector technical and economic regulatory frameworks, which will help facilitate future dialogue between PUB and GoK on aspects such as tariff adjustments and on the set-up of service performance targets. The subcomponent will finally support the continuation of water sector activities carried out under KAP-III until new arrangements are in place under the project to further support and strengthen PUB operations (community engagement in the three pilot areas receiving continuous water supply, enhanced NRW management).

Component 3: Water, Sanitation and Hygiene Awareness (Cost: US$2.21 million excluding contingencies; Financing: ADB – US$0.92 million and GCF – US$1.29 million)

35. This component supports the formulation and implementation of water, sanitation and hygiene awareness activities, which will consist of a comprehensive and intensive 5-year ‘WASH Awareness Program (WAP)’. The WAP is critical to support significant transformations in the population’s water use and behavior that are key to project success, such as: a) restoring confidence towards PUB and the quality of its supplied water; b) deterring further use of unsafe water sources for consumptive use; c) raising awareness of the volumetric tariff and stimulating payment for water according to metered consumption; d) conserving water despite its apparent abundance at the tap; and e) changing behaviors linked to sanitation, hygiene, menstrual hygiene management, and solid waste management in a nutrition-sensitive manner (i.e. considering and seeking to address the multiple pathways of fecal-oral transmission in the local context by (i) reducing fecal load in living environment, (ii) reducing
fecal transmission via hands, and (iii) preventing child fecal ingestion during mouthing and exploratory play). Activities a) to d), directly linked to PUB’s core mandate, will be implemented as part of the DBO contract while for activity e), an international NGO will be recruited under the project and will implement the awareness campaigns with the support of local Civil Society Organizations at the community level.

**Component 4: Project Management Unit (Cost: US$2.15 million excluding contingencies; Fully funded by ADB and GCF)***

36. This component will strengthen the management capacity of the PMU to monitor and administer Project implementation. The PMU, housed in MISE, will be the core unit responsible for the overall implementation of the STWSP including the day-to-day project activities, compliance with the provisions of the grant agreements and government policies and guidelines, project administration, preparation of grant withdrawal applications, and maintenance of records. It will be staffed from both MISE/PUB personnel and individual consultants.

**Component 5: Sanitation Pilots (Cost: US$1.24 million excluding contingencies; Fully funded by IDA)***

37. This component will support (a) the design and construction of onsite or small decentralized sanitation systems and fecal sludge management systems, and (b) the provision of technical assistance and training to community-based organizations and other stakeholders involved in the implementation and management of the sanitation and fecal sludge management facilities. The implementation of nutrition-sensitive pilot sanitation models will aim to upgrade current sanitation services and provide an acceptable alternative to a costly expansion of sewerage systems across all of South Tarawa beyond the areas targeted by the current ADB-financed project. The models will be recommended by a concept study and designed by a subsequent engineering study, both commissioned by NZ MFAT as part of donor collaboration under the project. Recommendations to improve greywater management, formulated in a recent technical assistance provided by the World Bank, will also be considered in the design of these pilots. Sanitation activities will focus on (but not be limited to) the three KAP-III village pilots (representing about 280 households) where 24/7 water supply was introduced in early 2018. The study should be completed in mid-2020. Investments in sanitation infrastructure will aim to reduce the contamination of urban groundwater and help improve the quality of those local water sources including during extreme weather events, thereby contributing to the area residents’ resilience to climate change threats.

**C. Project Beneficiaries***

38. The entire population of South Tarawa (58,000) is expected to benefit from improved water services through the project. All customers across South Tarawa will receive house connections and will enjoy continuous supply of drinking water at a satisfactory pressure level and complying with national quality standards. The upgrade of operating policies within PUB, as supported by the DBO, will also lead to the improvement of customer services, including higher responsiveness to any query or complaint. Several communities are also expected to benefit from access to improved sanitation. The targeted number of beneficiaries for sanitation will be determined upon completion of the preparatory study commissioned by NZ MFAT.

**D. Results Chain***

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To develop the results chain for STWSP, a theory of change approach was adopted and is illustrated in Figure 1 below.

**Figure 1: Theory of Change Chain for STWSP**

**Activities**
- Construction of seawater desalination plant
- Construction of a photovoltaic power plant
- Expansion and modernization of the water supply network
- O&M of PUB water infrastructure by a private operator
- Upgrade of PUB technical and commercial management systems
- Vocational training and on-the-job training of PUB staff
- Construction of a photovoltaic power plant

**Outputs**
- Seawater desalination plant constructed
- Photovoltaic power plant constructed
- Water supply network modernized and expanded
- PUB infrastructure operated and maintained according to international quality standards
- Enhanced operational capacity by PUB staff
- Improved commercial management
- Photovoltaic power plant constructed

**Outcomes**
- Water production capacity sufficient to meet water demand and ensure service continuity
- Water supply network reaching all households in South Tarawa, on a continuous basis
- Contamination of PUB water from groundwater infiltration prevented
- Reduced non-revenue water
- Reduced electrical energy cost
- Improved operational performance of the water supply services provider in South Tarawa

**Objectives**
- Increase access and quality of water supply services

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**E. Rationale for World Bank Involvement and Role of Partners**

The World Bank’s engagement in Kiribati’s water sector adds value in several areas, including: (i) bringing in global experience of water infrastructure investments and associated technical assistance; (ii) providing best practices for water utility reform and private sector participation, including through DBO contractual arrangements; and (iii) helping GoK address any environmental and social safeguard issues. Transferring this expertise will be key in supporting the government to prepare and implement the proposed project efficiently and effectively. Also, as noted earlier, STWSP builds on the KAP series of projects and on PUB technical assistance activities (including KUSRP and the PPIAF-funded Kiribati Water Sector Reform Study), all supported by the World Bank.
41. There is a rationale for public concessional financing of the project, given the urgency and need to increase water supply to address the coverage gap, the size of planned investments as well as the market, sector and macro-economic context that would make commercial financing unaffordable and highly uncertain. Moreover, for water supply and sanitation investments of this nature and associated positive externalities justifies the use of public resources. This is consistent with international experience where countries have achieved universal water supply and sanitation coverage with significant public financing.

42. The proposed investments and technical and financial improvements will help improve the overall financial position of PUB and, in time, could make private sector financial participation more viable in the future: (i) the expansion of water services will significantly increase the revenue base of PUB and improvements supported under component 2 will enhance the technical and financial viability of PUB; and (ii) subcomponent 2.3 will assist with some of the sector governance and regulatory issues. These two sets of improvements to be triggered by private sector participation will directly contribute to PUB’s ability to achieve financial efficiency, which ultimately leads to improved creditworthiness and enables access to commercial capital.

43. There has been over the recent years strong coordination among donors, which are working from common investment maps and policy recommendations, captured under the South Tarawa Water and Sanitation Roadmap 2011-2030. In addition to the strong collaboration with ADB in the context of project cofinancing arrangements, STWSP will benefit from GCF funding, approved in October 2018, to be administered by ADB, whose Board approved the proposed ADB grant in early September 2019. STWSP will also benefit from the preparation by NZ MFAT of the preparatory engineering documents supporting the design of sanitation-related activities. The completion of these engineering designs is planned for early 2020. NZ MFAT is also providing funding for an international advisor in the role of PUB CEO through a Technical Assistance initiative managed by the Australian Department of Foreign Aid and Trade (DFAT). The project’s steering committee, NIDSC, will ensure participation, coordination and synchronization between partners and their respective programs and projects.

F. Lessons Learned and Reflected in the Project Design

44. The project design draws from valuable experience gained by ADB in the procurement and implementation of desalination plants in the Marshall Islands, adopting robust plant designs to meet the service provider’s limited operational capacity and difficult access to spare parts, and using DBO arrangements to support the progressive development of local capacity. The importance of designing simple water networks that can be operated and maintained by PUB was also highlighted under KAP-III. Components used in the reticulated network systems were specified to be readily available from domestic and regional markets, and materials and component to conform standards prevailing in the region whenever possible to match suppliers’ inventories.

45. The project also incorporates lessons from the World Bank’s significant experience in water utility reform programs, including through public private partnerships and performance-based contracts. Past programs have succeeded where governments have been fully committed to reforming their urban water supply sectors, in particular with regards to the recovery of costs from user charges, the strengthening of the utility’s management autonomy and accountability to end users and to the government. A relevant lesson learned from the Armenia Municipal Water Project (P126722) is the need to carefully analyze plans for budget support to management contracts (government subsidy) to encourage the utility to gradually move towards cost recovery in the long
term as service quality improves, which the team has applied in collaboration with ADB regarding GoK’s CSOs. The Vietnam Water Supply Development Project (P073763) showed that starting small, through pilots, when rolling out innovative measures (DBO, NRW programs) was key to the identification of appropriate measures and their successful scale up, similar to the pilots carried out under KAP-III. The inclusion of strong contractual incentives is also recognized as an important condition for increasing efficiency.

46. The project builds on the World Bank’s global experience with performance-based contracts to reduce non-revenue water. To be efficient, NRW programs directed at reducing physical leakages must include a sizable budget for investment and rehabilitation. In this sense, the design of the DBO(s), through which performance improvements will be achieved, must balance accountability for end results and cost-effectiveness when assigning the performance risk to the private partner. The identification of the potential for a performance-based component in the contract also follows the guidance provided in the recently published Operational Manual for The Use of Performance Based Contracts for Non-Revenue Water Reduction. Engagement in Panama’s secondary city of Colon (P119694), where there is a high incidence of violence, has showed the importance of a well-structured and inclusive social management in ensuring buy-in from customers and promoting behavior change around the implementation of metering and tariffs, paving the way for the implementation of the project’s Performance-Base Contract (PBC). The PBC allowed the utility to test and lay the groundwork for new methods of doing business, providing the Colon Business Unit with a concrete example of service-focused operation and the tools necessary to implement this new approach.

47. The World Bank’s global experience highlights the close link between stakeholder engagement throughout the project cycle and a project’s effectiveness and sustainability. To ensure a sense of ownership and commitment in the beneficiary communities, the project will promote community participation through continuous consultations prior to and during implementation. Experience in Tegucigalpa, Honduras (P103881), echoes the importance of active citizen engagement in local planning and the development of outreach and communication material, which helped the project overcome some opposition to metering through the PBC. In addition, implementation in Honduras demonstrated the need for explicit government involvement and support in sustaining the gains realized through the PBC. The lessons from the KAP-III project also indicate the need to devote considerable time and resources for effective community engagement, public awareness raising, and behavior change management. Extensive community consultation over long time periods formed part of the implementation program and proved essential to expedite processes, together with close coordination between contractors, the KAP-III PMU, GoK and other relevant government agencies. The project will also support programs to raise community awareness on the importance of safe drinking water, source protection and proper sanitary practices. The project will ensure women’s participation in these programs given that the burden of an inadequate water supply falls most heavily upon their shoulders.

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28 World Bank. 2015. ICR 3553.
III. IMPLEMENTATION ARRANGEMENTS

A. Institutional and Implementation Arrangements

48. The Government of Kiribati indicated a strong preference for the World Bank and ADB to prepare a joint operation, rather than separate projects. Developing a unified approach, both during preparation and throughout implementation, will help minimize duplication, transaction costs and complexity, which would be essential in a context of limited implementation capacity. The World Bank and ADB subsequently adopted a common approach and framework to address each donor’s respective environmental and social requirements, as well as financial management and disbursement arrangements. It was also agreed that, to facilitate project management, only one donor’s procurement procedures should be utilized during implementation. For several reasons, including the advanced stage of ADB’s project preparation, and because ADB is mobilizing GCF funding, it was agreed that ADB would be the lead cofinancier and that the World Bank team would use the Alternative Procurement Arrangements (APA) policy during implementation. Using ADB’s procedures to procure works, goods and services will eliminate the need to carry out separate tenders according to different procedures. Two Project parts will be fully financed by the Association and will not be subject to APA: (i) Part 2.3 - the management of the water reserves and sector strengthening activities; and (ii) Part 5 - implementation of sanitation pilots. Under these Project parts, the Recipient will use the Bank’s procurement rules and the Bank will lead procurement implementation support and monitoring.

49. The APA agreement signed\(^\text{33}\) by the World Bank and ADB defines how both agencies would respond to issues during implementation, including technical, procurement, financial management and safeguards aspects of STWSP. Both agencies agree to ensure the prompt delivery and exchange of information regarding the project and, when practical, will field joint missions during implementation to supervise progress. The APA would take effect after approval by the Boards of Directors of both organizations.

50. The implementing agency will be the Ministry of Infrastructure and Sustainable Energy (MISE). This is the first time MISE plays that role in a project financed by the World Bank, although it was responsible for the technical implementation of individual components of World Bank-financed projects and has experience in implementing projects financed by ADB.

51. The National Infrastructure Development Steering Committee (NIDSC) will act as the project steering committee to provide strategic direction and guidance during project implementation. NIDSC will provide general oversight and will review progress and the results of periodic monitoring and evaluation activities. NIDSC is chaired by the Secretary of the Cabinet and includes as core members the Secretaries of MFED and MISE and may be expanded to include representation from other stakeholders, if needed, to strengthen coordination and implementation. NIDSC will meet on a semi-annual basis, or more frequently, as needed.

52. A PMU has been established to support MISE in implementing STWSP. It reports to the Secretary of MISE and to NIDSC. The PMU, under the guidance of MISE, will have responsibility for overseeing and managing project execution and compliance with project requirements, including those associated with procurement, financial management and auditing, safeguards, monitoring and evaluation, and project reporting. KFSU will support the PMU on financial management (FM) and accounting functions and arrangements under the project. In addition to

\(^{33}\) Signed on February 20, 2019
its manager, who has already been recruited, the PMU will appoint seven individual consultants with specialist expertise in project management, technical and social matters, procurement management, accounting, and environmental and social safeguards. In particular, a procurement specialist and a safeguard manager will be appointed in the PMU and an accountant in KFSU by not later than three months after effective date of the financing agreement. The PMU will recruit and manage the DBO contract covering all activities under subcomponents 1.1, 1.2, 2.1 and part of component 3 activities, and all other contracts required to achieve the PDOs. An Independent Audit Body recruitment will be hired to review the achievement of the performance targets of the PO(s), which will be critical to DBO(s) contact management. During project implementation, the PMU will also be supported by Project Implementation Assistance (PIA) consultants in project management, supervision and safeguards management and coordination.

53. A Project Operations Manual (POM) is being jointly developed with ADB and the PMU and define procedures for implementing STWSP. It shall be finalized and approved not later than one month after project effectiveness. STWSP will be carried out in accordance with the arrangements and procedures set out in the POM, which can be amended from time-to-time, provided all modifications are agreed with the World Bank and ADB in writing prior to any changes.

54. The project will be implemented over an eight-year period to allow for the financing of the five-year O&M of the DBO contract following the construction phase.

B. Results Monitoring and Evaluation Arrangements

55. To ensure effective monitoring and evaluation, several measures will be taken. Members of the PMU will be required to have demonstrated skills in data collection and reporting, preferably on World Bank and/or ADB projects. Secondly, this expertise will be bolstered with support from the project team through the provision of reporting templates and feedback on reports prepared by the CMU.

