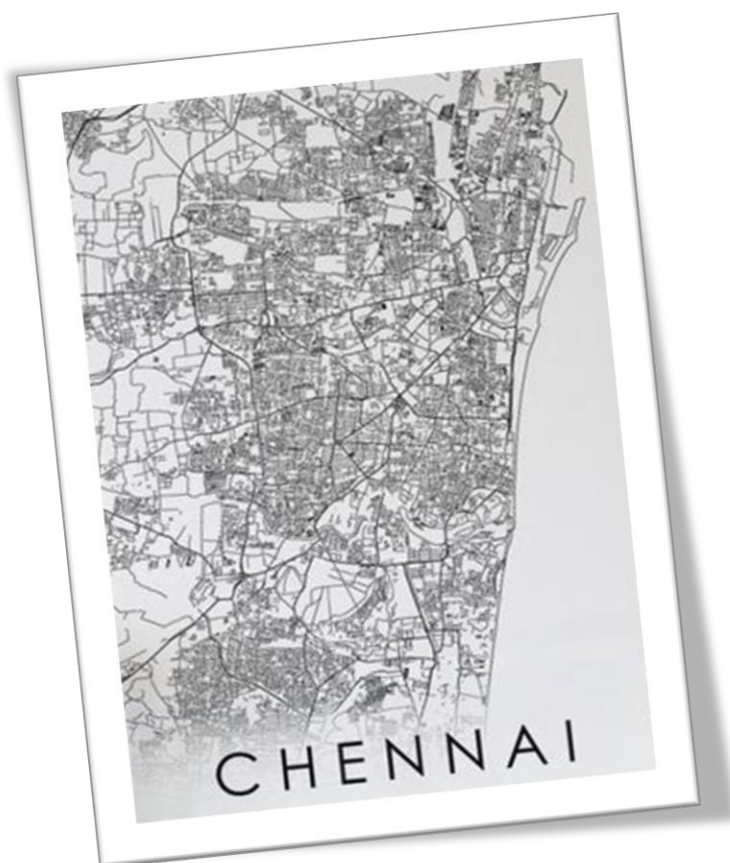


India: Chennai City Partnership: Sustainable Urban Services Program (P175221)

Technical Assessment Report



April 2021



THE WORLD BANK
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1 BACKGROUND and INTRODUCTION

The southern State of Tamil Nadu is one of India's most urbanized states and an economic powerhouse. By 2011, nearly half (48.4 percent) of Tamil Nadu's population of 72.1 million was already urban. With the rapid urbanization that is underway, the share of the urban population is expected to increase to 63 percent by 2030. Over the last 5 years ending Financial Year 2019-20, the GSDP of Tamil Nadu (at constant prices) grew at 7.99%. This is higher than the national level GDP growth rate (at constant prices) of 6.71% during the same period.

The Chennai Metropolitan Area (CMA) epitomizes both the economic potential and vulnerabilities of the State's rapid urbanization. The CMA is the fourth-most populous metropolitan area in India and encompasses an area of 1,189 sq km. With an estimated population of about 10.9 million people and an estimated US\$78.6 billion GDP, CMA is also rated as the fourth-largest economy in India. Its diverse economy includes electronic manufacturing, automobiles, and IT/IT-enabled services. The CMA is highly vulnerable to natural disasters, climate change and, as the COVID-19 emergency revealed, to pandemics. Frequent disaster events—such as the devastating flood in 2015, debilitating drought in 2018 and 2019, Cyclone Gaja in 2018, and the ongoing COVID-19 pandemic (2020)—are inflicting substantial economic losses, causing loss of life and livelihoods, and adversely impacting infrastructure and service delivery.

The Government of Tamil Nadu (GoTN) is committed to making Chennai a world-class city—one that is green, livable for all residents, competitive, and resilient to climate change and other shocks. Given that Chennai is the most significant metropolitan area and economic growth engine of the state, the development of the CMA is prioritized within the Tamil Nadu 2023 Vision that is currently under implementation. Accordingly, the government has already been investing heavily in high-quality infrastructure assets in CMA. GoTN finds, however, that financing for infrastructure assets is neither automatically translating into substantial improvements in service delivery for citizens nor transforming the city rapidly enough. Therefore, as a key next step, GoTN is **commencing a program—Chennai 2030—that brings fresh impetus to transformation of the city and its services and, simultaneously, accelerates Chennai's shift to a growth trajectory that is lower-carbon and more resilient.** The Chennai 2030 program not only aims to improve Chennai's livability, productivity, and carbon footprint but also to serve as a “lighthouse”—in that experience from the program is expected to directly **inform development approaches for three additional metropolitan clusters (Coimbatore, Trichy, and Madurai)** as well as other important towns in Tamil Nadu.

The Greater Chennai Corporation (GCC), the largest urban local body (ULB) in the CMA, is directly responsible for delivering several but not all urban services in its jurisdiction. GCC's population accounts for about 68 percent of the total population of CMA.¹ GCC's service responsibilities include delivery of local roads and streetlights, stormwater drainage, municipal solid waste management (SWM), health, family welfare services, education, land and estate facilities, public spaces, and pedestrian infrastructure. By contrast, services such as water, sewerage, public transport are provided by separate agencies such as Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB), Metropolitan Transport Corporation (MTC), and Chennai Metro Rail Company (CMRL). Chennai Metropolitan Development Authority (CMDA) is responsible for metropolitan planning and development regulation. Some of these agencies, such as CMDA and MTC, are responsible for planning and delivery of services not only in the GCC area but also in all other local bodies in the CMA. These agencies have a varying degree of autonomy and capacity and report to different state-level departments.

¹The current population in GCC's jurisdiction is estimated at 7.4 million, while that of CMA is about 10.9 million.



Service delivery responsibilities in Chennai and CMA are fragmented across jurisdictions and service delivery agencies, and service quality, operational efficiency and environmental sustainability are suboptimal. The complexity and variation of institutional arrangements, performance, and challenges in service delivery are illustrated in the brief discussion below on four essential urban services: water supply and sewerage (WSS), urban mobility, municipal SWM, and public health care.

