

## Ex-Ante Evaluation (for Japanese ODA Loan)

South Asia Division I, South Asia Department

Japan International Cooperation Agency

### 1. Name of the Project

- ( 1 ) Country: India
- ( 2 ) Project: Project for Construction of Chennai Seawater Desalination Plant (II)
- ( 3 ) Project Site/Target Area: Chennai Metropolitan Area, Tamil Nadu (population: approx. 8.69 million (2011))
- ( 4 ) Loan Agreement: March 27, 2025

### 2. Background and Necessity of the Project

( 1 ) Current State and Issues of Water Supply Sector and the Priority of the Project in India

India had become the most populous country in the world in 2023 (approximately 1.4 billion people) and it is expected that the population will continue to increase (population growth rate of 0.7% in 2022 (World Bank, 2024)) and the economy will also continue to grow (GDP growth rate of 7.2% in 2022 (World Bank, 2024)) and the demand for water will increase. In response, it is necessary to strengthen water supply and develop efficient water supply systems by developing water resources and strengthening operation and maintenance management capacity.

The target area for the Project for Construction of Chennai Seawater Desalination Plant (hereafter referred to as “this Project”) is the Chennai Metropolitan Area (hereinafter, “CMA”), the capital of the state of Tamil Nadu in southern India, with a population of approximately 8.69 million (2011). This population is expected to exceed 15 million by 2035, but the development of water supply systems has not kept pace with population growth and economic development. In the water service area of the Chennai Metropolitan Water Supply and Sewerage Board, Government of Tamil Nadu (hereafter referred to as “CMWSSB”), specifically in Chennai Corporation, the water demand in 2023 exceeded 1,400 MLD (1.4 million m<sup>3</sup>), but the supply volume remained at around 1,015 MLD (around 1.015 million m<sup>3</sup>) in Chennai Corporation. In the CMA, there are many foreign companies, including Japanese companies (357 business locations as of October 2022, according to the Japanese Embassy in India website), and the severe water shortage is having a major impact on the investment environment. On the other hand, due to the lack of water sources, it

is difficult to meet the huge demand for water from surface and groundwater. As surface water is also easily affected by droughts during the dry season, a desalination project has been planned. In addition to the existing desalination plant (total capacity of 360 MLD), an expansion of the water supply capacity is being considered. This Project is positioned as one of the initiatives to secure safe and stable water resources in the CMA, in accordance with the Master Plan for Water Supply and Sewerage Sectors in Chennai Corporation and rest of CMA formulated by the city to solve these issues.

## ( 2 ) Japan's and JICA's Cooperation Policy and Operations in the Water Supply Sector/Area

Japan's Country Development Cooperation Policy for India (November 2023) has identified “clean socio-economic development” as a priority area, and support for water supply systems is positioned as part of “responding to environmental challenges and climate change issues.” In JICA Country Analysis Paper on India (March 2018), the “Program for Water Supply and Sewerage, Sanitation, and Pollution Prevention Measures” is listed under one of the priority assistance areas of “Sustainable and Inclusive Growth,” and JICA is committed to assisting the country to achieve sustainable economic growth and ensure that the benefits of this growth are shared equitably throughout society. Furthermore, this Project is positioned as a pillar of the “Addressing Challenges in an Indo-Pacific Way” initiative in the New Plan for a Free and Open Indo-Pacific (FOIP) from the perspective of responding to climate change through stable water supply and water resource management. The JICA Global Agenda also includes “Water Resources and Water Supply (Sustainable Water Resources Management and Water Supply)”, and JICA's cooperation policy is to support the growth of water supply services through measures such as expanding the revenue base and improving services by expanding and improving water supply facilities. This Project is in line with these policies and analyses.

In addition, under the Kumamoto Water Initiative announced by Prime Minister Kishida at the 4th Asia-Pacific Water Summit in April 2022, the Japanese government will provide approximately 500 billion yen in support over five years to promote the development of “high-quality water supply” and accelerate water-related initiatives in the Asia-Pacific region and around the world, and this Project is also aligned with this initiative.

## ( 3 ) Other Donors' Activities

ADB has been implementing the Tamil Nadu Urban Flagship Investment

Program (total loan amount: approx. US\$500 million) since 2018 to support the state's infrastructure development and service improvement, including water and sewerage. The German reconstruction finance corporation (KfW) supported the expansion of the Nemmeli desalination plant (production capacity: 110 MLD before expansion, 260 MLD after expansion) and the construction of a water pipeline adjacent to the planned plant construction site for this Project, and the expansion was completed in 2024. The Nemmeli plant was implemented based on the Master Plan for Water Supply and Sewerage Sectors in Chennai Corporation and rest of CMA. The World Bank has been implementing the Chennai City Partnership: Sustainable Urban Services Program (total loan amount of approximately US\$150 million) since 2021, and as part of this program, the installation of 100,000 water meters is scheduled to be completed in the city by 2028.