56. MISE will issue quarterly progress reports that will be due the last day of March, June, September and December of each year. These will be forwarded to the World Bank within 30 days of the end of each calendar quarter. A mid-term review will be prepared within three years of project effectiveness, and an Implementation Completion and Results Report completed within six months of the end of project implementation. MISE will also monitor progress against agreed performance indicators, as defined in Section VI. The PIA consultants will work closely with and provide regular updates to the PMU Manager on project progress. In the context of the DBO contract, an Independent Audit Body will be hired to periodically review the PO’s achievement of performance targets.

C. Sustainability

57. The Borrower’s commitment is ensured by the strong alignment between the project’s investments and national and sector strategies. The project is supporting the implementation of Kiribati Development Plan (2016-2019), which was the result of a comprehensive planning process that included consultation and coordination across the government, with civil society and the private sector. It is also closely aligned with the Water and Sanitation Roadmap 2011 to 2030, which was prepared in close consultation with members of the National Water
and Sanitation Coordinating Committee (NWSCC)) and with communities.

58. To ensure the sustainability of the project’s investments and services, the infrastructure has been designed and specified considering the impacts of climate change on water supply and demand, aiming to be climate-proof and with durability of materials as a high priority. Network infrastructure has been designed to function under various 50-year growth scenarios and the desalination system has been conceptualized in an adaptive manner to allow for a future increase in production capacity. The use of Solar PV technology to power the desalination plant(s) will significantly reduce the costs of operating the desalination system. In parallel, to ensure sustainability from the customer/user perspective, the project will implement a comprehensive social management plan, including an educational and awareness campaign throughout the project cycle to ensure the beneficiaries’ adoption of water and sanitation systems and to promote good hygiene practices and community environmental stewardship. Building on the experience gained through KAP-III, the project will also support GoK in the design and implementation of measures to protect and manage the water reserves at Buota and Bonriki, which are critical to long-term water security in South Tarawa and are subject to encroachment by squatters.

59. The use of long-term performance-based DBO contract arrangements for the water infrastructure will ensure the strong performance of these key assets for at least five years following completion of works and help progressively strengthen PUB’s capacity to operate these infrastructures by itself in an efficient and sustainable manner. PUB staff will benefit from extensive mentoring and on-the-job training from private sector professionals undertaking the O&M contracts as well as from technical assistance and vocational training programs on a broad range of topics. After project completion in 2027, PUB would be expected to build on this strengthened capacity and operate the systems without external support. However, depending on PUB’s achieved level of operational autonomy and on the availability of financial resources, there would also be the possibility for a continuation of the DBO arrangement, in its original form or with a reduced scope of operational support from the private operator.

60. Overall, the project’s financial sustainability will be ensured through a multi-pronged approach including: (i) the implementation of a power generation technology (solar PV) that significantly reduces the overall operating costs of the desalination plant(s) and of PUB, (ii) the financing of capital costs through grants that do not have to be recovered by PUB, (iii) the improvement of PUB’s operational efficiency to minimize operating costs and the strengthening of revenue generation through the involvement and capacity building efforts of the DBO contractor(s), (iv) the promotion of a new water tariff allowing to recover operating costs, building on the Government’s recent tariff reform and on emerging evidence of the population’s willingness to pay and consumption habits, (v) the introduction of a regulatory framework which clarifies PUB’s performance targets and accountability to MISE and further tariff updates, (vi) Government commitment to the CSO policy and to providing additional resources that may be required to cover PUB’s operational expenditures (OPEX) during project implementation, which was demonstrated in recent years and reiterated in the recent GCF application, and (vii) the inclusion of a legal covenant in the Financial Agreement requiring that Cabinet ensures availability of adequate financial resources to cover any shortfalls in the funding of PUB’s OPEX. Items (vi) and (vii) above will be particularly critical until the Government puts in place improved water tariffs, as supported under item (iv).

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34 National Water and Sanitation Coordinating Committee (NWSCC), chaired by MISE, was a multi-agency body with representatives from the ministries of health, public works, finance, environment, and internal affairs and nongovernment organizations. It was replaced in 2012 by the NIDSC.

35 Since the project will be entirely financed by grants, the recovery of CAPEX is not required.
IV. PROJECT APPRAISAL SUMMARY

A. Technical, Economic and Financial Analysis

61. The project design represents a technically viable approach to improve access to water supply services in South Tarawa. ADB has provided a Project Preparation Technical Assistance (PPTA) to MISE to develop concept designs for the modernized water supply system and the solar PV system, and a Project Design Advance (PDA) consultancy services to support the preparation of detailed designs and bidding documents. Engineering designs are built on past studies including the Tarawa Water Master Plan 2010-2030 and the Tarawa Water and Sanitation Roadmap 2011-2030. The proposed technical solutions, which include solar powered seawater desalination through reverse osmosis, pressurized transmission systems and gravity-fed distribution zones through head tanks are considered adequate to achieve drinking water service delivery standards.

62. The PPTA reconfirmed that two water sources should be considered a priority to meet South Tarawa’s long-term water supply needs, mitigate risks through sources diversification and increase resilience to climate-related risks on freshwater availability: groundwater from the water reserves (the historical source) and seawater desalination. The contaminated urban water lenses, freely accessible to most households through private shallow wells, are expected to continue playing a role, although reduced, in the population’s non-consumptive water use. The contribution of rainwater harvesting will remain marginal: although generally encouraged in South Tarawa, it cannot be relied on during prolonged droughts and it is not economically competitive with desalination given the small scale of potential harvesting schemes. Based on the present and future household water use levels presented in Table 2, the contribution of drought-proof water sources (seawater desalination) to the population’s water use is expected to grow from 0 percent to 56 percent because of the project.

63. Other non-conventional water resource development options would not be relevant to meet these objectives. Wastewater reuse would face several obstacles, such as (i) a low population coverage with sewerage systems (about 25 percent, scattered across three dispersed islets), with limited scale-up potential given the prevalence of traditional housing without internal plumbing, and (ii) the reliance on saltwater for toilet flushing.

Table 2: Household water consumption from various sources before and after the project (lpcd)

<table>
<thead>
<tr>
<th></th>
<th>PUB Water</th>
<th>Seawater desalination</th>
<th>Freshwater lenses - Water reserves</th>
<th>PUB total</th>
<th>Urban water lenses</th>
<th>Rainwater harvesting</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before the project (2018)</td>
<td>0</td>
<td>8</td>
<td>8</td>
<td>28</td>
<td>2</td>
<td></td>
<td>38</td>
</tr>
<tr>
<td>After the project (2030)</td>
<td>37</td>
<td>15</td>
<td>52</td>
<td>12</td>
<td>2</td>
<td></td>
<td>66</td>
</tr>
</tbody>
</table>

37 Team’s estimate, based on various sources of information, including:
   - White, 2009
   - Jacobs, Scope Pacific Ltd, 2017. South Tarawa Desalination Economic and Social Feasibility Study. NZ MFAT
   - A survey of 292 households conducted as part of STWSP preparation.
38 Including from the two desalination plants implemented in 2019 at PUB Power Plant and Tungaru Hospital
making wastewater brackish and inappropriate for conventional treatment.

64. To ensure the sustainability and adequate implementation of the desalination system, MISE will procure it using a DBO contract, including specific performance targets for O&M such as energy efficiency. The water transmission system is designed to interconnect South Tarawa’s groundwater abstraction and desalination systems, to mitigate the impacts of temporary failures in either system on water supplies to the population. When possible, head tanks refurbished under KAP-III will be considered rather than pumping systems to simplify O&M. The DBO contract bidding documents are currently under preparation, and their completion is expected in early 2019.

65. The major decrease in NRW, from 92 percent to an expected maximum of 25 percent (including a reduction of physical losses from 60 percent to less than 10 percent), will be possible through the replacement of a derelict water distribution system (which will be abandoned)\(^{39}\) by a new network, constructed and operated by an international DBO contractor with strong NRW minimization performance incentives. Most trench works will take place on sandy soils in non-asphalted alleys, which should facilitate the pace of implementation and minimize local disruptions. Under the WAP (component 3), the DBO contractor will also have significant resources to help PUB customers transition to the application of volumetric tariff charges and discourage unauthorized water use.

66. The design of sanitation activities will be carried out by a consulting firm under recruitment by NZ MFAT, and whose terms of reference have been reviewed and approved by the World Bank team. The sanitation solutions and the associated management model to be implemented under the project are expected to be simple in design and to recognize local constraints in terms of infrastructure maintenance capacity yet ensuring adherence to the “safely managed”\(^{40}\) sanitation standards as per SDGs.

67. A detailed screening for climate change and disaster risks was done for the project’s infrastructure investment components. South Tarawa is particularly vulnerable to sea overtopping and contamination of its freshwater lenses (due to sea level rise and increased storm surges), and to droughts, as described in paragraph 8. The design of the future water production system is based on a detailed assessment of associated risks on the future available yield of Bonriki and Buota groundwater lenses. The potential impacts of sea overtopping on future infrastructure (plants, networks, electrical system) showed that those threats are generally limited.

68. Concept designs for the water desalination system and detailed designs for the water network have been completed. Bidding documents for the DBO contract are currently under preparation. Concept designs for the solar PV system have been completed, and the preparation of engineering designs and bidding documents is underway. Terms of reference for the main project consultancies (PIA, PMU experts, awareness campaigns, water reserve sustainable management plans preparation) have been prepared. During the first 18 months of project implementation, it is expected that most key contracts (including the DBO contract) will be procured and under implementation.

69. **Least cost analysis and cost-effectiveness.** A least cost analysis was conducted, focusing on the power supply system, for which two credible design options have been identified: (a) diesel generation using PUB’s current system, and (b) the use of solar PV system. The analysis showed that the net present value (NPV) of

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\(^{39}\) To the exception of the new pilot water systems financed by KAP-III.

\(^{40}\) Use of improved facilities which are not shared with other households and where excreta are safely disposed in situ or transported and treated off-site
supplying electricity generated by diesel to address the incremental electricity demand of the project is around two times the NPV of supplying electricity using the PV technology, even if considering associated capital costs.

70. Engineering criteria used for the conceptualization and design of water infrastructure have been selected to minimize operating costs considering local needs. The proposed reverse-osmosis desalination technology is most cost-effective in this range of plant capacity. Overall, water infrastructure investments and associated consulting services represent a ratio of about US$560 per future beneficiary, a high level compared to common international references largely due to countries’ remoteness. The unit rates considered in project cost estimates are largely based on ADB’s extensive operational experience in the water sector in the Pacific region.

71. **Economic Analysis.** An ex ante economic analysis was undertaken for the proposed project, computing the economic internal rate of return (EIRR), economic net present value (ENPV), and economic benefit-cost ratio (EBCR) under two scenarios: low and high estimate of the value of CO₂ emissions reduction. The considered economic benefits were (i) avoided costs of medical treatment, avoided costs of lost productivity on the part of patients and caregivers (contributing to an improved country’s HCI), (ii) avoided loss of productivity due to the time spent by households collecting water from distant water sources, and (iii) carbon (CO₂) emissions avoided. Benefits for South Tarawa’s electricity sector related to the integration of the solar PV system to the grid and the occasional delivery of surplus electricity production have not been quantified. Therefore, the proposed cost-benefit analysis can be considered conservative, and it would be reasonable to assume that the actual project benefits will be larger.

72. Results of the economic analysis, summarized in Table 3, indicate the economic viability of the project, even when sensitivity tests were carried out, as shown below. Further details are provided in Annex 3. The project is justified because of the rates of return which are all higher than 12 percent. In the context of Kiribati, where natural resource endowment, particularly fresh water, is lacking and the incidence of poverty is high, the project’s contribution is highly valuable.

<table>
<thead>
<tr>
<th></th>
<th>EIRR (Value of CO₂ emissions excluded – high value of CO₂ estimate), %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Case</td>
<td>17.7 - 18.5</td>
</tr>
<tr>
<td>20% increase in capital expenditures (CAPEX)</td>
<td>16.2 - 16.2</td>
</tr>
<tr>
<td>20% increase in operational expenditures (OPEX)</td>
<td>18.2 - 18.2</td>
</tr>
<tr>
<td>20% decrease in benefits</td>
<td>15.3 - 15.3</td>
</tr>
<tr>
<td>20% decrease in benefits and 20% increase in costs</td>
<td>13.0 - 13.0</td>
</tr>
</tbody>
</table>

73. **Cost recovery.** The project was further assessed to determine the degree of cost-recovery from PUB’s perspective. Since the CAPEX are not expected to be recovered as these will be provided as a grant, as requested by GoK given the strong positive externalities, the financial analysis focuses on the review of PUB’s future cost recovery.

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41 Consistent with the Bank: *Guidance note on shadow price of carbon in economic analysis* (2017).
74. Major efficiency improvement measures supported by the project, such as the reduction of NRW and the provision of solar-powered electricity will help reduce significant PUB’s unit operating costs. The project will also help enhance revenue collection by (i) expanding the customer base through coverage increase, (ii) stimulating users’ willingness to pay by improving the quality of services and through awareness campaigns, (iii) improving PUB’s commercial and customer management capacity. The adoption of an optimized water tariff will also be critical to enhance revenues. Under the water tariff introduced by PUB in early 2018, a household bill for an average consumption of 52 lpcd (design assumption) would cost $AU60 per month, which represents on average $AU5.4 per cubic meter. There is increasing evidence that this tariff is not consistent with local affordability and willingness-to-pay parameters. In that perspective, MISE is currently conducting a review of the water tariff as foreseen under project Subcomponent 2.3 and with funding from the PPA (see Annex 1 for further details on the PPA). The present cost recovery analysis was made considering, for analytical purposes, a water tariff defined based on recent survey information. This proposed water tariff would bring a monthly household water bill down to $AU11.5 for a 52 lpcd consumption (on average $AU1.0 per cubic meter), which would represent 4.9 percent of household income in the lowest population quartile, in line with the international norms of affordability. It should also be noted that households will maintain access to free water sources (shallow wells, and for some, private rainwater harvesting), which will allow them to increase water use for non-consumptive purposes at no additional cost, if needed.

75. The cost-recovery analysis shows that, under the proposed tariff, tariff revenues would represent 155 percent of OPEX (without depreciation) during the O&M phase of the DBO contract(s), and 117 percent after project completion. This is to be compared to the current cost coverage ratio of 32 percent. In the event that PUB does not recover OPEX during project implementation, a covenant to the Financing Agreement will require that Cabinet ensures availability of adequate financial resources to cover any shortfalls in the funding of PUB’s OPEX. PUB’s SOE status requires the recovery of depreciation costs as well. In such case, the amount of subsidy required to complement revenues from the tariff would represent an average AU$1.15 million during the O&M phase of the DBO contract, and AU$1.54 after project completion.

B. Fiduciary

(i) Financial Management

76. The FM arrangements are expected to satisfy the FM requirement as stipulated in Bank policies and directives on Investment Project Financing subject to implementation of the recommended FM mitigating measures. The Kiribati Fiduciary Service Unit (KFSU) is located within MFED and staffed by consultants financed by ADB and World Bank-financed projects. The unit provides the day to day Financial Management support for all the World Bank-financed projects and employs three accountants who divide up the workload. The unit also provides some procurement support.