- (a) **Water resource availability, supply, and sewerage.** Chennai is plagued by recurring cycles of flooding and drought. High reliance on surface water makes Chennai particularly vulnerable to the impacts of climate change and extreme weather events. Chennai is widely considered to be among the most water-stressed cities in India and, currently, urban water demand does exceed water availability, at least in the dry season. However, recent analyses reveal that water stress is more a reflection of inadequate management—of water resources, the water supply system, and demand—than of resource inadequacy. A recent study shows that Chennai’s water shortages arise not from rainwater shortages but rather from suboptimal harnessing of runoff.² The reasons, identified by other research, include unplanned urbanization that has encroached on natural drainage systems, indiscriminate solid waste dumping in drains and catchment areas, and inadequate maintenance and management of reservoirs. The same factors also explain the recurrent flooding in Chennai. *Resource availability constraints are exacerbated by poor management of the urban water supply system and of demand.* As an organization, CMWSSB is hampered by an inadequate service delivery orientation, insufficient delegation of powers, lack of independent directors on its the Board, and weak performance management processes. The performance of the WSS system in the GCC area is poor and service coverage is partial, especially in the newly added areas of the city.³ Water is supplied only on alternate days for a few hours, and water losses in the system are high (non-revenue water is estimated at 40 percent).⁴ There is little demand-side management given that metering is limited (4 percent of household connections) and charges are extremely low (a flat rate of about Rs 80/month per household connection). High water losses and low charges also translate into poor financial sustainability, with the utility (CMWSSB) recovering only about 50 percent of operations and maintenance (O&M) costs through user charges. About 70 percent of sewage is collected and treated through existing sewage treatment plants, and only about 10 percent is recycled and reused. Overall, to enhance water security and reduce vulnerability to floods and droughts, Chennai needs to move towards integrated urban water resource management (WRM)—one where the Water Resources Department (WRD), CMWSSB, and GCC collaborate on an overarching program that addresses water availability, demand management, water conservation and storage, urban drainage and wastewater management.
- (b) **Mobility.** In recent years, Chennai's transportation mode share has shifted away from public transit and nonmotorized transport (NMT) toward personal vehicles.⁵ Higher personal vehicle use contributes to high road fatalities, congestion, air pollution, and greenhouse gas (GHG) emissions. The use of public transport,

² Nigam, S. Ruiz-Barradas, A. and Agniv Sengupta 2021. “The Chennai Water Crisis: Insufficient rainwater or suboptimal harnessing of runoff?” *Current Science*, Vol. 120, No. 1, 10 January 2021 43. The study estimates that harnessing just 42 percent of the winter monsoon runoff in the Chennai basin, and storing it using existing storage capacity, is sufficient to meet demand.

³ Current annual domestic water demand in the city, assessed by CMWSSB, is 1,333 MLD, whereas supply is 800 MLD—primarily through reservoirs and desalination plants. On average, CMWSSB supplies 86 liters per capita per day, against a planning standard/benchmark of 135 liters per capita per day.

⁴ At least 50 percent of customers’ water supply requirement is being met through borewells/dug wells/tankers.

⁵ In 2018, buses and NMT accounted for 50 percent of all trips. This includes walking (25 percent), cycling (3 percent), and bus (22 percent)—in Chennai; reliance on these modes is even higher among lower income groups. However, the share of buses and NMT has been falling over time. Use of personal motorized vehicles, especially two-wheelers, has been rising and the latter now accounts for 30 percent of trips.



especially buses, is declining due to limited integration and a shortage in bus services resulting in crowding, limited coverage, and overall low service quality. An estimated 39 percent of the population can only access 30 percent of jobs in a 45 minutes public transport trip. While Chennai ranks as relatively safe city in India, women's overall mobility is harmed by regular harassment, unsafe public spaces and public transport, and systems and services not reflecting their needs. Sector resource allocation reflects neither the current nor the targeted mode shares and provides limited financial incentives for service improvement, given that a large part of the cost to GoTN is implicit as a shareholder rather than explicit in the form of payments for services. The Chennai Unified Metropolitan Transport Authority (CUMTA), created to provide the institutional coordination mechanism across more than ten agencies and organizations, is not yet operationalized. Overall, while Chennai has developed a rather extensive mobility network, its challenge is to deliver seamless and safe citizen-centric mobility services with an emphasis on ensuring integration across modes, improving the quantity and quality of bus services, and expanding pedestrian and cycling infrastructure.

- (c) **SWM.** The efficacy of GCC's SWM services is limited due to lack of adequate infrastructure and systems across the value chain. Chennai generates about 5,100 tons of solid waste per day (TPD), and while about 95 percent of the waste is collected and transported, very little is processed; only about 8 percent is disposed safely owing to lack of sanitary landfills.⁶ Limited processing and disposal capacity has resulted in high levels of waste leakages, increased open dumping, littering and burning of waste leading to rapid environmental degradation, increased flooding risks, serious public health issues and high GHG emissions. In addition, extremely low levels of cost recovery and weak institutional systems for service performance monitoring and contract management exacerbate GCC's challenge of scaling up needed investments and systems for O&M.⁷ GCC needs to focus on waste reduction and resource efficiency measures that decouple urban population growth from waste generation, steadily move up the waste hierarchy towards reuse, recycling and recovery, and enhance the operational and financial sustainability of its SWM system.
- (d) **Health sector.** Chennai has made significant progress in improving reproductive, maternal, new-born and child health (RMNCH) outcomes through better access to services, but quality of care is emerging as a substantial emerging. In addition, there has been a significant increase in non-communicable diseases (NCDs), and yet the public sector primary health care system primarily caters to RMNCH services. Disease surveillance and public health are relatively strong in Chennai, but opportunities for further strengthening the system exist and have been highlighted through the COVID-19 emergency. Chennai has the advantage of significant resources and capacity as well as GoTN commitment to public provision of services, which enables it to provide health services through its own network of health facilities. While Chennai has been relatively successful in the health sector, there remain some systematic weaknesses: shortages in health workers, low capacity to provide a full range of primary health care services, fragmented referral system between primary care facilities managed by GCC and higher-level facilities managed by the state health department, a focus on inputs rather than results, and poor quality of care. Consequently, there is inefficient high use of secondary and tertiary level care for issues that could be dealt with at primary care level, resulting in delayed identification and access to care which contributes to a lack of continuum of care, avoidable acute adverse events, and high out-of-pocket-payments. There is an opportunity for stronger coordination mechanisms between the state and GCC health departments, more active citizen engagement to effectively reach

⁶About 51 percent of the waste generated is 'wet waste' and the rest 'dry waste.' Processing capacities are low—only 500 TPD for wet waste (19 percent of generation) and 300TPD for dry waste (12 percent)—and, consequently, resource recovery is also low (16 percent) and far below potential.

⁷ O&M cost recovery is estimated at less than 3 percent.



populations with information and services, engagement with the private sector, and cross-sectoral linkages and coordination between health, water and sanitation, and transport departments.

The emerging short- and medium-term challenges across these urban services are strikingly similar in CMA and are indicative of those in other metro regions in India. As the above discussion suggests, service delivery in most of these sectors in CMA suffers from the following cross-cutting challenges: (i) fragmentation of responsibilities across multiple agencies and jurisdictions; (ii) lack of institutional capacity and mechanisms for integrated planning and delivery; (iii) operating frameworks that focus on investments for infrastructure asset creation rather than on service delivery performance measured in terms of coverage, quality, sustainability and resilience; and (iv) lack of sustainable financing frameworks, with very low own-source revenue generation, excessive reliance on the state government for input-based budget allocations and operating subsidies, and few incentives for cost-effective service delivery and private sector participation.

The COVID-19-induced crisis has highlighted the need for better services and the limitations of current delivery models; it has created an imperative to pivot towards sustainable delivery and building back better. During the first few months of the COVID-19 pandemic, Chennai was among the 10 large Indian cities that quickly became hot spots and accounted for the majority of cases in the country. As with other city corporations, GCC has been at the frontlines of the response. On the one hand, the pandemic has underscored the need for additional, better, and more resilient services in sectors such as water, sanitation, health, and public transportation. On the other hand, with the severe economic downturn underway, the state, local governments, and utilities are financially strapped and unable to continue delivering highly subsidized services, let alone scale up and improve them significantly. There is a clear understanding across GoTN that it is time to strengthen key service delivery institutions, *overhaul current service delivery models and pivot* towards arrangements that can, over time, deliver world-class services in a manner that is environmentally and financially sustainable as well as socially inclusive.