### **3. Project Description**

#### **( 1 ) Project Description**

- ① **Project Objective:** This Project aims to provide safe and reliable water supply by carrying out construction of a seawater desalination plant and its related water supply facilities, thereby improving living conditions of the residents including the poor people as well as the investment environment in the concerned areas in CMA in the State of Tamil Nadu.
- ② **Project Components**
  - a) Construction of a seawater desalination plant (production capacity: 400 MLD)
  - b) Construction of water pumping stations and a water reservoir
  - c) Installation of product water transmission mains
  - d) Improvement of the existing water distribution networks, installation and replacement of water supply equipment (including meters) (to be implemented by the executing agency)
  - e) Installation of external power transmission lines
  - f) Consulting services: conceptual design, detailed design, bidding assistance, construction supervision, management improvement assistance, public awareness assistance, etc.
- ③ **Project Beneficiaries (Target Group):** Population served by the water distribution network to be developed under this project in the Chennai Corporation: approximately 8.57 million people (2023)

( 2 ) Estimated Project Cost: 120,933 million yen (Japanese ODA loan: 52,556 million yen)

( 3 ) Schedule: March/2018- March/2029 (133 months)

The Project will be considered complete when all facilities are commissioned (March 2028)

( 4 ) Project Implementation Structure

1 ) Borrower: President of India

2 ) Guarantor: N/A

3 ) Executing Agency: Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB)

4 ) Operation and Maintenance System: Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB)

( 5 ) Collaboration and Sharing of Roles with Other Donors

1 ) Japan's Activity: This Project is positioned as part of efforts to comprehensively strengthen the infrastructure of the CMA, along with other projects such as the Chennai Metro Rail Project (Phase 2) (I) (L/A signed in FY2018), the Project for the Construction of Chennai Peripheral Ring Road (Phase 1) (L/A signed in FY2019), and the Project for the Construction of Chennai Peripheral Ring Road (Phase 2) (L/A signed in FY2023).

2 ) Other Donors' Activity: KfW and this Project (400MLD) share the seawater desalination projects planned by CMWSSB based on the Master Plan for Water Supply and Sewerage Sectors in Chennai Corporation and rest of CMA, and the potable water produced by both projects is supplied to the CMA by CMWSSB.

( 6 ) Environmental and Social Consideration

① Category: B

② Reason for Categorization: This Project does not fall under the categories of sectors/characteristics that are likely to have an impact, or areas that are likely to be affected as listed in the "JICA Guidelines for Environmental and Social Considerations" (promulgated in April 2010)", and it is judged that any adverse impact on the environment will not be significant.

③ Environmental Permit: The Environmental Impact Assessment (EIA) report for this Project was approved by the Ministry of Environment, Forests and Climate Change in October 2018.

④ Anti-Pollution Measures: Measures will be taken to prevent the spread of dust, noise and muddy water during construction, such as water

spraying, the use of soundproofing equipment and the introduction of measures to prevent the spread of suspended solids, such as silt screens. In addition, it is expected that wastewater from the desalination plant during operation will be treated on site and discharged in accordance with local laws and regulations.

⑤ Natural Environment: The Project area is not located in or near sensitive areas, such as national parks, and it is expected that any negative impact on the natural environment will be minimal. In addition, there are no confirmed sea turtle nesting or spawning sites in Tamil Nadu near the project area, and the migration area is along the coast and in deeper waters than the intake and outfall. Regarding the impact of wastewater containing concentrated saline water, there is no confirmed presence of rare species in the vicinity of the wastewater outfall, and the increase in salt concentration is mitigated by diffusion, so it is assumed that the undesirable impact on the ecosystem will be limited.

⑥ Social Environment: This Project does not involve land acquisition or resettlement of residents, as the land is secured under a 30-year lease contract. As for the impact on local fishermen, measures will be taken to prevent muddy water during construction, and when the facility is in operation, wastewater will be treated within the facility before being discharged, and the concentrated saline wastewater will be diffused to prevent an increase in salt concentration, so the negative impact is expected to be limited.

⑦ Other/Monitoring: During construction, the contractor and CMWSSB will monitor air quality, water quality, noise, waste disposal, the ecosystem, etc. When the plant is in operation, CMWSSB will monitor the water quality of the surrounding sea areas and the ecosystem (including the impact on fishing) in relation to the discharge of concentrated seawater.