77. The financial management assessment was carried out in accordance with the “Principles Based Financial Management Practice Manual” issued by the Board on March 1, 2010. Under the World Bank’s

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42 OPEX per cubic meter of water sold.
43 Household income and willingness-to-pay information gathered from the survey of 292 households conducted in June 2018 across South Tarawa, and household consumption and billing records from the KAP-III pilot villages now benefiting from 24/7 water supply.
44 Based on international recommendations, water expenditures should be within the range of 3-5 percent of the household monthly income of the lowest income group.
OP/BP 10 with respect to projects financed by the World Bank, the borrower and implementing agency are required to maintain financial management systems – including accounting, financial reporting, and auditing systems - adequate to ensure they can provide the World Bank with accurate and timely information regarding the project resources and expenditures.

78. The main risk is potentially insufficient resources in KFSU to manage the FM functions of the project and to mitigate this risk, a full time Project Accountant will be employed by the PMU and based in the KFSU. A covenant to the Financing Agreement will require that the Accountant is hired no later than three months after Project effectiveness.

(ii) Procurement

79. The World Bank Procurement Regulations for Investment Project Financing issued in July 2016 will be followed for procurement under the project Subcomponent 2.3 and Component 5. For all other procurement, the project will adopt Alternative Procurement Arrangement (APA) instrument as per the section III.F of the World Bank Policy “Procurement in IPF and Other Operational Procurement Matters” for all other parts of the project. In those parts, the project will relay and apply the procurement rules and procedures of another Multilateral Development Bank – ADB, which will take lead in providing the implementation support and monitoring of project procurement activities. The project will fund the procurement of goods, works and services related to the water sector and to the energy sector using ADB’s procurement rules and procedures. The detailed procurement plan for the first 18 months is prepared based on the analysis in a short Project Procurement Strategy for Development (PPSD).

C. Safeguards

80. Under the joint cofinancing arrangement with ADB, both the World Bank’s and ADB’s policies will apply to all project safeguards instruments. The World Bank will review the instruments and related documents prior to finalization and disclosure. Management of all safeguards issues will be conducted by MISE. The PMU will be responsible for ensuring the preparation and implementation of safeguards instruments, as well as overall compliance enforcement of relevant national safeguards regulations and World Bank safeguards policies. Due to MISE’s limited experience with ADB’s or the World Bank’s safeguards policies and instruments, the PMU will hire dedicated environmental and social safeguards specialists and be supported in related tasks by the Project Implementation Assistant (PIA).

(i) Environmental Safeguards

81. The key potential environmental impacts associated with the project relate to the construction activities, operation of the desalination plant(s) and pollution of the Bonriki and Buota groundwater lenses. None of these potential impacts are significantly adverse, impacts are site-specific and mitigation measures can be readily designed. Hence, the project is classified as Category B in accordance with OP 4.01 Environmental Assessment. The project triggers environmental safeguards policies on Natural Habitats (OP/BP 4.04), and Physical Cultural Resources (OP/BP 4.11). An Environmental and Social Impact Assessment (ESIA) was prepared and disclosed in-country and on World Bank external website on September 30, 2019.

82. Construction activities will cause no more than temporary impacts in any one location. These impacts will
include minor dust and noise generation from construction plant. It is not expected that these impacts will significantly impact community amenities. The main by-product of the desalination process is brine which has a higher salinity than the receiving marine waters. The potential impacts of this discharge will be mitigated through mixing with sewage effluent in the Betio outfall and dispersion at a depth of 30 meters below the surface beyond the reef platform.

83. Existing informal settlement activities on the Bonriki and Buota water lenses have the potential to cause pollution to the underlying water lenses, compromising the water quality of this source. It will therefore be critical to institute a management regime to ensure that potential pollution is minimized (see subcomponent 2.3).

84. The Tarawa atoll includes numerous physical cultural resources (PCR) comprising historical relics from World War II. While known relics can be avoided by design, there is the potential for chance finds of PCR items. Hence a standard chance finds procedure will be developed to respond to this eventuality and appended to the ESIA.

(ii) Social Safeguards

85. Overall, the project will be socially beneficial as the provision of safe drinking water and proper sanitation is expected to have a significant positive impact on health and livelihoods. The anticipated negative impacts will be localized, site-specific and small in scale. OP/BP 4.12 is triggered while the project is not expected to require significant land acquisition.

86. As most of the exact sites where infrastructure will be constructed have not yet been identified, the client has focused on preparing a Resettlement Policy Framework (RF) to clarify the principles and legal and institutional procedures for resettlement and rehabilitation to be applied to the investments. The RF has been prepared in a consultative manner and in accordance with ADB’s and the World Bank’s policies on Safeguards, as well as the requirements of the Kiribati legal framework. This document has been consulted upon, approved by the World Bank and disclosed in-country and on World Bank external website on September 30, 2019. The ESIA and RF address social risks and benefits of the project as well as measures to manage the risks. Further social assessment work will be undertaken – and informed by meaningful consultation – during detailed design and preparation of future ESMPs and resettlement plans.

87. Where possible, government-owned or leased land has been identified for siting of project infrastructure. The solar PV array will require about three hectares, which represents a challenge given the scarcity of land in South Tarawa. The Bonriki water reserve has been identified by GoK as the most likely location for the array. As part of detailed design activities, the Project Design Advance (PDA) consultant hired by ADB will identify precise siting areas for the PV array, water supply tanks and booster pumping stations considering the various technical, land use, environmental and social implications. A desalination plant will be implemented in West Betio on a land over which Government has a long-term lease, and discussions are ongoing over the possible implementation of a second plant in McKenzie.

88. In the Bonriki and Buota water reserves, the project will support the formulation and implementation of Sustainable Management Plans (SMPs) in consultation with reserve occupants, to mitigate lenses pollution risks. The SMPs will include measures such as community awareness about potential water contamination from household activities, education on behavior change and prevention of further in-migration. Should,
GoK seek to resettle occupants to support project implementation or more broadly to preserve groundwater quality from local pollution, the RF incorporates measures to ensure that this is undertaken in accordance with OP 4.12 requirements. Any decision to resettle shall only be taken once all other options and mitigation measures have been reviewed and ruled out.

(iii) Gender and citizen engagement aspects

Gender plays a significant role in the interaction with water and the impact of waterborne diseases. Women’s roles in water and sanitation include: water collection from wells and communal rainwater harvesting systems; responsibility for household hygiene and sanitation; decision making on use of household resources; care for household members whose illnesses are a result of waterborne diseases such as diarrhea; mobilizing communities and disseminating information on the impacts of poor water and sanitation attitudes and practices; and the management and monitoring of water collection, distribution and use. As such, the need to ensure that the household has safe water affects women’s time and options for income generating and other activities. Caring for ill family members also is generally a female responsibility. Bouts of poor health through ongoing waterborne disease illnesses affect school attendance in both female and male children (GHD, 2015). Men sometimes support women to fetch water (in pails or other receptacles), linked to the purchase of rainwater for household consumption. Gender imbalance, significant in the nation’s workforce, are even more stark in the water sector: women represent 38 percent of all employed people in South Tarawa, but only 9 percent (7 out of 81 employees) of the MISE’s Water and Sanitation Engineering Unit (WSEU) and PUB’s Water Engineering Department staff.

Having access to safe and sustainable water supply will have a particularly positive impact on women, who carry much more of the burden of managing water collection and hygiene practices in households, as described above, so that they can spend more time on other productive activities. The project will monitor the impacts of 24/7 safe water supply on their daily lives through different citizen engagement mechanisms, such as household surveys, interviews and customer satisfaction reporting, in a gender-disaggregated manner. The project will actively engage citizens and will seek their feedback through mechanisms such as customer satisfaction surveys, community consultations, focus group discussions and a GIS-based complaint management system to be designed and implemented under the DBO contract(s). Moreover, the project Gender Action Plan (GAP) addresses potential gender inequality risks and promotes women as project beneficiaries through provision of targets for female participation in community discussions/consultations on the design and implementation of water supply improvements; female participation in MISE and other project related capacity building activities; employment of females for project related infrastructure; training on GAP implementation and gender awareness for the PMU and MISE/PUB staff. Due to men’s traditional roles both in carrying water as well as in undertaking general household work, the GAP also requires that males are adequately represented in the project.

Strategies proposed under the GAP to address gender disparities in this project and associated indicators include: (i) establishing new connections which would benefit 100 percent of female-headed households (which represented in 2015 up to 25 percent of total households); (ii) ensuring participation of women in project orientation and consultations and focus group discussions organized under Components 3 and 4 (orientation sessions will also be conducted with men due to their role in carrying water and the need to engage them to not damage the water supply piping); (iii) ensuring that, in all activities under Component 3, at least 50 percent of community mobilizers are women, and that women represent 50 percent of participants (including girls in schools) in gender-sensitive monthly WASH awareness-raising seminars and activities; (iv) ensuring that at least 20 percent of new recruits to PUB’s WSEU are women, which will be achieved as a result of efforts by the DBO contractor(s)
to strengthen PUB’s female water engineer incubator program in Kiribati Institute of Technology, and through the development of a PUB Human Resources policy to stimulate women’s career development; and (v) ensuring that at least 20 percent of PUB staff trained through the project are women and that at least 10 percent of women are involved in community work during civil works and employed during O&M by the DBO contractors). Gender equality in safety and hygiene for both men and women workers will be required in all contracts and activities. The project will provide sufficient resources to implement the GAP, with the internationally-recruited Social and Gender Specialist of the PMU being directly responsible for its implementation and monitoring and contracts terms of reference and specifications drafted to reflect these plans and commitments wherever applicable.

92. **Gender-based violence (GBV).** Violence against women and girls is prevalent in Kiribati: an estimated 68 percent of women between the ages of 15 and 49 years who have ever entered into relationships have reported experiencing physical or sexual violence, or both, by a partner. In the context of water and sanitation services, the main GBV-related risk appears to relate to open defecation practices taking place at dark, in remote areas. Component 5 of the project will aim to reduce open defecation, and therefore minimize women and girls’ exposure to potential GBV. Overall, an assessment of the project was carried out using the World Bank’s GBV Risk Assessment Tool, and it was found to fall into the “lower risk” category. This is due, in particular, to: (i) significant resources being dedicated by the project to construction supervision, with the presence of an international social development gender aspects specialist in the PMU, (ii) the absence of remote construction areas that would be difficult to supervise, and (iii) the limited amount (in time and number) of labor influx anticipated to carry out the works. The PMU and supervisors will be provided with referral information to direct any complaint or issue related to GBV during project implementation. Contracts including construction activities will include a code of conduct setting GBV-sensitive behavior standards.

(iv) **Grievance Redress Mechanisms (GRMs)**

93. The safeguards instruments have also integrated a GRM process for the project. This incorporates a process to receive and facilitate resolution of affected peoples’ concerns, complaints, and grievances about the project’s performance, including those concerning environmental and social impacts and issues. The GRM will ensure that: (i) the basic rights and interests of every affected person are protected; and (ii) their concerns arising from project performance during the phases of design, construction and operation activities are effectively and addressed in a timely manner. The GRM will need to ensure that any concerns are addressed quickly and transparently, and without retribution to the affected parties. The grievance process will ensure that no costs are imposed on those raising the grievances; that concerns arising from project implementation are adequately addressed in a timely manner; and that participation in the grievance process does not preclude pursuit of legal remedies. Specific means of redress are available in disputes over land ownership or compensation, or for grievances related to project construction impacts which are detailed in the safeguards instruments. The PMU’s Safeguards Manager will be responsible for monitoring and managing the GRM, with the support of the Social and Gender Development Specialist.

**Grievance Redress Service**

94. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB’s

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45 SPC, 2010. *Kiribati Family Health and Support Study: A study on violence against women and children*
Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB’s independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and World Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank’s corporate Grievance Redress Service (GRS), please visit http://www.worldbank.org/GRS. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

V. KEY RISKS

95. The overall risk rating for the operation is considered **High**, largely due to the institutional capacity risks that may affect the achievement of the project objectives.

96. **Political and governance (risk rating Substantial)**. The political and governance risk to the delivery of the development objective is assessed as substantial due to unavailability or high turnover of Ministry decision makers. Over the past year, GoK implemented a reorganization process at Minister and Secretary levels, bringing new changes to a number of ministries. This can lead to delays in decision-making at government level and undermine implementation effectiveness and efficiency. The clear definition of implementing agency responsibilities strengthening its decision-making autonomy, together with continuous consultation during project implementation at all levels of the government, will help mitigate this risk.

97. **Sector policies and strategies (risk rating High)**. GoK’s commitment to tariff reform and to the CSO policy will be key to PUB’s operational and financial sustainability, and any change of policy would undermine the achievement of project objectives. This commitment has been demonstrated over the past two years with the adoption of ambitious water tariffs, the payment of CSOs to PUB and through the launch of the Strengthening Economic Management Reform Program. Improved water tariffs reflecting households’ socio-economic parameters and optimizing cost recovery of OPEX have not been adopted yet, and this represents a risk for PUB’s financial sustainability. This risk is mitigated by the inclusion of (i) a legal covenant requiring the submission by June 30, 2020 of a water tariff revision study acceptable to the Bank and taking closely into consideration local affordability parameters, and (ii) a legal covenant requiring that Cabinet ensures availability of adequate financial resources to cover any shortfalls in the funding of PUB’s OPEX. There is also a sector strategy risk linked to the possible negative perception of a private operator’s involvement in PUB’s operations. This will be mitigated by the application of a lesser form of public-private participation, a DBO contract that avoids disruptions in assets ownership and staff status, and by the emphasis put in the contract on capacity building, which will strongly benefit PUB staff. There are uncertainties associated with respect to population’s long-term acceptance of water user charges. This risk will be mitigated by the implementation of the comprehensive and intensive 5-year ‘WASH Awareness Program (WAP)’ under Component 3, together with a substantial improvement in the service quality.

98. **Institutional capacity for implementation and sustainability (risk rating High)**. Implementation and institutional capacity are very constrained due to the small number of public servants and competent professionals available for supporting this sector turnaround. Low capacity can contribute to a lack of decision

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46 Policy-Based Grant financed by ADB was approved late 2017, promoting (i) continued government commitment to the payment of its CSOs, and (ii) water tariffs reforms that introduce usage fees to improve access and quality of water services in a sustainable manner.
making and delays, make the outcomes of capacity building efforts vulnerable to staff turnover, and undermine project implementation. To mitigate these risks, the project has been deliberately designed to (i) include well-staffed PMU and PIA, and (ii) dedicate important resources to PUB institutional strengthening and implementation capacity, including through the long-term involvement of the private operator hired under the DBO arrangements, and whose contract will include enhanced obligations in terms of knowledge transfer activities. Construction activities to replace and expand the water supply network across South Tarawa may also be overwhelming for local authorities. To mitigate any risk associated to the delivery of construction permits, the PMU and PIA will coordinate closely with local authorities and with the DBO contractor to schedule trench works in the least disruptive manner for communities and traffic.