In response to GoTN's request, the World Bank has proposed a Chennai City Partnership (CCP) that will bring both financing and knowledge to support the city's transformation. The partnership is seen as a programmatic engagement that is multi-phased and commences with a multi-sectoral operation—the Chennai Sustainable Urban Services Program (C-SUSP)—focusing on the institutional and financial changes that can drive significant improvements in service delivery.

2 PROGRAM DESCRIPTION

2.1 Government Program

Vision 2023 Tamil Nadu. The vision document provides a strategic investment plan to improve competitiveness and quality of life in Tamil Nadu for 2012–2023 at a total estimated cost of approximately US\$203 billion. This Government program identifies 10 priority theme areas, including the provision of world-class infrastructure, protection against vulnerability, improving the quality of institutions and governance, and creating 10 world-class cities (including Chennai). The Vision Plan also lays out an Urban Development Sector investment plan, which prioritizes Chennai's development, including improvements in water supply and sanitation services, public transport, SWM, and public health services.

GoTN's new Chennai 2030 program (2021-2030) aims to accelerate Chennai's transformation into a city that is green, livable, competitive, and resilient. The program is envisaged as a multi-phased program that will pool resources from government sources and development partners and leverage the private sector for both finance and expertise. It builds on insights and experience gained from ongoing investments and initiatives in CMA, and



especially the lesson that investments alone—especially, if they are uncoordinated—are insufficient to achieve transformation of the city. Accordingly, the new program entails several shifts: (i) from disparate vertical initiatives in different geographic areas to a more coordinated multi-sectoral program focused on a single metropolitan area; (ii) from a singular focus on investments to an emphasis on service delivery outcomes; and (iii) a new focus on addressing challenges that are common across different sectors/services and testing new models of service delivery. All program activities will be **structured in the form of three pillars**: (i) strengthening institutions; (ii) enhancing quality of urban services; and (iii) improving financial sustainability of service delivery.

Phase 1 of the Chennai 2030 program—the proposed Government program (‘p’, the program)—commences the process of transformation in service delivery and its institutions. The program (that is, Phase 1 of Chennai 2030) will focus on improving the delivery of selected metro-level services, with infrastructure investments being limited to those that will help realize service improvements in the short term; investments in major/large infrastructure projects will be deferred to Phase 2. These future investments will both deepen and leverage the institutional and systems improvements (enhanced planning, coordination, implementation capacity, and financial sustainability) undertaken by service delivery agencies in Phase 1. The program will be implemented over a 5-year period (2021-26) with the objective of improving the quality of and access to core urban services.

The program will focus on selected services—health, SWM, mobility, WSS—and incentivize relevant service agencies to achieve tangible improvements in service performance. These services were selected because they: (i) have a high impact on city’s livability, productivity, sustainability and/or resilience; (ii) service performance indicators are below desirable benchmarks and/or there is need to improve the nature and quality of services to meet changing needs of the city and its citizens; and (iii) are linked to each other in a manner that improvement in one can lead to improvements in another. The program’s geographical focus is the CMA, with a particular emphasis on improving service outcomes in the GCC area. Activities under the selected areas are outlined below.

- **Municipal governance, finance, and services (health and SWM).** The program focuses on (i) strengthening GCC’s organizational and financial capacity by addressing critical human resource gaps and improving own-source revenue generation; (ii) improving access to and quality of comprehensive primary health care services delivered by GCC and strengthening disease surveillance; and (iii) strengthening the institutional systems for planning and delivery of integrated municipal SWM services with a specific focus on dry waste recycling and resource efficiency.
- **Urban mobility services.** The program focuses on improving urban mobility, especially public bus transport services and NMT, by (i) operationalizing and strengthening the CUMTA to serve as the main agency responsible for integrated planning and delivery of mobility services in CMA; (ii) investing in expansion and improvement of MTC’s bus services through performance-based contracting linking GOTN payments to quality service delivery; (iii) enhancing women’s safety in public transport and public spaces through a result-based approach; and (iv) investing in GCC’s demonstration “mega-streets” program that will improve streets and public spaces to promote NMT options, including walkability and cycling, and upgrade all utilities along those streets in a coordinated intervention.
- **WRM, water supply, and sewerage services.** The program supports WRD and CMWSSB with policy, institutional, and financing changes to enhance WRM and service delivery. WRM would be improved through (i) preparation of a new Water Act that includes, among others, creation of a Water Regulatory Authority and legislation for groundwater management; (ii) investments in resilient watersheds to improve the water conservation and management; and (iii) operationalization of a system for cascade reservoir management, optimization and enhanced monitoring. WSS services would be improved through (i) incentives to establish and achieve benchmarks for service performance and operational efficiency; (ii) use of performance-based



operator contracts for improving services in the core city area; (iii) expansion of network coverage and household connections for WSS in newly added peripheral urban areas, and (iv) incentives for improving O&M cost recovery from user charges.

The program has a total estimated government budget of US\$1.46 billion over five years (from 2022 to 2027) for the development of institutions, infrastructure, and delivery systems in identified service sectors. For urban mobility, the government has allocated US\$638.9 million–US\$558.5 million for MTC, US\$68 million for GCC, and US\$12.5 million for CUMTA. For the water sector, the government has allocated US\$268 million–US\$225.7 million for CMWSSB and US\$42.5 million for WRD. For municipal services (health and SWM), the government has allocated US\$541 million for GCC. An additional US\$ 12 million is allocated for Program management across all participating agencies. The program would be coordinated and managed by the Tamil Nadu Infrastructure Development Board (TNIDB), which reports to the Finance Department of the state government.

2.2 Theory of Change

The proposed CCP is envisaged as a programmatic engagement between the GoTN and the World Bank that supports the Chennai 2030 program and aligns with its three pillars. Specifically, the Partnership adopts a framework with three interlinked results areas to enable a transition to higher-quality, sustainable and resilient services: (i) strengthening institutions; (ii) enhancing the quality of urban services; and (iii) improving financial sustainability of service agencies.

In the absence of fully empowered ULBs that can deliver integrated city management, the Program creates mechanisms for better coordinating planning, management, and service delivery in CMA. One way to tackle the identified problem of fragmentation in urban management and service delivery would be for Tamil Nadu to implement the 74th constitutional amendment act, passed in 1992, that mandated the setting up and devolution of powers to ULBs as the lowest unit of governance in urban areas. The fact that few states have implemented the act points to the difficult political economy surrounding this issue. It is, therefore, crucial to identify alternative mechanisms for improving urban management and service delivery outcomes. This Program **reduces fragmentation within sectors by creating coordinating institutions and initiates processes for coordinating across sectors.** In the transport sector, it supports the operationalization of the CUMTA to coordinate service provision across providers of bus, rail, road, and pedestrian infrastructure and services. In the water sector, it supports the creation of a Water Regulatory Authority that can oversee allocation across uses and, potentially, help coordinate different initiatives to enhance water availability and security. In the health sector, it creates mechanisms for improving coordination between state and local initiatives and between primary, secondary, and tertiary care facilities. It also supports coordination among different sectors—for example, between health and the water and transport sectors—through planning and investments in relevant cross-sectoral initiatives.