#### ( 7 ) Cross-Sectoral Issues

1) Climate change: This Project aims to stabilize the water supply by securing water sources that are not affected by fluctuations in rainfall and rainfall patterns expected to be caused by climate change, and to save water through improvements to the water supply network, thereby contributing to climate change adaptation.

2) Poverty measures and consciousness: This project aims to rehabilitate the water distribution network to improve water supply services in the

target area, including the slum area, and therefore falls under the category of poverty alleviation.

( 8 ) Gender Category

【Not a “Gender Project”】 ■ GI (Gender Informed)

<Details of Activities/Reason for Categorization> This is because the Project did not result in the establishment of indicators or plans based on gender analysis. However, in this Project it is planned to provide adequate facilities for women workers, create an inclusive work environment that does not give rise to discrimination or harassment, and apply flexible working arrangements for pregnant and breastfeeding women.

( 9 ) Other Important Issues

Japanese companies' products have already been adopted for high-pressure pumps and booster pumps that supply water to reverse osmosis membranes (RO membranes) at the seawater desalination plant.

**4. Targeted Outcomes**

( 1 ) Quantitative Effects

1) Outcomes (Operatio and Effect Indicators)

Indicator	Baseline (Actual value in 2023)	Target (2030) [2years after project completion]
<b>【Indicators concerning the Seawater Desalination Plant】</b>		
Plant facility utilization rate (%) <sup>1)</sup>	-	75
<b>【Indicators for the Chennai Corporation concerning the distribution network to be developed in the Project】</b>		
Population served (in 1000 persons)	8,570	9,669
Percentage of Population Served with Pipe (%) <sup>2)</sup>	86	97
Meter installation rate (%) <sup>3)</sup>	3	28

<sup>1)</sup> The plant facility utilization rate is calculated as the average daily water supply volume/water supply capacity of the seawater desalination plant.

<sup>2)</sup> The percentage of population served with pipe is calculated as the population served by piped water / population served.

<sup>3)</sup> The meter installation rate is calculated as the number of meters installed/the number of households connected.

[Reference values]

Water served population in CMA (in thousands)<sup>4)</sup>: Baseline (year 2023) 10,753, Target (year 2030) 14,128

Average amount of water supply in CMA (MLD)<sup>4)</sup>: Baseline (year 2023): 1,183, Target (year 2030): 1,907

<sup>4)</sup> As the project does not cover the development of water distribution networks in the CMA outside Chennai Corporation, the indicators for the CMA are for reference only.

Average daily water supply in Chennai Corporation (MLD) <sup>5)</sup>: Baseline (year 2023): 1,015, Target (year 2030): 1,799

<sup>5)</sup> These values are for reference only, as they include water supply from other plants.

( 2 ) Qualitative Effects: Improvement of water quality and water pressure satisfaction (customer survey/sample survey) and improvement of living environment through safe and stable water supply service in CMA (improvement of residents' health conditions, etc.), promotion of economic and social development (economic growth in the CMA, promotion of investment, etc.)

### ( 3 ) Internal Rate of Return

Based on the assumptions listed below, the economic internal rate of return (EIRR) for this Project is 20.2%. The financial internal rate of return (FIRR) turned out to be negative as a result of calculations over the project life period due to the current low tariff level. A gradual increase in tariffs is planned in the future, and it will be monitored during the project implementation period.

#### 【EIRR】

Cost: Project costs, operation and maintenance costs (all excluding taxes)

Benefit: Willingness to pay for water fees, reduction of well drilling and operating costs, reduction of medical expenses, reduction of domestic water transporting costs.

Project Life: 30 years

#### 【FIRR】

Cost: Project costs, operation and maintenance costs

Benefit: Additional revenue

Project Life: 30 years

## **5. External Factors and Risk Control**

( 1 ) Precontidiot: The executing agency carries out the renewal of the water pipeline network without delay.

( 2 ) External Factors: None in particular

## **6. Lessons Learned from Past Projects**

The ex-post evaluation results of the “Urban Water Supply and Sanitation Improvement Program” in India and other findings show that it is necessary to consider a realistic plan for a tariff system that enables maximum beneficiary contribution and the dissemination of water meters by accurately predicting demand for services and the amount and ability of residents to pay for water supply projects. In this Project, it is confirmed that revisions to water rates are being made in stages, taking into account the cost recovery of the executing agency and the ability of consumers to pay, and that the Water Meter Policy enacted in 2022 set a target of achieving a 100% water meter installation rate in Chennai Corporation in the future, and that steady meter installation is planned in multiple programs, including this Project. In addition, capacity building and provision of advice are delivered to enhance financial robustness through consulting services, with plans to support the distribution of water meters through such initiatives.