99. **Fiduciary risk (risk rating Substantial):** There is a significant procurement risk related to the relative complexity of procuring a DBO contract, for which MISE has no prior experience. Delays in the procurement of the DBO contract would directly impact overall project implementation. This risk will be mitigated by the appropriate staffing of the PMU and the hiring of a Project Implementation Technical Assistance to support the preparation of related bidding documents and evaluation reports. Also, uncertainties with regards to contractors’ interest to carry out long-term assignments in South Tarawa represent a procurement risk, which has been mitigated by bundling water infrastructure investments in a DBO package to offset mobilization costs of international contractors and improve its attractiveness. The financial management risk is mitigated by maintaining the project accounts and other financial management functions in the Kiribati Fiduciary Services Units (KFSU), which is under the oversight of MFED. This is consistent with other World Bank financed projects in Kiribati.

100. **Environmental and social risks (risk rating Substantial):** Any significant opposition to the newly introduced water charges by the population which has been supplied with free water since 2013, albeit at a very poor level of service, would undermine PUB’s capacity to secure a reliable stream of revenues to recover its costs and operate infrastructure in a sustainable manner. These risks will be mitigated by the progressive introduction of water tariffs adapted to the willingness to pay by the population, including its poorest segment and the implementation of dedicated awareness campaigns building on KAP-III’s experience, together with extensive communications and citizen engagement activities. The risks of significant cumulative environmental impacts, related for example to brine and chemicals disposal or to construction activities are generally low, provided mitigation measures are implemented per the project’s environmental and social management plan (ESMP). Finally, GoK may not relocate people living on the Bonriki and Buota water reserves in relation with STWSP implementation or with broader groundwater conservation purposes without prior meaningful consultation with the relocated people and/or without providing them with prompt and effective compensation and other resettlement assistance prior to relocating them to prevent exposing the relocated people to severe long-term hardship and impoverishment risks. These risks are mitigated by the inclusion of measures in the Project’s Resettlement Policy Framework (RF) designed to ensure that any resettlement of people living on the Bonriki or Buota water reserves, if required, is undertaken in accordance with OP 4.12 requirements.
## RESULTS FRAMEWORK AND MONITORING

### Results Framework

**COUNTRY:** Kiribati  
**South Tarawa Water Supply Project**

### Project Development Objectives(s)

The proposed PDOs are to increase access to and quality of water supply services, and to improve the operational performance of the water supply services provider, in South Tarawa.

### Project Development Objective Indicators

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>DLI</th>
<th>Baseline</th>
<th>End Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased access and quality of water supply services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>People provided with access to improved water sources though piped house water connections (Number)</td>
<td>0.00</td>
<td></td>
<td>36,000.00</td>
</tr>
<tr>
<td>People provided with access to improved water sources though piped house water connections of which are female. (Percentage)</td>
<td>51.00</td>
<td></td>
<td>51.00</td>
</tr>
<tr>
<td>People provided with continuous water supply (Number)</td>
<td>0.00</td>
<td></td>
<td>58,000.00</td>
</tr>
<tr>
<td>People provided with continuous water supply, or which are female (Percentage)</td>
<td>51.00</td>
<td></td>
<td>51.00</td>
</tr>
<tr>
<td>Samples testing at distribution points meeting national standards for residual chlorine. (Percentage)</td>
<td>54.00</td>
<td></td>
<td>95.00</td>
</tr>
<tr>
<td>Time spent daily by households collecting water (Minutes)</td>
<td>52.00</td>
<td></td>
<td>15.00</td>
</tr>
<tr>
<td>Improved utility operational performance</td>
<td></td>
<td></td>
<td></td>
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</table>
### Intermediate Results Indicators by Components

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>DLI</th>
<th>Baseline</th>
<th>End Target</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Non-revenue water (Percentage)</strong></td>
<td></td>
<td>92.00</td>
<td>25.00</td>
</tr>
<tr>
<td><strong>Component 1: Improvement of Water Supply Services</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1 Daily per capita volume of piped water available for consumption by PUB residential customers (Liter)</td>
<td>5.00</td>
<td></td>
<td>52.00</td>
</tr>
<tr>
<td>1.2 Piped house water connections that are created or rehabilitated under the project (Number)</td>
<td>0.00</td>
<td></td>
<td>9,000.00</td>
</tr>
<tr>
<td>1.3 Metering level (Percentage)</td>
<td>2.00</td>
<td></td>
<td>95.00</td>
</tr>
<tr>
<td><strong>Component 2: Institutional Strengthening and Implementation Support</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1 Private operator supporting PUB operations in place and operational (Yes/No)</td>
<td>No</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>2.2 PUB improved management systems in place and operational (Yes/No)</td>
<td>No</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>2.3 Collection Ratio (Percentage)</td>
<td>70.00</td>
<td></td>
<td>90.00</td>
</tr>
<tr>
<td>2.4 Unit operational cost (US$/m3 sold) (Amount(USD))</td>
<td>1.60</td>
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<td>0.30</td>
</tr>
<tr>
<td>2.5 Operating cost coverage (Number)</td>
<td>0.32</td>
<td></td>
<td>0.80</td>
</tr>
<tr>
<td>2.6 Grievances responded to and satisfactorily resolved in relation to PUB water services according to standards (Percentage)</td>
<td>0.00</td>
<td></td>
<td>80.00</td>
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<tr>
<td>2.7 Share of female staff in MISE’s Water &amp; Sanitation Engineering Unit and PUB’s Water Engineering Department (Percentage)</td>
<td>9.00</td>
<td></td>
<td>13.00</td>
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</table>
### Indicator Name: Water reserve sustainable management plan approved and under implementation (Yes/No)

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>DLI</th>
<th>Baseline</th>
<th>End Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.8</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

### Component 3: Water, sanitation and hygiene awareness

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Baseline</th>
<th>End Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 People trained to improved hygiene behaviour or sanitation practices under the project (Number)</td>
<td>0.00</td>
<td>5,000.00</td>
</tr>
<tr>
<td>People trained to improved hygiene behaviour or sanitation practices under the project, of which are female. (Number)</td>
<td>0.00</td>
<td>2,500.00</td>
</tr>
<tr>
<td>3.2 Percentage of people reporting a positive impact on their daily lives resulting from 24/7 access to safe water at home (Percentage)</td>
<td>0.00</td>
<td>50.00</td>
</tr>
<tr>
<td>3.3 Percentage of women reporting a positive impact on their daily lives resulting from 24/7 access to safe water at home (Percentage)</td>
<td>0.00</td>
<td>60.00</td>
</tr>
</tbody>
</table>

### Component 5: Sanitation pilots

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Baseline</th>
<th>End Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>People provided with access to improved sanitation services (CRI, Number)</td>
<td>0.00</td>
<td>1,500.00</td>
</tr>
<tr>
<td>People provided with access to improved sanitation of which are female (Percentage)</td>
<td>51.20</td>
<td>51.20</td>
</tr>
</tbody>
</table>

### Monitoring & Evaluation Plan: PDO Indicators

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Definition/Description</th>
<th>Frequency</th>
<th>Datasource</th>
<th>Methodology for Data Collection</th>
<th>Responsibility for Data Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>People provided with access to improved water sources though piped house water connections</td>
<td>This indicator measures the cumulative number of people who gained access to piped house water connections.</td>
<td>Semi-annually</td>
<td>PIA / MISE progress reports and primary data collection, surveys and interviews, and desk reviews.</td>
<td>MISE</td>
<td></td>
</tr>
<tr>
<td>Indicator</td>
<td>Description</td>
<td>Frequency</td>
<td>Data Sources</td>
<td>Responsibility</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>People provided with access to improved water sources though piped house water connections of which are female.</td>
<td>People provided with access to improved water supply services that have been constructed through the project. As this is a cumulative indicator, it excludes beneficiaries from the KAP III pilot zones and the population already connected to PUB is considered having already access to improved water (per MDG definition).</td>
<td>Semi-annually</td>
<td>PIA / MISE progress reports and latest Population and Housing Census available</td>
<td>DBO contract auditor</td>
<td>MISE</td>
</tr>
<tr>
<td>People provided with continuous water supply</td>
<td>Population receiving pressurized water from PUB without interruption. This will be assessed once pressure loggers are in place, against a threshold of 98% of water continuity over the year.</td>
<td>Semi-annually</td>
<td>PIA / MISE progress reports (based on water pressure monitoring and recording) and latest Population</td>
<td>All customers within a given District Metered Area will be considered to be supplied continuously when pressure loggers within the area will have shown a positive pressure of at least 0.4 bars without cumulated interruption of more</td>
<td>MISE</td>
</tr>
<tr>
<td>People provided with continuous water supply, or which are female</td>
<td>Housing Census available than 2 hours per month.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>---------------------------------------------------------------</td>
<td>--------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>This indicator measures the percentage of female beneficiaries receiving PUB water supply without interruption.</strong></td>
<td><strong>Semi-annually</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PIA / MISE progress reports and latest Population and Housing Census available</strong></td>
<td><strong>Primary data collection, household surveys and interviews</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MISE</strong></td>
<td><strong>Primary data collection, household surveys and interviews</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Samples testing at distribution points meeting national standards for residual chlorine.</th>
<th>This indicator measures the proportion of water samples meeting residual chlorine standards on bacteriological parameters over a year. Samples shall be taken at distribution points (customers’ taps).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Semi-annually</strong></td>
<td><strong>PUB reports and DBO contract auditor</strong></td>
</tr>
<tr>
<td><strong>Field inspection and water sampling, laboratory testing and analysis.</strong></td>
<td><strong>MISE</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time spent daily by households collecting water</th>
<th>The Baseline is informed by the 2018 household survey commissioned by the World Bank. Subsequent household surveys are</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time spent daily, on average, by South Tarawa households collecting water for their residential use: going to the point source, waiting in line, fetching water and return home.</strong></td>
<td><strong>Household surveys considering administered on a representative sample of households across South Tarawa</strong></td>
</tr>
<tr>
<td><strong>At year four and at on the last year of project implementation</strong></td>
<td><strong>MISE</strong></td>
</tr>
</tbody>
</table>
Non-revenue water

NRW is defined as the percentage of water produced that is not ultimately billed to consumers. Water not billed to consumers results from water losses (physical and commercial losses) as well as authorized consumption that are not billed. This will be calculated with the IWA methodology.

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Definition/Description</th>
<th>Frequency</th>
<th>Datasource</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Daily per capita volume of piped water available for consumption by PUB residential customers</td>
<td>This indicators measures the amount of water produced by PUB available for consumption by residential customers (liters per capita per day), after deductions made due to water losses and non-residential consumption. Its increase</td>
<td>Semi-annually</td>
<td>PIA / MISE PMU progress reports</td>
</tr>
<tr>
<td>Indicator</td>
<td>Description</td>
<td>Frequency</td>
<td>Monitoring Tools</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------</td>
<td>---------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1.2 Piped house water connections that are created or rehabilitated under the project</td>
<td>Piped household water connection is defined as a connection that provides piped water to the consumer through either a house or yard connection. It does not include, inter alia, standpipes or water provided through tanker trucks.</td>
<td>Semi-annually</td>
<td>PIA / MISE PMU progress reports                                                  Field survey validation and operational monitoring and reporting</td>
</tr>
<tr>
<td>1.3 Metering level</td>
<td>Percentage of PUB water connections that are equipped with a functioning water meter</td>
<td>Semi-annually</td>
<td>PUB reports and DBO contract auditor                                            PUB asset management and commercial management records</td>
</tr>
<tr>
<td>2.1 Private operator supporting PUB operations in place and operational</td>
<td>This indicators describes whether the private operator, to be recruited under Design-Build-Operate arrangements, is contracted and supporting technically PUB in the operation of its water systems.</td>
<td>Semi-annually</td>
<td>MISE PMU                                                                        Regular operational meetings, performance evaluation and reporting</td>
</tr>
<tr>
<td>2.2 PUB improved management systems in place and operational</td>
<td>This indicators describes whether core utility management systems, including at least a Maintenance Managements</td>
<td>Semi-annually</td>
<td>PUB                                                                             Technical and financial operational reporting</td>
</tr>
<tr>
<td>Indicator</td>
<td>Description</td>
<td>Frequency</td>
<td>Source</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------</td>
<td>-----------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>2.3 Collection Ratio</strong></td>
<td>Percentage of billed amount that is being cashed, across South Tarawa.</td>
<td>Semi-annually</td>
<td>PUB operational records</td>
</tr>
<tr>
<td><strong>2.4 Unit operational cost (US$/m3 sold)</strong></td>
<td>Ratio between operational and maintenance costs (without depreciation) and volumes of water sold over one year.</td>
<td>Annually</td>
<td>PUB reports</td>
</tr>
<tr>
<td><strong>2.5 Operating cost coverage</strong></td>
<td>Total annual operational revenues (generated by water sales) / total annual operating costs (without depreciation)</td>
<td>Annually</td>
<td>PUB reports</td>
</tr>
<tr>
<td><strong>2.6 Grievances responded to and satisfactorily resolved in relation to PUB water services according to standards</strong></td>
<td>This indicators describes whether complaints are addressed in compliance with PUB operating standards, which define timing of responsiveness, and the level of required responses.</td>
<td>Semi-annually</td>
<td>PIA / MISE PMU progress reports and PUB annual report</td>
</tr>
<tr>
<td><strong>2.7 Share of female staff in MISE’s Water &amp; Sanitation Engineering Unit and PUB’s Water Engineering Department</strong></td>
<td>This indicator describes the percentage of female employed by MISE’s Water and Sanitation Engineering Unit and PUB’s Water Engineering Department.</td>
<td>Annually</td>
<td>MISE and PUB human resources records</td>
</tr>
<tr>
<td>2.8 Water reserve sustainable management plan approved and under implementation</td>
<td>Note: while the target appears modestly superior to the baseline, its achievement will require MISE and PUB to more than double the share of female recruited (from 9 percent in 2019 to about 20 percent in 2027), which is a substantive effort considering the local employment market.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1 People trained to improved hygiene behaviour or sanitation practices under the project</td>
<td>The indicator relates to sustainable management plans for the water reserves of Bonriki and Buota, to be prepared and implemented under the project to mitigate pollution risks. It describes whether at least one plan has been approved and is being implemented</td>
<td>Annually</td>
<td>MISE</td>
</tr>
<tr>
<td></td>
<td>This indicator describes the number of people who have taken part in improved hygiene behavior or sanitation practices training under the project. This includes beneficiaries of face-to-face training, workshop, community consultations implemented</td>
<td>Annually</td>
<td>MISE PMU semi-annual report</td>
</tr>
<tr>
<td>People trained to improved hygiene behaviour or sanitation practices under the project, of which are female.</td>
<td>as part of WASH awareness campaigns, and of the Sanitation Pilots component.</td>
<td></td>
<td></td>
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<tr>
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</tr>
<tr>
<td>People trained to improved hygiene behaviour or sanitation practices under the project, of which are female.</td>
<td>This indicator describes the number of female who have taken part in improved hygiene behavior or sanitation practices training under the project. This includes beneficiaries of face-to-face training, workshop, community consultations implemented as part of WASH awareness campaigns, and of the Sanitation Pilots component.</td>
<td>Annually</td>
<td>MISE PMU semi-annual report</td>
</tr>
<tr>
<td>3.2 Percentage of people reporting a positive impact on their daily lives resulting from 24/7 access to safe water at home</td>
<td>This indicator will aim to measure improvements in the quality of people's lives in terms of time saving, safety or income, due to safe water usage, and will be determined based on surveys conducted in 4 to 6 pilot sites.</td>
<td>Fourth and last year of Project implementation</td>
<td>Gender Action Plan progress report</td>
</tr>
<tr>
<td>3.3 Percentage of women reporting a positive impact on their daily lives resulting from 24/7 access to safe water at home</td>
<td>This indicator will aim to measure improvements in the quality of women's lives in terms of time saving, safety or income, due to</td>
<td>Fourth and last year of Project implementation</td>
<td>Gender Action Plan progress report</td>
</tr>
<tr>
<td>People provided with access to improved sanitation services</td>
<td>safe water usage, and will be determined based on surveys conducted in 4 to 6 pilot sites.</td>
<td>Semi-annually</td>
<td>MISE</td>
</tr>
<tr>
<td>People provided with access to improved sanitation of which are female</td>
<td>The indicator measures the cumulative number of people who benefited from improved sanitation facilities that have been constructed through operations supported by the World Bank.</td>
<td>Semi-annually</td>
<td>PIA / MISE progress reports and latest Population and Housing Census available</td>
</tr>
</tbody>
</table>
ANNEX 1: IMPLEMENTATION ARRANGEMENTS AND SUPPORT PLAN