Agency-level reforms are expected to restore the links between finance, service performance, and accountability to the state and citizens. A key reason for the current state of poor service delivery is that service agencies (GCC, MTC, and CMWSSB) have become increasingly accustomed to receiving support from the state, usually in the form of budgetary resources for inputs and investments, without being held accountable for service outcomes. In parallel, own-source revenue generation—from tariffs, fees and/or taxes—has also fallen, both because of politically-influenced restrictions on rates and poor collection efforts, and this has eroded downward accountability to citizens. Using the CCP Framework of three inter-linked results areas, the proposed series of operations aim to bring back the focus of service agencies to service delivery performance. They will do so by financially incentivizing service delivery performance, steadily helping the agencies improve their own-source revenues and overall financial performance, restoring the links between budgetary allocations and results (upward accountability), and supporting mechanisms for enhancing accountability to citizens and feedback from them (downward accountability). Overall, the CCP Framework offers one way to re-orient infrastructure agencies



and financing away from a focus on creating infrastructure assets and towards delivering citizen-centric services that are inclusive, high-quality, resilient, and sustainable.

The C-SUSP is proposed as a first engagement under the Partnership and supports the government program identified as Phase 1 of the Chennai 2030 program. The C-SUSP, designed as a PforR, incentivizes results and has three features that are worth highlighting. *First*, the C-SUSP directs efforts under the “institutions” pillar on reducing fragmentation in service delivery and vulnerability to climate change and increasing transparency. Therefore, institutional efforts under the C-SUSP focus on both building the capacity of existing service delivery institutions and establishing new institutions and mechanisms that would improve coordination, enhance resilience, and increase transparency. *Second*, the C-SUSP aims to demonstrate one approach to achieve urban transformation—by selecting and sequencing actions across multiple sectors and overtime to catalyze the process of institutional and service delivery transformation in a single city. *Third*, given that the city has been hit hard by the ongoing COVID-19 pandemic, the C-SUSP supports strengthening of municipal primary public health services and those infrastructure services that can contribute directly to better health and, more broadly, to enhancing resilience and sustainability; this point is discussed further below.

Building Back Better after COVID-19: Selecting services that enhance resilience and sustainability. In India and in Tamil Nadu, the COVID-19 pandemic has revealed the fault lines not only of health care delivery systems but also of systems for social protection and delivery of basic infrastructure services such as water, sanitation, and transport. It has highlighted the issue of inequitable access to services, housing, and safe public spaces. It has also emphasized the connections between environmental, animal, and human health, and underscored the need to sustain and maintain environmental and eco-system services. These considerations guided the selection of services and activities under the C-SUSP. **The Program enhances resilience to health shocks** such as pandemics by strengthening the primary health care system, improving disease surveillance and public health, and by improving other key services that have a positive impact on health outcomes, that is, water, sanitation, safety in public spaces, and creation of an urban environment that facilitates walking and cycling. **The Program enhances climate resilience and environmental sustainability** by supporting (i) climate adaptation interventions—especially, those that reduce Chennai’s water insecurity and vulnerability to droughts; and (ii) climate mitigation interventions—that is, the shift to greener and more sustainable mobility modes (public transport and NMT), reducing water losses, improving SWM, and reducing municipal waste generation.

Moving key agencies up a ladder of reforms and performance, over time: Phasing of operations. The phasing of operations under the Chennai Partnership and design of the C-SUSP acknowledges that substantial improvements in institutional systems and service delivery performance take time and can only be realized through an incremental, carefully planned, and phased approach. The Bank’s engagement is currently envisaged as *series of three operations covering at least two phases of the Chennai 2030 program*. The proposed C-SUSP PforR (FY21) is expected to be followed by an operation on Urban Mobility and Spatial Development (FY22) and another on Water and Resilience (FY23); the latter two will support Phase 2 of the Chennai 2030 program which is under development. While the C-SUSP will commence the process of institutional change and service transformation concurrently in multiple service sectors, the reform process will be deepened through follow-on investment projects that would be more sectoral in nature. **Financing under for the follow-on operations⁸ will be linked to achievement of critical reforms under the C-SUSP**; this will significantly increase the financial incentives for the participating agencies to advance on the reform agenda. The Partnership may continue bringing other critical

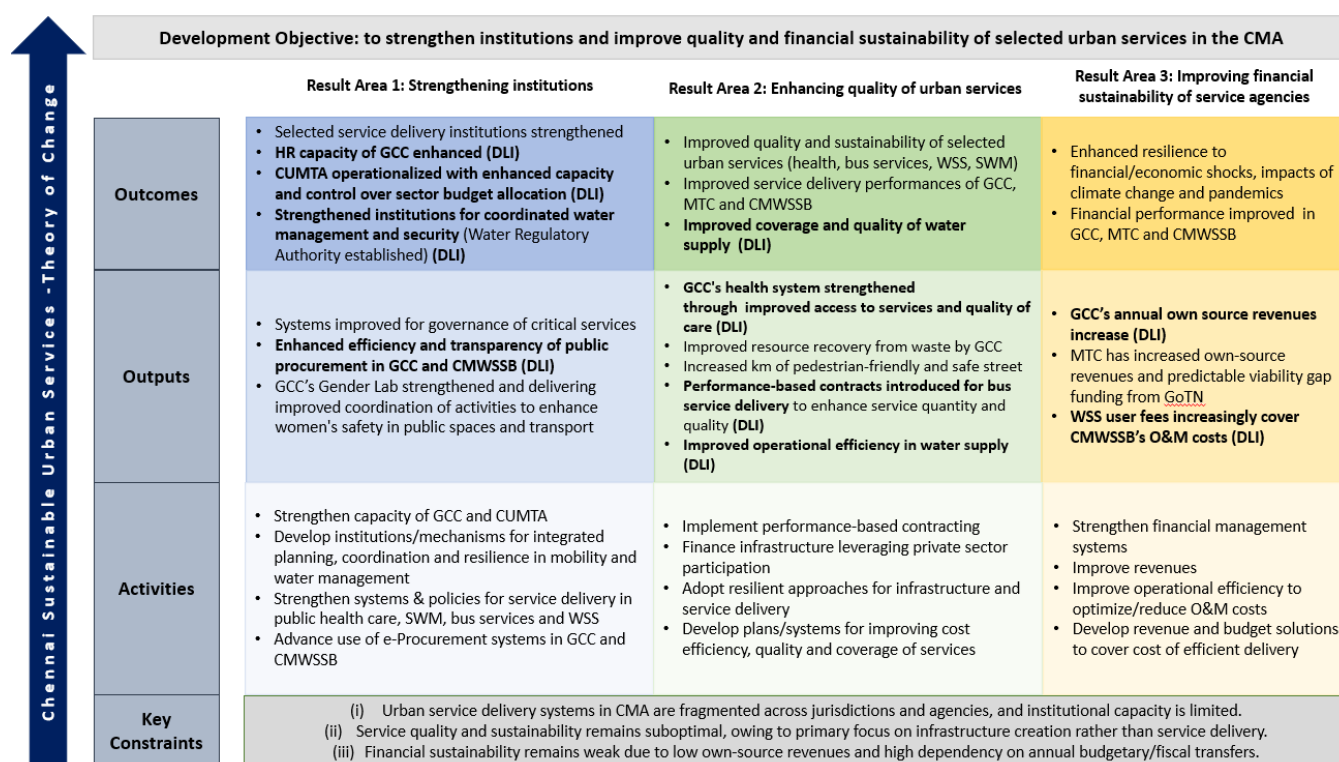
⁸The Program will be followed by at least two operations on (i) urban mobility and spatial development; and (ii) water and resilience. These follow-on operations will aim to further advance the institutional capacity but more importantly support major investment needs in given sectors.