## **7. Evaluation Results**

This Project is consistent with the development issues and policies of the Government of India, as well as the aid policies and analysis of the Government of Japan and JICA, and contributes to the provision of safe and stable water supply services through the construction and improvement of seawater desalination facilities and water supply and distribution facilities. It is also expected to contribute to SDG Goal 6, “Ensure availability and sustainable management of water and sanitation for all,” and therefore it is highly necessary for JICA to assist in the implementation of this Project.

## **8. Plan for Future Evaluation**

( 1 ) Indicators to be Used

As indicated in Section 4.

( 2 ) Future Evaluation Schedule

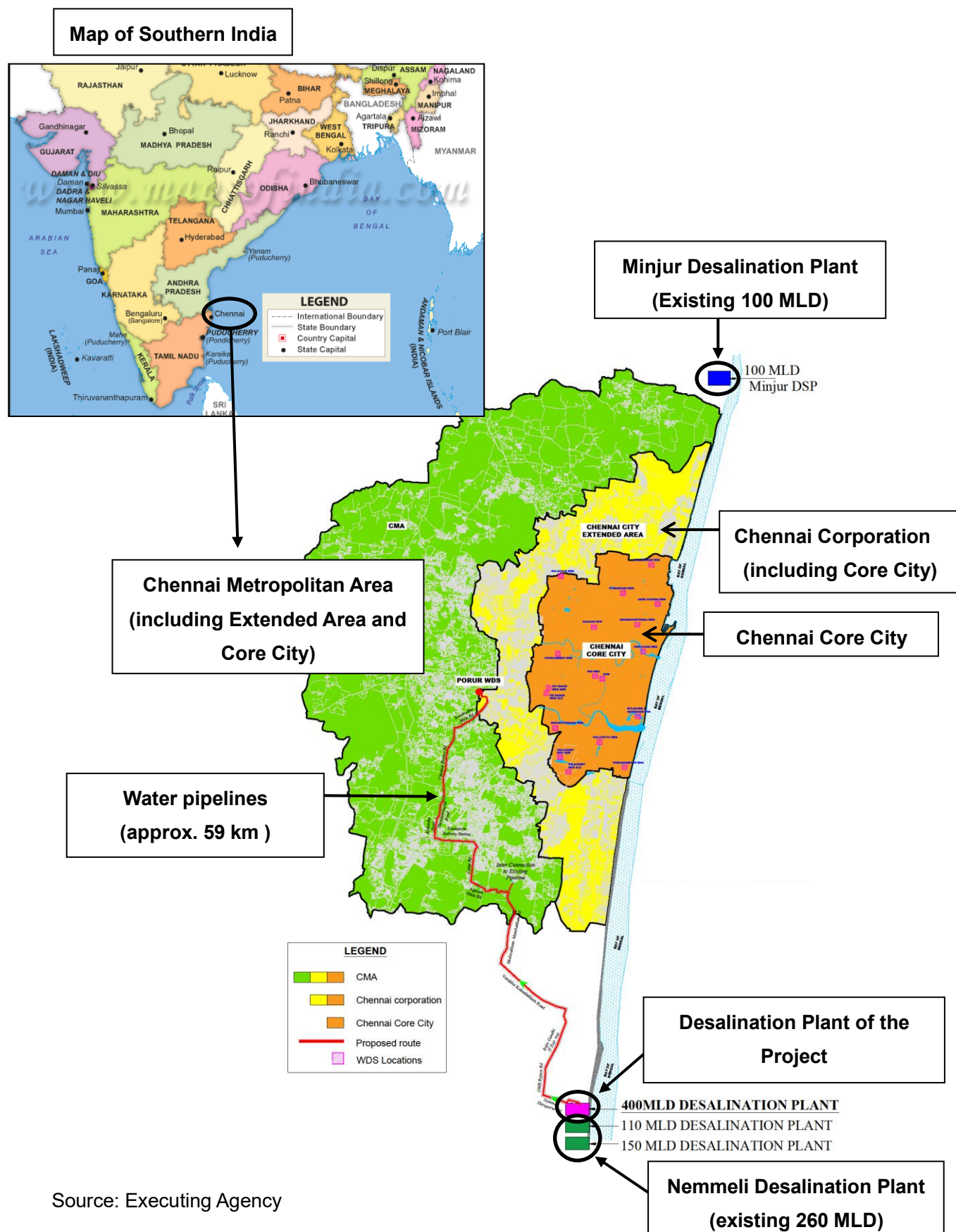
Ex-post evaluation: 2 years after the Project completion

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Appendix: Map of the Project for Construction of Chennai Seawater Desalination



# Map of the Project for Construction of Chennai Seawater Desalination



Source: Executing Agency