COUNTRY: Kiribati
South Tarawa Water Supply Project

Project Institutional and Implementation Arrangements

1. The implementing agency will be the Ministry of Infrastructure and Sustainable Energy (MISE). This is the first time MISE plays that role in a project financed by the World Bank, although it was responsible for the technical implementation of individual components of World Bank-financed project and has experience in implementing projects financed by ADB. The National Infrastructure Development Steering Committee (NIDSC) will act as the project steering committee to provide strategic direction and guidance during project implementation. NIDSC will provide general oversight and will review progress and the results of periodic monitoring and evaluation activities. NIDSC is chaired by the Secretary of the Cabinet and includes as core members the Secretaries of MFED and MISE and may be expanded to include representation from other stakeholders, if needed, to strengthen coordination and implementation. NIDSC will meet on a semi-annual basis, or more frequently, as needed.

2. A PMU has been established to support MISE in implementing STWSP. It reports to the Secretary of MISE and to NIDSC. The PMU, under the guidance of MISE, will have responsibility for overseeing and managing project execution and compliance with project requirements, including those associated with procurement, financial management and auditing, safeguards, monitoring and evaluation, and project reporting. KFSU will support the PMU on financial management (FM) and accounting functions and arrangements under the project. In addition to its manager, who has already been recruited, the PMU will appoint seven individual consultants with specialist expertise in project management, technical and social matters, procurement management, accounting, and environmental and social safeguards. In particular, a procurement specialist and a safeguard manager will be appointed in the PMU and an accountant in KFSU by not later than three months after effective date of the financing agreement. The PMU will recruit and manage the DBO contract covering all activities under subcomponents 1.1, 1.2, 2.1 and part of component 3 activities, and all other contracts required to achieve the PDs. An Independent Audit Body recruitment will be hired to review the PO’s achievement of performance targets, which will be critical to DBO contract management. During project implementation, the PMU will also be supported by Project Implementation Assistance (PIA) consultants in project management, supervision and safeguards management and coordination.

3. GoK indicated a preference for the World Bank and ADB to prepare a joint operation, rather than separate project. Developing a unified approach, both during preparation and throughout implementation, would help minimize duplication, transaction costs and complexity, which would be essential in a context of limited implementation capacity. The World Bank and ADB teams subsequently adopted a common approach and framework to address each donor’s respective environmental and social requirements, as well as financial management and disbursement arrangements. It was also agreed that, to facilitate project management, only one donor’s procurement procedures should be utilized during implementation. For several reasons, including because ADB is mobilizing GCF funding, it was agreed that ADB would be the lead cofinancer and that the World Bank team would use the APA policy during implementation. Using ADB’s procedures to procure works, goods and services will eliminate the need to carry out separate tenders according to different procedures.
4. The World Bank and ADB therefore signed an APA agreement defining how both agencies would respond to issues during implementation, including technical, procurement, financial management and safeguards aspects of STWSP. Both agencies agree to ensure the prompt delivery and exchange of information regarding the project and, when practical, will field joint missions during implementation to supervise progress. The APA would take effect after approval by the Boards of Directors of both organizations.

5. A project operation manual (POM) will be jointly developed with ADB and the PMU one month after project effectiveness at the latest, and will define procedures for implementing STWSP. STWSP will be carried out in accordance with the arrangements and procedures set out in the POM, which can be amended from time-to-time, provided all modifications are agreed with the World Bank and ADB in writing prior to any changes.

6. The project will be implemented over an eight-year period, to allow for the financing of the five-year O&M of the DBO contract following the construction phase, and to contribute to a successful implementation of the utility turned around program and sector consolidation.

**Financial Management**

7. Budgeting Arrangements: The project budget will be on a cash basis, formulated from the agreed work plans to cover the life of the project, broken down into each financial year which spans from January to December. The overall budget will be an aggregate of the activities whose costs will be estimated at the start of the project and updated annually. MISE will liaise with the KFSU in the annual budget review and the KFSU will monitor actual expenditure against the budget. Budgeting capacity within the KFSU is limited and given the complexity of the project, some consideration may be given to employment of additional budgeting expertise at crucial stages of the budgeting process.

8. Accounting/Staff Arrangement: It is recommended that a provision be made in the project budget for the financing of a Project Accountant as the FM demands of this project will substantially require a dedicated office. It is highly desirable that the person have strong project management accounting skills. The responsible Finance Officer, based in KFSU, will prepare the accounting documentation for each transaction which will be authorized by MISE. Quick Books software will be used to record the project financial transactions through a separate company and accounts will be maintained on a cash basis. A covenant to the Financing Agreement will ensure that the Accountant is hired no later than three months after Project effectiveness.

9. Internal Controls: The Government of Kiribati accounting processes ensure authorization and payment processes are clearly segregated however there have been poor compliance with internal control procedures. Generally, KFSU follow Government of Kiribati policies and procedures and the KFSU also has prepared and Financial Management Manual which outlines additional FM requirements for World Bank financed projects. While there has been some failure to comply with internal controls and more importantly failure to recognize issues that arise, e.g. authorizations signed without adequate review now require additional migration measures need to be put into place.

10. Flow of Funds: This section will only address the flow of World Bank Funds and not address how ADB funds will flow and what if any relationship will be in place for the two sources of finance. An Australian dollar segregated Designated Account (DA) will be opened at the Australia and New Zealand Banking Group Limited (ANZ) Bank in
Kiribati. The design of the project indicates there may be a high proportion of Direct Payments. Withdrawal Applications authorized signatories will be the same MEFD staff who are signatories for the other World Bank financed projects. Withdrawal Applications will be prepared by the Project Accountant. KFSU and MFED staff have experience in preparing and submitting Withdrawal Applications and no issues are expected that could cause delays in funds flow.

11. The financing allocation described in Table 1 is the result of (i) GCF’s financial contributions being specifically defined for each sub-component; (ii) efforts to minimize the number of contracts that will require multiple withdrawal applications; and (iii) ADB’s preference not to cofinance sub-component 2.3 and component 5 of the project. For sub-components to be financed by more than one cofinancier, payments requests will be addressed to all contributing cofinanciers for amounts proportional to each cofinancier’s overall financial contribution to the sub-component.

12. Financial Reporting: The project will be required to prepare quarterly interim unaudited financial reports (IFRs) in a format agreed upon with the World Bank. The IFRs will be required to be submitted not later than 45 days after the end of the reporting period. The IFRs will be prepared by the Finance Officer in consultation with MFED. The KFSU have a good record for submitting IFRs within the prescribed time frame and the risk of late submissions is low however there have been issues over the accuracy of commitments register and failure to take action on issues identified by the reports.

13. External Audit: The Kiribati National Audit Office will conduct an annual audit of the project accounts and these will be received by the World Bank within six months of the end of each of the reporting periods. The Kiribati National Audit Office has extensive experience in auditing government departments and World Bank funded projects and is an auditor acceptable to the World Bank.

**Disbursements**

14. The project will be able to use four Disbursement Methods: Advance, Reimbursement, Direct Payment and Special Commitment.

15. In order to facilitate the incremental operating costs and local payments, a DA in Australian dollar will be opened at the ANZ Bank, the only banking facility available in Kiribati. The documentation required for the replenishment of the advance will be by Statement of Expenditure, Bank Statement and DA reconciliation. The project will be required to retain financial documentation for review by World Bank staff and substantiation by the auditors when conducting the annual project audit. The Finance Officer will prepare all Withdrawal Applications which will be reviewed and signed by the authorizing officers at MFED prior to submission to the World Bank.

16. The project will have the following disbursement categories as outlined in Table A2. For categories (1) and (2), only a share of expenditures will be financed by the grant. The rest of expenditures will be financed by the ADB grant under category (1), and by the GCF grant under category (2). The unallocated category is included to cover as needed contingencies associated to the other expenditure categories. Expenditures will be financed by IDA inclusive of taxes, and by ADB and GCF exclusive of taxes.
Table A1.1: Disbursement Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>IDA (expressed in USD equivalent)</th>
<th>IDA (expressed in SDR)</th>
<th>Percentage of Expenditures to be Financed (inclusive of Taxes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Goods, works, non-consulting services, Training and Workshops, Operating Costs and consulting services under Subcomponents 1.1, 1.2 and 2.1</td>
<td>10,012,000</td>
<td>7,390,000</td>
<td>32.44 percent</td>
</tr>
<tr>
<td>(2) Goods, works, non-consulting services, Training and Workshops, Operating Costs and consulting services under Subcomponent 2.3 and Component 5</td>
<td>1,440,000</td>
<td>1,080,000</td>
<td>100 percent</td>
</tr>
<tr>
<td>(3) Refund of Preparation Advance</td>
<td>600,000</td>
<td>450,000</td>
<td>Amount payable pursuant to Section 2.07 (a) of the General Conditions</td>
</tr>
<tr>
<td>(4) Unallocated</td>
<td>2,948,000</td>
<td>2,180,000</td>
<td></td>
</tr>
<tr>
<td><strong>Total Amount</strong></td>
<td><strong>15,000,000</strong></td>
<td><strong>11,100,000</strong></td>
<td></td>
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</tbody>
</table>

17. **Project Preparation Advance (PPA):** A PPA in the amount of US$0.6 million is in place to enable GoK to undertake activities supporting project preparation that are consistent with the PDOs prior to the effectiveness of the grant, and which have been procured in accordance with applicable World Bank procurement procedures. Activities financed under the PPA include the continuation of water sector activities carried out under KAP-III, such as (i) community engagement in the three pilot areas now receiving continuous water supply, (ii) technical assistance for enhanced NRW management by PUB, and (iii) sector studies on areas such as technical and economic regulation.

18. **Procurement**

   Capacity Assessment. An assessment of MISE’s capacity to implement procurement actions for STWSP was carried out as part of project preparation. The results of the assessment are available in the World Bank’s project portal website and identify risks, risk ratings and mitigation measures. Overall, the assessment indicates a limited level of human resources (including procurement) within MISE to manage projects in accordance with World Bank processes, constraints related to the capacity of the contracting industry to respond to MISE’s needs, and lack of vigorous public oversight. A risk mitigation action plan has been recommended to MISE.

19. Local contractors lack the equipment and expertise for projects of such scale, and international contractors will need to be attracted to undertake these works. Works will need to be bundled into sufficiently large packages to offset mobilization costs of an international contractor. For the procurement of the DBO contract, initial market sounding suggests that several contractors could be interested to bid.
For components 1 to 4 (except 2.3), procurement will follow ADB’s procurement and consultants guidelines, which are well harmonized with the World Bank’s. ADB will take the lead in reviewing and clearing all terms of reference and other procurement documents. The World Bank will provide inputs to review terms of reference, design reports, bill of quantities and engineer’s estimates, specifications, drawings, etc. from the technical point of view. MISE will procure all goods, works and services according to ADB’s policies and procedures. After a tender is completed, the World Bank will be informed of such and be provided with a copy of the signed contract. During implementation, the World Bank and ADB would supervise the work of consultants and contractors fully. For components 2.3 and 5, procurement implementation will follow World Bank’s Procurement Regulations. It is expected that the size of contracts under these two components is small and no complex procurement methods will be involved.

Implementation Support for Procurement. As needed, the World Bank’s task team will provide support to MISE for implementing procurement activities under Components 2.3 and 5, including training (face-to-face or remotely by video or audio), provision of guidance and templates of procurement documents. The World Bank’s procurement specialist will visit MISE at least annually.

Exceptions to National Competitive Bidding (NCB) Procedures. ADB’s procurement risk assessment identified adjustments necessary for NCB, which would include an increase in advertisement time to a minimum of 28 days, and guidance on pass-fail criteria for evaluation of bids for goods and works.

Procurement of Works. Procurement of works will include desalination, solar power arrays and water distribution network. International Competitive Bidding and NCB procedures are expected be followed for procurement of works.

Procurement of Goods. Goods to be procured might include ICT equipment, hardware and software, and possibly office equipment and facilities. Goods would be carried out under shopping procedures.

Selection of Consultants. Consultants would be hired for specialized technical services, project management, fiduciary, safeguards, and monitoring and evaluation services. MISE would be responsible for processing the selection of consultants to be hired internationally.

Prior-Review Thresholds. The procurement methods and prior review thresholds for different types of procurement, as agreed with ADB, will be provided in the POM.

Procurement Plans. An initial procurement plan was prepared by MISE in relation to likely investments to take place during the first 18 months of project implementation.

Environmental and Social (including safeguards)

The RF sets appropriate measures during the implementation of the project. This also includes provisions for the development of terms of reference of design consultants to prepare future instruments relevant to the measures that were not identified in the investments, in this instance sanitation and water reserve activities other measures to consider during project implementation. The implementation of the plans will be supervised and under Subcomponent 2.2: Project implementation support and sector strengthening, support will be provided to MISE in project management, design and supervision activities. This includes hiring consulting services to
undertake (i) surveys to facilitate detailed design of project infrastructure; (ii) detailed design of water supply network infrastructure; (iii) procurement support to MFED, MISE and PUB, including preparation of bidding documents, bid evaluation and contract award; (iv) supervision of works; (v) safeguards support and community engagement in preparation for project activities; and (vi) sector studies such as reviews of water sector technical and financial regulation.