sectors or services in during the later years with the same umbrella objective of enhancing urban service delivery in CMA and supporting its transition to a lower-carbon, more inclusive, and resilient growth path.

Results areas under the C-SUSP. The first results area on institutions focuses on activities that enhance capacities, integrated planning, and transversal governance in critical institutions. This is where most of the outcome-level indicators concentrate, several of which are recognized as disbursement-linked indicators (DLIs). The second results area on services supports activities that will commence the process of enhancing the quality and sustainability of selected urban services; higher order improvements will require additional capital investments under follow-on programs. The third results area on financial sustainability requires service delivery agencies to steadily move up a financial capability ladder, with basic reforms in Phase I and deepening reforms in Phase 2. Therefore, the PforR aims to facilitate medium-term outcomes under the latter two results areas, and the DLIs are generally concentrated at the output level. With this approach, the Theory of Change is presented below.

Figure 1. Theory of Change of the Program



2.3 PforR Program Scope and Design

The proposed PforR Program would support and strengthen the implementation of the first phase of the government program by focusing on a core set of service delivery improvements across the identified service sectors with US\$ 701 million in financing over 5 years (2021-2026). As a subset of the Government program, the PforR Program boundaries are defined as follows:

- Services.** The Program will cover all the identified service sectors under the Government program including (i) health; (ii) municipal SWM; (iii) urban mobility, with a focus on strengthening bus service delivery, municipal pedestrian infrastructure, and women's safety in public spaces; and (iv) WRM and urban WSS. In each of these, the Program covers a subset of activities and investments



supported under the government program. A key difference between the government program and PforR is that the latter prioritizes support for institutional changes and new models of service delivery, leaving some of the more traditional investment approaches to the broader government program.

- **Duration.** The Program will be implemented over 5 years (2021–26).
- **Financing support.** The total Program budget is proposed as US\$701 million, with US\$ 150 million from IBRD, potential co-financing of US\$150 million from the Asian Infrastructure Investment Bank (AIIB), and US\$ 401 million as counterpart funding from GoTN.
- **Geographical coverage.** The Program will cover the CMA region. Among the ULBs, there is a special focus on GCC, as the largest and economically most important ULB in CMA.

The PforR Program will focus on supporting activities across the three interlinked results areas (RAs) that correspond to the three pillars of the government program. The three RAs are: i) strengthening institutions; ii) enhancing the quality of urban services; and iii) improving the financial sustainability of service agencies. The Program will provide financial incentives to the service delivery agencies for implementing key institutional, financial, and service delivery reforms in the respective service sectors and demonstrate concrete improvements across all three results areas. Together, the activities under these three results areas will lead to improved institutional systems, financial capacities, and service levels in CMA.

Table 1. Program Boundaries

	Government Program	Program Supported by the PforR	Reasons for Non-alignment
Title	Phase 1: Chennai 2030	C-SUSP	
Objective	To improve the quality of and access to core urban services in CMA	To strengthen institutions and financing for improving quality and sustainability of selected urban services in the CMA	PforR prioritizes fundamental institutional reforms, only selected investments, and new delivery models
Duration	2021-2026	2021-2026	
Geographic coverage	CMA	CMA	
Results areas	Three pillars focusing on (i) strengthening institutions, (ii) infrastructure and service delivery, and (iii) enhancing financial sustainability of services	Three Result Areas focusing on (i) strengthening institutions, (ii) enhancing the quality of urban services, and (iii) improving the financial sustainability of service agencies	
Overall Financing	US\$1.46 billion	US\$701 million	Balance to be supported by GoTN

Results Area 1: Strengthening institutions. This results area will support the improvement of key Chennai service delivery entities through critical policy reforms and institutional strengthening. Under this results area support will be provided to (i) create or strengthen institutions that can improve integration and coordination of service delivery across administrative and institutional jurisdictions; (ii) enhance the organizational capability of key agencies; and (iii) strengthen transparency through rollout of e-procurement.



Results Area 2: Enhancing the quality of urban services. Under this results area, support will be provided to three key service delivery entities—MTC, CMWSSB, and GCC—to improve service delivery outcomes and performance.

Results Area 3: Improving financial sustainability of service agencies. Under this results area, support will be provided to MTC, CMWSSB and GCC to improve their overall financial performance and the financial sustainability of targeted services.

2.3.1 Program Development Objective (PDO) and PDO Level Results Indicators

The PDO is to strengthen institutions and improve quality and financial sustainability of selected urban services in the CMA. The PDO-level results indicators are as follows:

- (a) Reduction in vacancy rates of Group A & B cadre of GCC to enhance professional capability
- (b) Operationalization of CUMTA with enhanced capacity and control over sector budget allocation to oversee urban mobility in the metropolitan areas
- (c) Improvement in service delivery performance of MTC, CMWSSB and GCC (public health) disaggregated by gender and vulnerable groups ⁹
- (d) Percentage increase in GCC annual OSR
- (e) Improved financial performance for WSS service

2.3.2 Disbursement Linked Indicators and Verification Protocols

Program resources will be disbursed based on the achievement of 10 DLIs. These DLIs have been selected to incentivize the more important reforms, new models of service delivery, and achievement of improvements in service quality and performance. The weighing of resources across different DLIs reflects their importance toward achieving the program results. Resources allocated to the DLIs do not represent the total financial outlay required. Program resources will be channeled through GoTN's Finance Department to implementing entities involved in the Program. Table 2 details the DLIs and their allocated funding from IBRD and AIIB. A complete DLI matrix is provided in annex 2.

The achievement of all DLIs will be reviewed and confirmed by the independent verification agent (IVA). The Program Management Unit will be responsible for reporting on achievement of the Program DLIs each of which includes several disbursement-linked results (DLRs). An independent firm will be contracted by GoTN to conduct third party verification for all Program DLIs to be submitted as part of an Annual Program Report (APR). The DLIs will be verified through a combination of data sources in accordance with an agreed verification protocol as provided in annex 2. The IVA will deploy a suitable methodology depending on the results area, which may include desk review of documents, baseline surveys, and physical inspection and field visits for projects funded by the Program among others. All disbursement requests to the World Bank will be submitted with the results of the

⁹This is a composite index that consists of the following service-specific indicators: (i) WSS: additional households connected and receiving assured water supply of at least one hour daily; (ii) GCC Health: increase in the UPHC Service Provision Improvement index value; (iii) Urban mobility: index measuring increase in quantity of service and in user satisfaction. Each sector will account for one-third of the value of the indicator which will be measured as an index. The performance level identified through surveys will be taken as 100. For details, refer to the Results Framework and monitoring and evaluation (M&E) annex.



independent verification.

Table 2. DLIs and Allocated Financing

Result Area	DLI	Responsible Agency	Allocated Amount (US\$, millions)	
			World Bank	AIIB ¹⁰
1. Strengthening institutions (US\$62.5 million)	1. Reduction in vacancy rates of Group A & B cadres of GCC to enhance professional capability	GCC	7.50	7.50
	2. CUMTA is operational with enhanced capacity and control over sector budget allocation	GoTN/Transport Department and CUMTA	4.00	4.00
	3. Strengthened institutions for coordinated water management and security (Water Regulatory Authority established)	WRD, GoTN	14.62	14.62
	4. Enhanced efficiency and transparency of public procurement (GCC and CMWSSB)	GCC, CMWSSB	5.00	5.00
2. Enhancing quality of urban services (US\$177 million)	5. GCC's health system strengthened through improved access to services and quality of care	GCC	20.00	20.00
	6. Performance-based contracts for bus service delivery to enhance quantity and quality of services	MTC	41.00	41.00
	7. Improved operational efficiency in water supply (performance contract, NRW reduction) and metering for demand-side management	CMWSSB	17.50	17.50
	8. Improved access to water supply (increase in coverage and reliability)	CMWSSB	10.00	10.00
3. Improving financial sustainability of urban services (US\$60 million)	9. Increased annual own-source-revenues in GCC (percentage)	GCC/GoTN	15.00	15.00
	10. Improved financial sustainability of WSS services (with user fees increasingly covering O&M costs)	CMWSSB/GoTN	15.00	15.00
Front end fee	(0.25% of IBRD loan amount)		0.38	0.38
Total			150.00	150.00

2.4 Climate Change Co-Benefits of the Program

¹⁰ The DLIs are planned to be financed by the World Bank and AIIB in equal shares; contingent on approval by AIIB Board which will occur after approval by the Bank's Board.



Chennai is highly vulnerable to climate change and to disaster risks such as floods, tsunamis, droughts, and cyclones. The 2019 droughts and the 2015 floods adversely affected the city's economy and had a lasting negative impact on the lives of its citizens. The proposed operation will directly contribute to both mitigation and adaptation efforts. The program will: a) support expansion and share of green modes of urban mobility—buses, walking and cycling—to counter the trend towards the use of carbon-intensive modes and personal vehicles; b) reduce vulnerability of the city to the cycle of floods and drought (events that are expected to increase in severity), by supporting establishment of Water Regulatory Authority to enhance integrated planning, development, management and use of water resources across WRD, CMWSSB and GCC; c) reduce GHG emissions and flooding instances through improved SWM; and d) support digitalization of infrastructure facilities and systems (the value chain) to aid remote operation and enhance resilience. Detailed climate vulnerability context and specific climate adaptation and mitigation actions supported by the Program are presented below.

Vulnerability Context:

Climate change and disasters. The maximum temperature over Chennai for the periods 2010-2040 (2020s), 2040-2070 (2050s) and 2070-2100 (2080s) with reference to the baseline (1970-2000) is projected to increase by 0.9°C, 1.9°C and 2.9°C, respectively. Similarly, the projections of minimum temperature for the same periods indicate an increase of 1.1°C, 2.2°C and 3.3°C, respectively. The annual rainfall projection for the periods 2020s, 2050s and 2080s indicate a general decrease of 0.1 percent, 5.0percent, and 1.0percent, respectively with respect to the baseline. However, the projections indicate higher possibility of extreme rainfall events in the northern coastal areas and lower level of rainfall in the inland southern and western regions with risk of prolonged drought conditions. In general, South India is projected to experience increased frequency of tropical cyclones with increasing average wind speeds. Projected Sea Level Rise along the eastern coast of India is likely to increase coastal flooding and salinity ingress in surface waters.

Chennai is known for its multi-hazard vulnerability and CMA is exposed to a wide range of hazards, including floods, earthquake, cyclone, storm surge, tsunami, CBRN/Industrial/Transport, fire accidents and pandemics.¹¹ The city has witnessed several natural disasters of severe intensity such as- large scale losses of lives and colossal damages to the infrastructure during Tsunami 2004; Chennai and its surroundings during 2015 Floods; crippling of the entire city due to the severe drought in 2016–2017; and severe damages due to recent Cyclone Amphan. Rising temperatures and varied precipitation patterns will only intensify these existential threats. Recurring floods and drought (water crisis) are two serious impacts of Climate Change in Chennai. Warming of Bay of Bengal due to climate change will also impact intensity and frequency of cyclones in the region.¹² This would also mean direct impacts on sea water current, atmospheric pressure, atmospheric temperature, and uneven tropical rainfalls.

Urbanization. Chennai constitutes more than 25 percent of the Tamil Nadu State urban population and more than 12 percent of the Tamil Nadu State total population. The population of the metropolitan area will be about 1.26 crore by 2026.¹³ River and coastal floodplains are often convenient places for the establishment of cities, farms, and industrial sites. Easily accessible waterways facilitate commerce, rich river floodplain soils increase agricultural production and rivers offer readily available sources of freshwater. Rapid urbanization, congestion, more buildings and increasing commercial activity in certain pockets of the city, has led to higher temperature levels. A recent study on urban heat islands by the Centre for Climate Change and Adaptation Research Centre, Anna University,¹⁴

¹¹ <https://tnsdma.tn.gov.in/app/webroot/img/document/SDMP-29-08.pdf>.

¹² https://www.business-standard.com/article/current-affairs/severity-of-cyclones-in-bay-of-bengal-on-the-rise-say-scientists-119050300848_1.html.

¹³ Tamil Nadu State Action Plan for Climate Change.

¹⁴ <https://www.annauniv.edu/cccdm/mediacentre.html>.



indicates people who live in parts of central and north Chennai experience the heat more than those residing in suburbs with green cover. Chennai lost 33 per cent of wetlands during the last decade. Sea water incursion causes reduction in drinking & irrigation water supplies of potable and usable quality respectively. Moreover, emissions from automobiles, air conditioning and industries have turned them into heat islands that are hotter than their surrounding areas. The impact of floods and droughts on vulnerable and poor people can be particularly devastating and long-lasting. In urban areas they can be highly destructive, particularly if they occur with little preparation or warning. They can destroy assets and infrastructure, cause major hygiene crises by blocking drains and flooding sewage, shutter businesses, and of course lead to mortality and morbidity.