Monitoring and Evaluation

29. To ensure effective monitoring and evaluation of all project indicators, several measures will be taken. Members of the PMU will be required to have demonstrated skills in data collection, collation and reporting, preferably on World Bank or ADB projects. Secondly, this expertise will be bolstered with support from the project team through the provision of reporting templates and feedback on reports. Many of the project indicators are part of SW’s internal reporting system and are already being communicated to the Pacific Water and Wastewater Association for utilities benchmarking. These efforts will seek to streamline as much as possible all project indicators into SW’s monitoring and evaluation system.

30. MISE will issue quarterly progress reports that will be due the last day of March, June, September and December. These will be forwarded to the World Bank within 30 days of the end of each calendar quarter. A mid-term review will be prepared in mid-2022 (expected), and an Implementation Completion and Results Report completed within six months of the end of project implementation. MISE will also monitor progress against agreed performance indicators, as defined in Section VI. The PIA consultants will work closely with and provide regular updates to the PMU Manager about project progress.

Role of Partners

31. The ADB and World Bank teams have devised a common approach and framework to jointly implement the project, and to address technical matters and each donor’s respective environmental, social, financial management and disbursement requirements. It should be noted that, the joint co-financing arrangement implies both donors’ involvement in implementation support of all project activities, regardless of whether their respective financial contributions only focus on a subset of project components. During implementation, procurement will be carried out using ADB’s procurement policies and procedures (except for Subcomponent 2.3 and Component 5). As part of this approach, ADB and the World Bank will jointly carry out bi-annual missions to supervise project progress and implementation. At least one representative designated to speak on behalf of each partner will participate. ADB and the World Bank will jointly prepare and issue reports, such as MoUs/Aide Memoires, at the end of each supervision mission. If a joint mission is not possible, the partners can field teams independently, but will share all project documentation.

Strategy and Approach for Implementation Support

32. **Risk minimization through design.** The strategy for implementation support is based on the design of the project and its identified risk profile. During project preparation, considerable efforts have been made to identify key risks. Key project design decisions were made in order to reduce risks going into project implementation. These include simplifying the project scope, providing extensive technical and operational assistance support to MISE and PUB, designing procurement strategies based on careful market assessments and seeking alignment with the Tarawa Water and Sanitation Roadmap 2011-2030.
33. **Risks during Implementation.** Notwithstanding these risk minimization and mitigation measures in project design, significant residual risks will remain during implementation, in particular stemming from (i) uncertainties with respect to the introduction of improved water tariffs better supporting PUB’s financial sustainability, and (ii) uncertainties with respect to population’s long-term acceptance of user charges, the sustainability of project outcomes. These risks will be mitigated by the inclusion of (i) a legal covenant requiring the preparation and submission of a water tariff revision study acceptable to the Bank and taking closely into account local affordability parameters, and (ii) a legal covenant requiring that Cabinet ensures availability of adequate financial resources to cover any shortfalls in the funding of PUB’s OPEX. In addition, the World Bank’s implementation support approach will focus on providing technical support to MISE to support its efforts to (i) successfully carry out the project activities, (ii) meet the fiduciary, environmental and social safeguards compliance requirements of Kiribati, the World Bank and ADB, and (iii) strengthen its institutional capacities.

**Implementation Support Plan and Resource Requirements**

34. The implementation support approach is detailed in Table A2.2 and it includes:

(a) **Technical Guidance and Supervision.** Joint missions with ADB will be conducted about every six months, or more frequently, if needed. The focus of engineering implementation support will be on (i) working closely with MISE, its own technical assistance and supervision consultants to review and provide technical advice on designs and specifications (including the normal reviews of bidding documents), (ii) working closely with MISE, its own technical assistance and supervision consultants to review ongoing technical assistance and physical works and provide advice on technical issues arising.

(b) **Safeguards.** The World Bank’s supervision team includes environmental and social safeguards specialists who will undertake safeguard supervision and monitoring of the project. The World Bank’s team will work closely with the ADB team and bring in specific specialists on an as-needed basis. The World Bank team will supervise implementation of the social and environmental management instruments and provide guidance to MISE to address any issues. Technical supervision will include review of PUB’s quality monitoring records during normal supervision and take mitigating actions in the event quality issues are detected.

(c) **Fiduciary.** World Bank FM supervision will generally be conducted by on-site visits in Kiribati, at least twice a year or as the needs arise, based on the risk assessment of the project. The supervision objective is to ensure that financial management systems are adequately maintained throughout the life of the project. The supervision will include a review of overall operation of the FM system, including transaction-testing and other areas deemed necessary during supervision. Capacity building needs will be assessed on an ongoing basis, and addressed in collaboration with the implementing agency and project management.
Table A2.2: Schedule of Implementation Support

<table>
<thead>
<tr>
<th>Time</th>
<th>Focus</th>
<th>Skills Needed</th>
<th>Resource Estimate</th>
<th>Partner Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>First twelve months</td>
<td>Project launch and start-up</td>
<td>Task Team Leader, Water and Sanitation Engineer, Public-Private Participation Expert, Desalination Expert, Renewable Energy Expert, Community Mobilization Specialist, Financial Management, Procurement, Environment and social Administrative Support</td>
<td>Supervision budget</td>
<td>ADB to participate in joint missions and provide technical support</td>
</tr>
<tr>
<td>12-96 months</td>
<td>Project implementation</td>
<td>Task Team Leader, Water and Sanitation Engineer, Financial Management, Procurement, Environment and social Administrative Support</td>
<td>Supervision budget</td>
<td>ADB to participate in joint missions and provide technical support</td>
</tr>
</tbody>
</table>

Skills Mix Required

<table>
<thead>
<tr>
<th>Skills Needed</th>
<th>Number of Staff Weeks</th>
<th>Number of Trips</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task Team Leader</td>
<td>8</td>
<td>2</td>
<td>Based in Region</td>
</tr>
<tr>
<td>Co-Task Team Leader</td>
<td>8</td>
<td>2</td>
<td>Based in Region</td>
</tr>
<tr>
<td>Water and Sanitation Engineer</td>
<td>6</td>
<td>2</td>
<td>Based in Region</td>
</tr>
<tr>
<td>Public-Private Partnerships Expert</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desalination Expert</td>
<td>2</td>
<td>1</td>
<td>Until plant completion</td>
</tr>
<tr>
<td>Renewable Energy Expert</td>
<td>2</td>
<td>1</td>
<td>Until solar PV completion</td>
</tr>
<tr>
<td>Environmental Specialist</td>
<td>2</td>
<td>2</td>
<td>Based in Region</td>
</tr>
<tr>
<td>Social specialist</td>
<td>4</td>
<td>2</td>
<td>Based in Region</td>
</tr>
<tr>
<td>FM specialist</td>
<td>2</td>
<td>2</td>
<td>Based in Region</td>
</tr>
<tr>
<td>Procurement specialist</td>
<td>3</td>
<td>2</td>
<td>Partly provided by ADB under APA</td>
</tr>
<tr>
<td>Liaison officer</td>
<td>4</td>
<td>NA</td>
<td>Based in CO</td>
</tr>
</tbody>
</table>
### Partners

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution/Country</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian Development Bank</td>
<td>ADB / Manila, Philippines</td>
<td>Ongoing support during implementation</td>
</tr>
<tr>
<td></td>
<td>ADB / Suva, Fiji</td>
<td></td>
</tr>
</tbody>
</table>
ANNEX 2: DETAILED PROJECT DESCRIPTION

COUNTRY: Kiribati
South Tarawa Water Supply Project

1. To achieve the Project Development Objectives (PDOs), the proposed project will have four components as follows:


2. This component will aim to improve access to safe water supply services in South Tarawa and resilience of the services to climate change. It will include:

Subcomponent 1.1: Increase in water production capacity (Cost: US$11.73 million; Financing: IDA – US$3.90 million equivalent; ADB and GCF – US$7.83 million)

3. This subcomponent will support the construction of seawater desalination systems and the rehabilitation of existing water production facilities. This subcomponent will support the construction and operation of a desalination plant and ancillary infrastructure in Te Makin, West Betio, and potentially of a second one in McKenzie. The seawater reverse osmosis desalination plant(s) will have an initial capacity of at least 4,000 cubic meter/day. This will allow for a significant increase in potable water consumption by South Tarawa population from an average of 32 lpcd in 2018 to an average of 60 lpcd after project. This increase in PUB water supply capacity will also enable a decrease in the share of non-safe and climate dependent water sources (shallow groundwater and marginally rainwater) in residential water use from 75 percent in 2018 to 12 percent after the project. The desalination plant(s) will, to a large extent, climate proof the South Tarawa water system, covering about two thirds of PUB production capacity up to 2030, while the rest is to be met with water abstracted from the groundwater lenses of Bonriki and Buota using existing water production systems. Design criteria take into account the expected reduction in yield of the groundwater lenses due to climate change, and include selected provisions to enable its expansion up to 6,000 cubic meter/day total capacity in the future (which would be deemed sufficient until at least 2040), without the need to upgrade supporting infrastructure. Brine will be discharged through the nearby sewerage submarine outfall, currently being upgraded under STSISP, to diffuse sewage 30 meters deep, beyond the reef edge.

4. The proposed production capacity will help mitigate the risk of groundwater yield reduction due to the increasing threat of sea overtopping and drought to these lenses, which are among the main pathways by which the water supply on South Tarawa is vulnerable to climate change. Considering the remote island context in which a longer lead-time is needed for spares, chemicals and specialist support, plant design criteria favor robust engineering designs, including partial or full standby items for all processes and an extensive stock of critical spares to be held on site. The DBO contracting approach (see paragraph 9) will ensure that design and construction activities are undertaken with knowledge of accountability for the O&M over the following five years. This will foster the selection of a robust design incorporating careful consideration of the challenging environment...
presented by the remoteness of South Tarawa.

Subcomponent 1.2: Expand and modernize water supply network (Cost: US$10.64 million excluding contingencies; Financing: IDA – US$3.54 million equivalent, ADB and GCF – US$6.35 million and Counterpart financing – US$0.75 million)

5. This subcomponent will support the significant upgrade to, and expansion of, the water transmission and distribution networks to achieve full service coverage across South Tarawa through piped water connections. The system will be upgraded to have adequate capacity to meet water demands up to year 2040. The works will include: (i) implementation and upgrades of primary pumping systems at at the desalination plant(s) in West Betio and potentially McKenzie, and in the Buota and Bonriki water reserves; (ii) implementation of additional ground storage, replacement and upgrades of reticulation networks in communities across South Tarawa; (iii) networks expansions to the currently unserved areas or Bonriki North and Buota. Together with the increased water production capacity (subcomponent 1.1), the modernized water network will allow for the continuous supply of all South Tarawa population with drinking water complying with water quality standards and will help substantially reduce NRW. It will also allow for a substantial reduction of widespread kerosene-based water boiling practices at the household level, contributing to a decrease of GHG emissions of 31,991 tons of CO₂ equivalent over 20 years.

6. Although most works on the distribution system will entail the replacement of existing infrastructure, the future system will follow the same general hydraulic architecture consisting in a succession of distribution zones gravity-supplied by head tanks, which are connected to the transmission main running between the desalination plant(s) and the Bonriki water production system. The project foresees the creation of sixteen district metered areas and the installation of metered house connections, which will allow for detailed and continuous non-revenue water monitoring.

Subcomponent 1.3: Solar photovoltaic power plant (Cost: US$7.91 million excluding contingencies; Financing: ADB and GCF – US$7.91 million)

7. This subcomponent will support the construction of a solar photovoltaic power plant, energy storage and transmission infrastructure. The proposed PV array will have of 2,500 MW production capacity will be ground mounted and associated to a Solar Smoothing Energy Storage system to be connected to the grid. The current electric power network in South Tarawa is generated at around 80 percent from diesel. There is currently some excess installed generating capacity, but this is not expected to meet the growing electricity demand of the water system for more than a few years. The proposed PV array will offset up to 98 percent of the demand of the entire system, including the desalination plant and water supply pumping systems. It will also allow a reduction by about 50 percent of PUB’s future operating costs. This technical solution will allow for a net reduction of GHG emissions by the water system by 57,523 tons of CO₂ equivalent over 20 years. Across South Tarawa, the overall power generation capacity from low-emission sources is expected to increase from 27 percent in 2018 to 42 percent after the project. The proposed works also include an upgrade to the existing 11 kV power network to cater for the additional energy demand associated with the desalination plant(s).

8. This component is designed to contribute to the sustainability of water-related investments funded under Component 1 and to help improve the operational efficiency and financial viability of PUB. It will include:

Subcomponent 2.1: Support to water supply system O&M and utility institutional strengthening (Cost: US$7.73 million excluding contingencies; Financing: IDA – US$2.57 million equivalent, ADB and GCF – US$5.16 million)

9. This subcomponent will support the operation and maintenance of the water supply system by a private operator and its auditing, the upgrade of the PUB’s management systems and capacity building activities for PUB staff. This will include the O&M of the desalination plant(s) and water supply network over a five-year period by a private contractor, which will have previously carried out plant(s) design and construction through a DBO contract. The O&M component of this contract will include specific performance targets for O&M, such as available water production capacity, continuity of service, water quality compliance at distribution, non-revenue water, energy efficiency and customer responsiveness. In addition to ensuring reliability of the installed infrastructure over that period the DBO contract will play a key role in building PUB capacities to undertake preventive, predictive and breakdown maintenance of the plant(s) and network, and ensure sound asset management. Under this subcomponent the DBO contract will also support the delivery utility management systems to improve non-revenue water (NRW) monitoring, asset management, billing and collection and GIS-based customer complaints management, the enhancement of customer-oriented culture in the utility and the delivery of vocational training to administration and technical staff on core technical subjects. The DBO contract will limit the PO’s responsibility to technical aspects of PUB operations, and will not include bills collection as part of the scope of responsibilities. The subcomponent will finance the recruitment of an Independent Audit Body to monitor and evaluate the contract’s key performance indicators.

10. This subcomponent will finally support the delivery of vocational training to administration and technical staff on core subjects such as: (i) training to technical staff in water industry operations and associated English language, computing and foundation skills to attain qualifications per internationally recognized competence standards; (ii) training to electrical technicians to meet on-the-job requirements for a Certificate in Electrotechnology; (iii) training and mentoring targeted at PUB and MISE managers with a view towards developing whole of project management skills, including contract management and procurement skills; and (iv) training in customer services for administration staff.

Subcomponent 2.2: Project implementation support (Cost: US$3.60 million excluding contingencies; Financing: ADB and GCF – US$3.13 million and Counterpart financing – US$0.47 million)

11. This subcomponent will support Project implementation through (i) infrastructure design activities, (ii) technical assistance to MISE and the PMU for Project management and supervision. This includes hiring consulting services to undertake (i) surveys to facilitate detailed design of project infrastructure; (ii) detailed design of water supply network infrastructure; (iii) procurement support to MFED, MISE and PUB, including preparation of bidding documents, bid evaluation and contract award; (iv) supervision of works; and (v) safeguards support and community engagement in preparation for project activities. A project implementation assistance (PIA) consultancy firm will be hired to support the PMU in contracts management and supervision, including
management and coordination of safeguards. The terms of reference and selection of the PIA firm place a strong emphasis on capacity transfer.

Subcomponent 2.3: Management of the groundwater reserves and sector strengthening (Cost: US$0.80 million excluding contingencies; Fully funded by IDA)

12. This subcomponent will support the management of the Bonriki and Buota Groundwater Reserves and sector strengthening through (i) the formulation and implementation of water reserves sustainable management plans, (ii) the preparation of sector studies, and (iii) the implementation of community engagement and non-revenue water management activities. The preparation and implementation of sustainable management plans will help mitigate water pollution risks to the Bonriki and Buota water lenses and conserve these resources increasingly vulnerable to climate change impacts. Management plans could include a range of measures such as: raising awareness among current occupants of the potential impacts of their activities on groundwater quality, implementing small scale infrastructure improvements (e.g. sanitation, drainage), establishing an active surveillance and compliance regime aimed at protecting the water reserves and preventing further encroachment on the reserves, and enhancing groundwater quality monitoring. This subcomponent will support the preparation sector studies such as (i) a review of water sector economic regulation, defining clear principles and mechanisms for future water tariff revisions and CSO allocations, to improve predictability of the utility’s long-term revenue stream, and (ii) the design of a performance-based contract between PUB and MISE describing the utility’s targets in terms of quality of service, operational and financial performance, to strengthen PUB’s accountability and facilitate strategic dialogue with MISE. The subcomponent will also support the continuation of water sector activities carried out under KAP-III: community engagement in the three pilot areas receiving continuous water supply to facilitate households’ transition to 24/7 water supply and their acceptance of the water tariff, and technical assistance to PUB for enhanced NRW management, to sustain the gains achieved under KAP-III before the mobilization of technical assistance under STWSP.

Component 3: Water, Sanitation and Hygiene Awareness (Cost: US$2.21 million excluding contingencies; Financing: ADB – US$0.92 million and GCF – US$1.29 million)

13. This component support the formulation and implementation of water, sanitation and hygiene awareness activities, which will consist in a comprehensive and intensive 5-year ‘WASH Awareness Program (WAP)’. The WAP is critical to support significant transformations in the population’s water use and behavior that are key to project success. Three programs are proposed to form the WAP:

(a) Part A ‘Water for Life’: A water focused communication and engagement program that expands on the PUB’s existing information, education and communications program and extends across all of South Tarawa. ‘Water for Life’ will focus on the implementation of the new water supply system, user pays, and 24-hour metered supply to facilitate a smooth transition by households to the new conditions. It will be led by PUB with support from MISE. Objectives include ‘enhancing water conservation understanding and practice’, and ‘enhancing customer best use and maintenance practices for the service’ to improve water conservation and help households control their water expenditures, and encourage the community’s ownership of the project. Further, the objectives surrounding ‘strengthen trust in the service and provider’ and ‘create acceptance and demand for the PUB safe and reliable water service’ are highly relevant to foster bills payment and for climate mitigation, given current practices surrounding burning kerosene to boil water. If the lens supply is not available, and rationing is implemented, awareness raising and community outreach through this
activity will be essential to ensure public acceptance and participation in rationing strategies. This Part, directly related to PUB operations and mandate, will be implemented under the DBO contract.

(b) Part B ‘WASH Community Partnership’: A broader WASH behaviour change campaign with a focus on tackling behaviours linked to water security and safety, sanitation, hygiene, menstrual hygiene management, and solid waste management, in a nutrition-sensitive manner. This program will expand on and align with the STSISP community engagement program. This program will be led by an international NGO, in collaboration with the Ministry of Health and Medical Services (MHMS);

(c) Part C ‘Walk the Talk’ – A program focused on strengthening the enabling environment (including policy, regulations, institutional capacity and leadership) required for comprehensive and sustainable adaptation to climate change, behaviour change, and effective sector coordination. This part will be led by MISE.

Component 4: Project Management Unit (Cost: US$2.15 million excluding contingencies; Fully funded by ADB and GCF)

14. This component will strengthen the management capacity of the PMU to monitor and administer Project implementation. The PMU, housed in MISE, will be the core unit responsible for the overall implementation of the STWSP including the day-to-day project activities, compliance with the provisions of the grant agreements and government policies and guidelines, project administration, preparation of grant withdrawal applications, and maintenance of records. Under the guidance of MISE, the PMU will have responsibility for overseeing and managing project execution and compliance with project requirements, including those associated with procurement, financial management and auditing, safeguards, monitoring and evaluation, and project reporting. It will comprise a mix of MISE/PUB staff and individual consultants with expertise in project management, technical and social matters, procurement management, accounting, and environmental and social safeguards.

Component 5: Sanitation Pilots (Cost: US$1.24 million excluding contingencies; Fully funded by IDA)

15. This component will support (a) the design and construction of onsite or small decentralized sanitation systems and fecal sludge management systems, and (b) the provision of technical assistance and training to community-based organizations and other stakeholders involved in the implementation and management of the sanitation and fecal sludge management facilities. The implementation of nutrition-sensitive pilot sanitation models will aim to upgrade current sanitation services and provide an acceptable alternative to a costly expansion of sewerage systems across all of South Tarawa beyond the areas targeted by the current ADB-financed project. The models will be recommended by a concept study and designed by a subsequent engineering study, both commissioned by NZ MFAT as part of donor collaboration under the project. Sanitation activities will focus in priority on (but not be limited to) the three KAP-III village pilots (representing about 280 households) where 24/7 water supply has been introduced early 2018. The study should be completed early 2020. The activities include: (i) investments in sanitation (and handwashing) infrastructure; and (ii) technical assistance and training to support community-based organizations and other stakeholders involved in the management of the sanitation facilities and in fecal sludge management. Investments in sanitation infrastructure reduce the contamination of urban groundwater and help improve the quality of those local water sources including during extreme weather events, thereby contributing to the area residents’ resilience to climate change threats.
ANNEX 3: ECONOMIC AND FINANCIAL ANALYSIS

COUNTRY: Kiribati
South Tarawa Water Supply Project

Least Cost Analysis

1. A least cost analysis was conducted, focusing on the power supply system, for which two credible design options have been identified. The desalination plant(s) and water pumping system will require substantial incremental demand for electricity, which is estimated at 5.0 GWh per annum. Two technology options that would generate the required energy were assessed: (a) diesel generation using PUB’s current system, at a cost of AU$0.55 per kWh, and (b) the use of solar PV system to supply partially the amount of electricity equivalent to the project’s incremental demand. The proposed PV system comprises a grid connected 2,500 PV power station that can generate 3.6 GWh per annum of PUB’s electrical network. The PV investment cost is assumed to be AU$10.09 million and the required O&M for the PV system is AU$25,000 per annum. The PV system is expected to avoid CO₂ emissions by 2,876 tons per annum. The assumed value of carbon emitted is AU$48.26 per ton. This yields total annual avoided CO₂ emissions in the amount of AU$137,396. The O&M costs using diesel generation are expected to reach AU$2.0 million annually, with an electricity cost from the grid at AU$0.55 per kWh. Results of the least cost analysis show that the net present value (NPV) of supplying 3.6 GWh by diesel to address the incremental electricity demand of the project is around two times the NPV of supplying electricity using the PV technology. Based on the above results, a PV system was included in the project.

<table>
<thead>
<tr>
<th></th>
<th>Solar PV System</th>
<th>Diesel Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPV (AU$)</td>
<td>9,065,933</td>
<td>18,302,345</td>
</tr>
</tbody>
</table>

Economic Analysis

2. The ex-ante economic analysis covered 94 percent of the total project cost (components 3 and 5 are not included in the analysis). Costs and benefits were treated as increments to a without-project situation. The project’s economic viability was determined by computing the economic internal rate of return (EIRR), economic Net Present Value (ENPV), and economic Benefit-Cost Ratio (EBCR). A shadow discount rate of 6 percent was applied.

3. **Economic costs.** The economic costs associated with the project, both CAPEX and OPEX, were derived from the financial estimates (see paragraph 26 in the main section) and were adjusted to consider market distortions. Taxes and duties account for 12 percent and were deducted from the cost estimates. Price contingencies were also removed while physical contingencies remain. A shadow wage exchange rate factor of 0.9 was considered.

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47 This value, used by ADB in its proposal to the GCF, differs from the ones recommended by the Bank Guidelines on shadow pricing of carbon in this context (AU$3.62 per ton to AU$107.24 per ton) and applied elsewhere in the present section. This value is presented here to maintain consistency with the GCF proposal. Higher values would further strengthen the recommendation of a Solar PV System.
The shadow exchange rate factor is 1.0, as all costs were valued using Australian dollar, which is also the domestic price numeraire.

4. **Economic benefits.** The economic benefits arising from the project are as follows: (i) avoided costs of medical treatment, avoided costs of lost productivity on the part of patients and caregivers, and value of avoided loss of life due to project health benefits, (ii) avoided loss of productivity due to the time spent by households collecting water from distant water sources, and (iii) carbon (CO2) emissions avoided.

   a. **Health benefits.** The key beneficial impact of the STWSP in South Tarawa is the reduction and elimination of the currently high dependence of residents on contaminated water supplies for drinking and basic hygiene, contributing to the improvement of the country’s Human Capital Index. Most sources of water in South Tarawa are contaminated: shallow wells, polluted by human and animal waste; rainwater, polluted in contact with rarely cleaned rooftops and tanks, and which is almost never disinfected; and PUB water, contaminated by groundwater as it flows through regularly depressurized distribution network, or by unclean storage facilities used to cope with the intermittent supply. Despite efforts by part of the population to boil water before consumption, the incidence of water-borne disease throughout South Tarawa is very high. Since 2002, diarrhea and dysentery cases have accounted for about 70 percent of all hospital, clinic, and alternative care center visits in relation to water-borne disease treatments. Over the same period, the estimated number of care center visits for all water-borne diseases has risen alarmingly, from under 10,000 in 2003 to more than 45,000 in 2015, at approximately three times the rate of population growth in South Tarawa over the period. The most significant economic impacts are associated medical treatment costs, loss of productivity. Detailed examinations of hospital records, together with extensive interviews were conducted in 2014 to determine (i) the current and historical incidence of the five water-borne diseases listed above, (ii) the average treatment costs associated with them, and (iii) the value of the average loss of productivity per case, relating to the patient’s and caregiver(s) time while the patient is ill. In addition, a comprehensive review of the incidence of diarrhea and dysentery by gender and age group in South Tarawa from 2002-2016 was conducted, based on the MHMS data, leading to the following key values:

   - Prevalence of water-borne disease morbidity is estimated to represent 775 cases per 1,000 people per year (baseline value)
   - The ratio between the increase in prevalence of waterborne disease morbidity and population growth is assumed to be 1.5, conservative assumption compared to the ratio of 3 observed during the 2003-2015 period. Considering the projected population growth, the prevalence of water-borne disease would reach, without the project, a level of 1,275 cases per 1,000 people per year.

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48 Weekly random water quality testing by the Ministry of Health and Medical Services (MHMS) across South Tarawa in 2017 showed the presence of *E. coli* more than 90 percent of the time in rainwater and groundwater used by the population.

49 Ministry of Health and Medical Services database


51 ADB, 2017d. TA-9200 KIR: South Tarawa Water Supply Project (49453-001) – Project Preparatory Technical Assistance (PPTA) Financial Due Diligence and Cost Benefit Analysis
• The loss of productivity of patient and caregiver, per case of waterborne disease is estimated to represent AU$54.8, based on an average casual wage of AU$35 per day. Over a year, this represents an economic loss of up to AU$5.5 million in 2040.
• The average economic cost of treatment per case of waterborne disease is estimated to represent AU$32.6. Over a year, this represents an economic loss of up to AU$3.3 million in 2040.
• The reduction in the number of waterborne disease morbidity attributed to the project is estimated at 35 percent. The project economic benefits are therefore calculated as 35 percent of the stream of benefits described above from the time the upgraded water system is fully operational.

b. **Value of time saved.** According to the household survey conducted as part of project preparation in 2018, households spend an average 52 minutes per day collecting water (including the trip to water sources, waiting in line and fetching water). In a conservative approach, the related productivity loss is estimated based on half of the average casual wage of $A35 per day (with an increase in real wages of 1 percent per year). Over a year, it represents across South Tarawa a loss of AU$7.9 million. Considering that, after project implementation, households will continue spending 15 minutes per household per day collecting limited water from rainwater and well water sources, the project economic benefit represents AU$5.6 million per year.

c. **Carbon (CO₂) emissions avoided.** The total amount of CO₂ emissions that will be avoided over the life of the project (30 years) is 134,151 tons or 4,471.70 tons per year. This will result from (i) no need for kerosene-based boiling of water at household level, and (ii) avoided diesel-based generation to power pumping in the network due to the use of the solar PV system. The value of CO₂ emitted, on low estimate scenario, is assumed at AU$53.6 per ton in 2021 and increasing to AU$104.5 per ton in 2050. On high estimate scenario, the value of CO₂ emitted is assumed at AU$107.2 in 2021 and increasing to AU$209.1 per ton in 2050. Annual growth rate in real terms is 2.25 percent. In 2040, the value of avoided CO₂ emissions represents US$0.37 million per year on low estimate scenario, and US$0.46 million per year on high estimate scenario.

5. **Energy sector benefits.** The implementation of the solar PV system connected to South Tarawa’s grid will increase the electricity supply system’s overall capacity. Whenever electricity demand for the water system is smaller than the solar PV system’s capacity (in particular during the first years of operation), the available surplus will be available to supply other electricity users in South Tarawa, at a much lower cost that would be possible from the diesel generation system. Positive externalities for the city’s electricity sector have not been included in the present cost-benefit analysis, which focuses on the water system.

6. **Results.** Based on the estimates of the stream of economic benefits and costs over a 35-year period considered as the average economic life of future assets, the ENPV, EIRR and EBCR were computed under three scenarios: (a) excluding CO₂ emissions reduction in the cost-benefit analysis; (b) including and valuing CO₂

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52 Based on the review of interventions focusing on improved water supply (without sanitation) in Annette Prüss-Ustün, et al., 2019. “Burden of disease from inadequate water, sanitation and hygiene for selected adverse health outcomes: An updated analysis with a focus on low and middle-income countries”. International Journal of Hygiene and Environmental Health. https://doi.org/10.1016/j.ijheh.2019.05.004

emissions reduction using low estimate; and (c) including and valuing CO₂ emissions reduction using high estimates. Sensitivity tests were likewise undertaken: (a) 20 percent increase in CAPEX, (b) 20 percent increase in OPEX, (c) 20 percent decrease in benefits, and (d) 20 percent decrease in benefits and 20 percent increase in costs.

7. The table below summarizes the results of the base case and the sensitivity tests. ENPV figures are higher than zero and EIRR values are higher than the social discount rate of 6 percent, and EBCR values are higher than 1. These results indicate the economic viability of the project. The project is worth pursuing because the societal returns measured in terms of the economic benefits to the beneficiaries and the environment are significantly larger than the financial benefits.