Water resources and supply sector. Even though the core areas of Chennai enjoy 100 percent coverage of piped water supply, service levels are relatively poorer in rest of the city that have been recently added to the Corporation limits. Water demand in CMA is estimated at 1750 MLD and 2248 MLD in the Chennai SMP and (base case scenario of) the Chennai revised CDP, respectively. Against this, abstractable water quantity for 2026 (after factoring about 200 MLD from desalination, 90 MLD from sewage re-use and about 240 MLD of ground water in the city for uses other than drinking and cooking) is estimated at 1954 MLD. This gap between supply and demand is further expected to widen due to climate change. Rapid and unplanned expansion of the city at the expense of water bodies, wetlands and flood plains has contributed to the flood-drought cycle and highly site-specific water vulnerabilities. Due to erratic rainfall and inflation of agricultural inputs many agricultural laborers migrated to urban areas in search of jobs to sustain their life. The stream of people moving to large urban centers with hope of better fortune increases each year and this trend has led to large number of people, especially the poor, settling and living in floodplains in and around urban areas. These areas lie outside the formal city limits (peri-urban areas) so they are unplanned and unregulated. Thus, continually lack adequate drainage systems, water supply and sanitation facilities. This causes stress to water sources and increases the pollution. The competition between rural and urban demands for scarce water resources sometimes exacerbates the water shortage. Moreover, rise in sea level due to increase in global temperature will result in shifting of shorelines towards inland, thus affecting the freshwater interface in the coastal aquifer and ground water recharge. This situation is further aggravated by the high-water losses associated with aging distribution networks, and inadequate drainage systems not adapted to heavier monsoon rains. Climate change and extreme weather events also impact quality and availability of water, as also cause damage to water supply and drainage/sewerage infrastructure assets. Timing and intensity of rainfall can impact the transport of disease-causing organisms into the water supply systems. Further, increasing temperature will also lead to lower availability of dissolved oxygen and increased biological activity exhausting oxygen in water systems. Changed pattern of thermal mixing in water bodies can also create anaerobic conditions leading to eutrophication.

Transport sector. Vehicular population in Tamil Nadu has been increasing over the years due to urbanization, rising real per capita income and growth in personal transport.¹⁵ According to the Centre for Science and Environment (CSE) report,¹⁶ Chennai citizens make the longest trips in daily commute and the city stands second on overall emissions and thereby energy consumption among all metro cities in India. Chennai has the highest number of two-wheelers amongst all metro cities because of last-mile connectivity. Chennai also faces a declining share of public transport, and traffic congestion on its key corridors which contributes to higher GHG emissions and heat island effects. As the vehicular population increases, they also add to the congestion thereby increasing the amount of time of travel, the fuel costs, emissions, and social costs.

¹⁵ http://www.ifmrlead.org/wp-content/uploads/2015/01/Report_2_Fiscal_Instruments_for_Low_Carbon_Transport_in_Chennai.pdf.

¹⁶ <https://www.deccanchronicle.com/nation/current-affairs/260818/chennai-second-in-overall-emissions-study.html>.



SWM. Waste generation based on GCC's reported waste collection is estimated at 5,100TPD or approximately 2 million tons annually. The way the wastes are handled, stored, collected, or disposed can impact the environment and public health. Accumulation of solid waste is a matter of growing concern in CMA and this is further aggravated due to the absence of proper disposal and management plans. Though SWM is an obligatory responsibility of the local body, it is struggling to keep pace with the growing trend in the per capita waste generation, increasing urbanization and population. This results in the contamination of the groundwater sources, uncontrolled emission of methane by decomposition of waste, spreading of vector-borne diseases, rodents and so on, that result in adverse impact on the environment.

Health sector. Changes in climate can affect the potential transmission of vector borne diseases that include temperature, humidity, altered rainfall, soil moisture and rising sea level. Climate conditions affect quality and availability of water. Flooding and natural disasters may also cause sudden outbreak of diseases. According to the latest figures released by the National Vector Borne Disease Control Programme (NVBDCP) of the Ministry of Health and Family Welfare, there has been a sharp rise in the number of dengue cases in Tamil Nadu, particularly in Chennai area. With the change in temperature, erratic monsoons, water stagnation due to poor urban planning and, flooding, there will be higher incidence of vector borne diseases.

Climate Adaptation and Mitigation Actions Included Under the Program:

The activities supported under the Program significantly contribute reducing these vulnerabilities through climate adaptation and mitigation. Detailed information on climate adaptation and mitigation actions under each result area is provided in the below table:

Table 3. Climate Adaptation and Mitigation Actions by DLI

Activities	Adaptation Actions	Mitigation Actions
RA 1: Strengthening Governance and Institutions		
DLI 1: Reduction in vacancy rates in professional cadres (Group A & B) of GCC (US\$7.5 million)		
The activity would support the revision of the staffing norms and cadre structure of GCC with a specific focus on professional employee grades (Groups A & B), strengthen the recruitment process for GCC to enable recruitment of better quality of professionals, facilitate reduction in vacancies, and enhance employment opportunities for women as per the revised staffing norms.	<p><i>Vulnerability context:</i> Refer to (a) and (b)</p> <p><i>Intent to address identified vulnerabilities:</i> Human resources at GCC, CMWSSB and other important institutions needs to imbibe new skillsets, capabilities, especially in light of the need to address newer area including non-motorized transport, flood resilience, smart-streets, climate change and disaster risk management. The recruitment process will ensure selection of potential candidates with knowledge of climate change and disaster risk management.</p> <p><i>Explicit link between identified climate change risks and specific project activities:</i> Improving recruitment modalities, revising staffing norms and positions at GCC will address the skill gaps within Group A and B cadres such as in emerging areas of climate change, disaster risk management, GIS mapping, IT, SWM, and so on are essential</p>	



Activities	Adaptation Actions	Mitigation Actions
	to build capacity towards challenges of climate change.	
DLI 2: CUMTA is operational with enhanced capacity and control over sector budget allocation (US\$4 million)		
For CUMTA, priorities include the recruitment of needed technical staff, the adoption of a citizen-centric strategic vision plan (that is, the Comprehensive Mobility Plan), and securing authority for budgetary allocation and oversight of urban mobility investments.	<p><i>Vulnerability context:</i> Refer to (a), (b), and (d)</p> <p><i>Intent to address identified vulnerabilities:</i> The project will establish and strengthen the CUMTA as the key coordinating agency for delivery of urban mobility services across providers of all modes of transport, pedestrian services, and infrastructure. This will support the Transport department and MTC will help rapidly improve the institutional framework and capacity for delivery of bus services, given that buses are, by far, the most used form of motorized public transport in Chennai; and augment non-motorized modes of transport such as walking and cycling.</p> <p><i>Explicit link between identified climate change risks and specific project activities:</i> Development of Masterplan and Neighbourhood plans aligned with Transport Plan will transform the CMA by adopting transit-oriented development principles and adopt a new efficient mass transit system.</p>	Completion and implementation of a revised Comprehensive Mobility Plan will help address urban mobility issues such as congestion, enhanced access to public transport, availability of quality sidewalks/cycle lanes leading to reduction in GHG emissions.
DLI 3: Water Act prepared, Water Regulatory Authority established, and cascade reservoir management system operationalized (US\$15 million)		
The Program will support development of a Water Act that creates, among others, the legislative basis for a water regulatory authority and for groundwater water management. It will also support operationalization of the regulatory authority and the introduction of a system for cascade reservoir management, optimization, and monitoring.	<p><i>Vulnerability context:</i> Refer to (a), (b), and (c)</p> <p><i>Intent to address identified vulnerabilities:</i> The Project will support preparation of the legislation for management of surface and groundwater resources in consultation with stakeholders and establish a Water Regulatory Authority. It will also support preparation of a long-term integrated water security plan that address the challenges of climate change and extreme weather events for water resources and supply sector. Integrated cascade reservoir management system to help improve coordination among different agencies operating reservoirs for Chennai. Thus, improved co-ordination among these agencies will help avoid any extreme weather event due to climate change and enhance water security.</p>	