Table A3.2: Results of Economic Analysis

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ENPV (AU$ million)</td>
<td>EIRR (%)</td>
<td>EBCR</td>
</tr>
<tr>
<td>Base Case</td>
<td>90.6</td>
<td>17.8</td>
<td>2.7</td>
</tr>
<tr>
<td>20% increase in CAPEX</td>
<td>83.5</td>
<td>16.2</td>
<td>2.6</td>
</tr>
<tr>
<td>20% increase in OPEX</td>
<td>88.5</td>
<td>18.3</td>
<td>2.8</td>
</tr>
<tr>
<td>20% decrease in benefits</td>
<td>63.3</td>
<td>15.4</td>
<td>2.4</td>
</tr>
<tr>
<td>20% decrease in benefits and 20% increase in costs</td>
<td>54.1</td>
<td>13.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>
Financial Analysis

8. **PUB Financial Performance.** In the last decade, PUB has been experiencing financial deterioration. From 2010-17, PUB income has been generated from electricity (88 percent), water supply and sewerage (6 percent), other income (2 percent), and water supply subsidies (7 percent). Each service is managed as a separate business line in PUB, and financial accounts are maintained separately for the operational divisions. Costs associated with corporate divisions (human resources, financial management, etc.) are allocated to electricity, water and sewerage business lines following respectively 60 percent, 20 percent and 20 percent distribution ratios. From 2015-2017, operating cost was on average AU$1.47 million, and income reached US$1.81 million for water supply and sewerage operations. The absence of applicable residential water tariff until early 2018 impeded PUB from recovering the true costs of water service provision through water sales. The average annual water sales from 2015-2017 registered at AU$0.71 million, generated mostly by sales to non-residential customers, and by bulk water delivery by tanker. Only commercial and institutional users are metered and charged a rate of AU$10/cubic meter for commercial customers and AU$15/cubic meter for government and industrial customers. The same rates apply for water delivered by water tanker plus delivery charge of AU$12 to AU$57 depending on distance. Significant income resulted from Community Service Obligations, which represented an average AU$1.0 million over the 2015-2017 period, and AU$0.1 million was earned through connection fees and sales of stock from PUB stores. Key PUB operational indicators for 2017 are provided in the Table below.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Year 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coverage (water services) (%)</td>
<td>67</td>
</tr>
<tr>
<td>Non-revenue water (%)</td>
<td>92</td>
</tr>
<tr>
<td>Metering level (%)</td>
<td>2</td>
</tr>
<tr>
<td>Continuity of service (hours per day)</td>
<td>1</td>
</tr>
<tr>
<td>Collection ratio (%)</td>
<td>70</td>
</tr>
<tr>
<td>Unit operational cost (US$/cubic meter sold)</td>
<td>1.6</td>
</tr>
<tr>
<td>Staff per 1,000 water connections</td>
<td>9.2</td>
</tr>
<tr>
<td>Labor costs vs. operational costs (%)</td>
<td>47</td>
</tr>
<tr>
<td>Electrical energy costs vs. operational costs (%)</td>
<td>15</td>
</tr>
<tr>
<td>Chlorination costs vs. operational costs (%)</td>
<td>11</td>
</tr>
<tr>
<td>Maintenance costs vs. operational costs (%)</td>
<td>3</td>
</tr>
</tbody>
</table>

9. **Cost recovery analysis.** The project was further assessed to determine the degree of cost-recovery from PUB’s perspective. Since the project is being exclusively financed by grants, as requested by GoK given the strong positive externalities, the financial analysis focuses on the review of PUB’s future recovery of the operating costs. The cost of O&M of the desalination plant(s) and network will mostly be covered by the project for 5 years. The remaining O&M costs are expected to be financed from the financial revenues that will be generated as a result of the project. Financial revenues will be generated from water sales (no connection fees will be applied under the project) to domestic, commercial and institutional/industrial users. Considering the absence of reliable history on tariffs and bills payment for domestic users, the following analysis was made for analytical purposes:
a. **Domestic Users.** A new residential water tariff was approved by Cabinet early 2018. It is now applied in the KAP-III pilot areas and is expected to be eventually rolled out across South Tarawa. Under that water tariff, described in Table A3.4, a household bill for an average consumption of 52 lpcd (design assumption) would cost $AU60 per month, which represents on average $AU5.4 per cubic meter.

Table A3.4: Current tariff structure

<table>
<thead>
<tr>
<th>Tariff block</th>
<th>Consumption (cubic meter/household/month)</th>
<th>Share of households with this level of consumption (%)</th>
<th>Proposed price of water (AU$/ cubic meter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>0 to 2.5</td>
<td>23</td>
<td>2</td>
</tr>
<tr>
<td>Middle</td>
<td>2.5 to 10</td>
<td>27</td>
<td>5</td>
</tr>
<tr>
<td>High</td>
<td>Above 10</td>
<td>50</td>
<td>15</td>
</tr>
</tbody>
</table>

There is increasing evidence that this tariff is not consistent with local affordability and willingness-to-pay parameters, and a revision of the water tariff is currently being assessed under subcomponent 2.3 of the project, funded by the PPA. It is expected that a tariff revision will be submitted to Cabinet later in 2019 as a result of this study. The present cost recovery analysis was made considering, for analytical purposes, a water tariff defined based on (i) household income and willingness-to-pay information gathered from the survey of 292 households conducted in June 2018 across South Tarawa, and (ii) household consumption and billing records from the KAP-III pilot villages now benefiting from 24/7 water supply. This water tariff, described in Table A3.5, would bring a monthly household water bill down to $AU11.5 for a 52 lpcd consumption (on average $AU1.0 per cubic meter), which would represent 4.9 percent of household income in the lowest population quartile, therefore complying with these affordability recommendations..Pending It should also be noted that households will maintain access to free water sources (shallow wells, and for some, private rainwater harvesting), which will allow them to increase water use for non-consumptive purposes at no additional cost, if needed.

Table A3.5: Proposed tariff structure

<table>
<thead>
<tr>
<th>Tariff block</th>
<th>Consumption (cubic meter/household/month)</th>
<th>Share of households with this level of consumption (%)</th>
<th>Proposed price of water (AU$/ cubic meter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>0 to 5</td>
<td>31</td>
<td>0.75</td>
</tr>
<tr>
<td>Middle</td>
<td>5 to 20</td>
<td>54</td>
<td>1.45</td>
</tr>
<tr>
<td>High</td>
<td>Above 20</td>
<td>15</td>
<td>4.00</td>
</tr>
</tbody>
</table>

b. **Commercial, Government and Industrial users.** PUB data on number of connections and current consumption was used to project revenues, using the current tariffs of AU$10/cubic meter for commercial customers and AU$15/cubic meter for government and industrial customers.

---

54 Based on international recommendations, water expenditures should be within the range of 3-5 percent of the household monthly income of the lowest income group.
c. **Total revenues.** Based on the expansion of services to all households in South Tarawa, on the proposed tariff, on the expected reduced NRW (25 percent, a third of which for physical losses and two thirds for apparent losses\(^{55}\)) and improved collection ratio (considered at 90 percent in the future), revenues from water sales are expected to reach AU$2.0 million by 2030, two thirds of which from residential customers.

10. As illustrated in Figure A3.2, the analysis shows that under the proposed tariff, 155 percent of all PUB OPEX (without depreciation) could be recovered during the O&M phase of the DBO contract, and 117 percent after project completion. This is to be compared to the current cost coverage ratio of 32 percent. In the event that PUB fails to recover OPEX during project implementation, a covenant to the Financing Agreement will require that Cabinet ensures availability of adequate financial resources to cover any shortfalls in the funding of PUB’s OPEX. PUB’s SOE status requires the recovery of depreciation costs as well. In such case, the amount of subsidy required to complement revenues from the tariff would represent an average AU$1.15 million during the O&M phase of the DBO contract, and AU$1.54 million per year after project completion.

**Figure A3.2: Evolution of PUB’s revenues, expenditures and cost recovery**
11. Detailed projects of PUB’s operational and financial parameters are provided in Table A3.6.

Table A3.6: Main PUB operational and financial parameters

<table>
<thead>
<tr>
<th>Water Produced (cubic meter/day)</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
<th>2027</th>
<th>2028</th>
<th>2029</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUB water</td>
<td>1,800</td>
<td>1,800</td>
<td>3,094</td>
<td>3,599</td>
<td>4,103</td>
<td>4,608</td>
<td>4,700</td>
<td>4,706</td>
<td>4,890</td>
<td>4,988</td>
<td>5,088</td>
</tr>
<tr>
<td>Urban groundwater</td>
<td>1,160</td>
<td>754</td>
<td>348</td>
<td>348</td>
<td>348</td>
<td>348</td>
<td>348</td>
<td>348</td>
<td>348</td>
<td>348</td>
<td>348</td>
</tr>
<tr>
<td>Rainwater</td>
<td>87</td>
<td>87</td>
<td>87</td>
<td>87</td>
<td>87</td>
<td>87</td>
<td>87</td>
<td>87</td>
<td>87</td>
<td>87</td>
<td>87</td>
</tr>
<tr>
<td>NRW (%)</td>
<td>92%</td>
<td>92%</td>
<td>92%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
</tr>
<tr>
<td>Physical losses (cubic meter/day)</td>
<td>1080</td>
<td>1080</td>
<td>666</td>
<td>252</td>
<td>287</td>
<td>323</td>
<td>329</td>
<td>329</td>
<td>342</td>
<td>349</td>
<td>356</td>
</tr>
<tr>
<td>Commercial losses (cubic meter/day)</td>
<td>576</td>
<td>576</td>
<td>612</td>
<td>648</td>
<td>739</td>
<td>829</td>
<td>846</td>
<td>847</td>
<td>880</td>
<td>898</td>
<td>916</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water Delivered (cubic meter/day)</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
<th>2027</th>
<th>2028</th>
<th>2029</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic customers</td>
<td>376</td>
<td>376</td>
<td>2,120</td>
<td>2,495</td>
<td>2,869</td>
<td>3,243</td>
<td>3,308</td>
<td>3,308</td>
<td>3,442</td>
<td>3,511</td>
<td>3,581</td>
</tr>
<tr>
<td>Population Served</td>
<td>38,000</td>
<td>38,000</td>
<td>40,966</td>
<td>48,232</td>
<td>56,619</td>
<td>65,333</td>
<td>67,851</td>
<td>68,000</td>
<td>68,000</td>
<td>68,000</td>
<td>68,000</td>
</tr>
<tr>
<td>Per capita consumption (lpcd)</td>
<td>10</td>
<td>10</td>
<td>52</td>
<td>52</td>
<td>51</td>
<td>50</td>
<td>49</td>
<td>49</td>
<td>51</td>
<td>52</td>
<td>53</td>
</tr>
<tr>
<td>Non-domestic customers</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>204</td>
<td>208</td>
<td>213</td>
<td>217</td>
<td>221</td>
<td>226</td>
<td>230</td>
<td>235</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water Sold (cubic meter/day)</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
<th>2027</th>
<th>2028</th>
<th>2029</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic customers</td>
<td>63</td>
<td>63</td>
<td>1,739</td>
<td>2,046</td>
<td>2,353</td>
<td>2,660</td>
<td>2,713</td>
<td>2,713</td>
<td>2,822</td>
<td>2,879</td>
<td>2,936</td>
</tr>
<tr>
<td>Non-domestic customers</td>
<td>140</td>
<td>140</td>
<td>164</td>
<td>168</td>
<td>171</td>
<td>174</td>
<td>178</td>
<td>181</td>
<td>185</td>
<td>189</td>
<td>193</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average Tariff (AUS/cubic meter)</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
<th>2027</th>
<th>2028</th>
<th>2029</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic customers</td>
<td>0.00</td>
<td>0.00</td>
<td>0.95</td>
<td>0.95</td>
<td>0.95</td>
<td>0.95</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
</tr>
<tr>
<td>Non-domestic customers</td>
<td>11.03</td>
<td>11.03</td>
<td>8.46</td>
<td>8.46</td>
<td>8.46</td>
<td>8.46</td>
<td>8.88</td>
<td>8.88</td>
<td>8.88</td>
<td>8.88</td>
<td>8.88</td>
</tr>
<tr>
<td>Billing amount (AUS/year)</td>
<td>0.56</td>
<td>0.56</td>
<td>1.42</td>
<td>1.60</td>
<td>1.77</td>
<td>1.94</td>
<td>2.08</td>
<td>2.09</td>
<td>2.16</td>
<td>2.21</td>
<td>2.25</td>
</tr>
<tr>
<td>Metering level</td>
<td>2%</td>
<td>2%</td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
</tr>
<tr>
<td>Collection ratio</td>
<td>70%</td>
<td>70%</td>
<td>70%</td>
<td>80%</td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
</tr>
<tr>
<td>Operating revenue (AUS/year)</td>
<td>0.39</td>
<td>0.39</td>
<td>1.14</td>
<td>1.52</td>
<td>1.68</td>
<td>1.84</td>
<td>1.97</td>
<td>1.99</td>
<td>2.05</td>
<td>2.10</td>
<td>2.14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPEX</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
<th>2027</th>
<th>2028</th>
<th>2029</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor</td>
<td>0.58</td>
<td>0.58</td>
<td>0.56</td>
<td>0.58</td>
<td>0.61</td>
<td>0.64</td>
<td>0.64</td>
<td>0.64</td>
<td>0.65</td>
<td>0.66</td>
<td>0.66</td>
</tr>
<tr>
<td>Chemical</td>
<td>0.14</td>
<td>0.14</td>
<td>0.17</td>
<td>0.20</td>
<td>0.23</td>
<td>0.26</td>
<td>0.27</td>
<td>0.28</td>
<td>0.28</td>
<td>0.29</td>
<td>0.29</td>
</tr>
<tr>
<td>Electricity</td>
<td>0.18</td>
<td>0.18</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.10</td>
<td>0.19</td>
<td>0.32</td>
<td>0.40</td>
<td>0.48</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0.33</td>
<td>0.33</td>
<td>0.17</td>
<td>0.18</td>
<td>0.18</td>
<td>0.19</td>
<td>0.19</td>
<td>0.49</td>
<td>0.90</td>
<td>0.50</td>
<td>0.50</td>
</tr>
<tr>
<td>OPEX (AUS/year)</td>
<td>1.23</td>
<td>1.23</td>
<td>1.23</td>
<td>0.90</td>
<td>0.96</td>
<td>1.03</td>
<td>1.20</td>
<td>1.16</td>
<td>1.59</td>
<td>2.15</td>
<td>1.84</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating cost (AUS/cubic meter sold)</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
<th>2027</th>
<th>2028</th>
<th>2029</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Ratio</td>
<td>0.32</td>
<td>0.32</td>
<td>1.27</td>
<td>1.58</td>
<td>1.63</td>
<td>1.62</td>
<td>1.62</td>
<td>1.31</td>
<td>0.98</td>
<td>1.18</td>
<td>1.14</td>
</tr>
</tbody>
</table>

\* new system put in operation in 2022
\*\* excludes costs supported by the DBO (up to 2026), financed by the project
\*\*\* desalination membranes replacement every five years
ANNEX 4: MAP

COUNTRY: Kiribati
South Tarawa Water Supply Project