Activities	Adaptation Actions	Mitigation Actions
	<p><i>Explicit link between identified climate change risks and specific project activities:</i></p> <p>These efforts would not only contribute to meeting 80% of the city's water supply, but more importantly ensure that the water supply will be resilient to climate change impacts.</p>	
DLI 4: Enhanced efficiency and transparency of public procurement (GCC and CMWSSB) (US\$5 million)		
The CMWSSB and GCC will prepare e-procurement roadmaps to achieve, in a phased manner, targets related to use of e-procurement, contract management modules, and timely public disclosure of contract awards.		
RA#2: Improving Financial Sustainability		
DLI 5: Strengthening GCC's health system through improved access to services and quality of care (US\$20 million)		
This activity will support the development, adoption and implementation of a comprehensive Quality of Care strategy and operational plan by GCC; expansion of access to comprehensive primary health care services in UPHCs; strengthening of disease surveillance systems; and development of a comprehensive digital health system in GCC.	<p><i>Vulnerability context:</i> Refer to (a), (b), and (f)</p> <p><i>Intent to address identified vulnerabilities:</i></p> <p>Comprehensive Quality of care strategy, disease surveillance systems, and comprehensive digital health systems will help identify and tackle vector-borne and zoonotic diseases at an early stage, which will help restrict spreading of these diseases.</p> <p><i>Explicit link between identified climate change risks and specific project activities:</i></p> <p>By monitoring changes in disease outbreaks and developing comprehensive health care services to tackle novel viruses, vector-borne diseases (such as dengue, malaria, chikungunya), and zoonotic diseases many of which are due to changing climatic conditions, the project will enhance bio-security and pandemic response at the city level.</p>	
DLI 6: Performance-based contracts for bus service delivery (US\$41 million)		
<ul style="list-style-type: none"> This activity includes implementation of public transport service contracts between GoTN and MTC as well as gross cost contracts between MTC and private sector bus service providers for delivery of services through an addition of 1000 buses. Incentives will be provided to MTC for rolling out contracts and monitoring the service performance improvements through DLIs. This activity will also support GCC in 	<p><i>Vulnerability context:</i> Refer to (a), (b), and (d)</p> <p><i>Intent to address identified vulnerabilities:</i></p> <p>Implementation of public transport contracts for bus services will help retain the passengers that use public transport instead of them moving to private vehicles. Enhancement in walkability and cycling through Mega Street Program will promote use of non-motorized modes of transport, thus leading to reduction in GHG emissions.</p>	<p>Net reduction in GHG emissions due to reduction of vehicles on road due to modal shift to buses estimated at 235000 tons of CO₂ till 2035. All other GHG emissions converted to CO₂ equivalents, based on treatment costs. Appraisal guidelines for Metro projects, MoHUA, GoI, 2017 estimates cost of treatment at</p>



Activities	Adaptation Actions	Mitigation Actions
<p>scaling-up the planning and implementation of 11.6KMs of pedestrian-friendly multi-utility streets under Chennai city's "mega streets" program.</p> <p>In addition, capacity will be built in a new Gender Lab to coordinate and enhance the effectiveness of activities under the Women's Safety in Public Space program supported by Gol's Nirbhaya Fund, with a special emphasis on enhancing women's safety in and use of both public transport and public spaces in the city.</p>	<p>Capacity building of the new Gender Lab under the Women's Safety in Public Space program supported by the Nirbhaya Fund will enhance public transport infrastructure and services safety by providing seamless door-to-door mobility for all through multimodal integration, efficient capacity augmentation, and better access to public transport. Therefore, encouraging women to use public transport rather than private vehicles.</p> <p><i>Explicit link between identified climate change risks and specific project activities:</i> The activities under this DLI will help reduce GHG emissions by reducing vehicular congestion-promoting use of public and non-motorized modes of transport, replace old fleet of buses with new green buses, and improving efficiency of existing fleet.</p>	<p>INR 500 per ton of CO₂ and INR 100,000 per ton of other gases</p>
DLI 7: Improved operational efficiency in WSS service delivery (performance contract, NRW reduction) and enhancement of demand-side management (metering) (US\$17.5 million)		
<p>This activity will support CMWSSB in implementation of bulk metering, establishment of a baseline on non-revenue water (NRW), and actions to steadily reduce NRW and/or unaccounted for water.</p> <p>It will incentivize steady expansion of metering and use of volumetric tariffs as a crucial step in influencing user behavior and enhancing demand-side management. It will also support a phased increase in the number of water supply connections for assured water supply, including a robust baseline on quality and quantity of service delivery. At broader level, it will support CMWSSB in initiating reforms that strengthen the quality and accountability of service delivery.</p> <p>Key activities under discussion are a tripartite agreement on improving service delivery performance between GoTN, CMWSSB and GCC, including targets for a phased improvement of services in duration, volume and quality of supply at the customer; annual publication and disclosure of a customer</p>	<p><i>Vulnerability context:</i> Refer to (a), (b), and (c)</p> <p><i>Intent to address identified vulnerabilities:</i> There is growing pressure on available water resources given the burgeoning demand for water in Chennai city. It is critical to reduce water leakages for enhanced water availability through reduction in NRW and/or unaccounted for water, metering, installing meters for bulk water transmission lines, enhancing energy efficiency of pumps, and demand-side management.</p> <p><i>Explicit link between identified climate change risks and specific project activities:</i> Proposed activities will help maintain water supply for the city especially in case of any extreme weather event.</p>	<p>The use of energy-efficient pumps for water supply operations will not only improve operational efficiency but also lead to GHG emissions reduction.</p>



Activities	Adaptation Actions	Mitigation Actions
<p>report card; and establishment of two independent directors on CMWSSB Board for greater transparency and improved services.</p> <p>It will also support performance-based contracts for improvement of WSS services in the core city area (Zones X and XIII), including household connections, metering and NRW reduction.</p>		
DLI 8: Improved access to WSS Services through increase in coverage, quality, and reliability of service (US\$10 million)		
<p>This activity will support the long-term integrated planning, management and performance monitoring of SWM services by GCC to ensure that all the performance-based waste management service contracts deliver good quality and socially inclusive services. This activity will also support capacity expansion and efficiency improvement of the resource recovery facilities for dry waste through improved source segregation, logistics and technologies and integrated system planning for better throughput in selected zones.</p>	<p><i>Vulnerability context:</i> Refer to (a), (b), and (e)</p> <p><i>Intent to address identified vulnerabilities:</i></p> <p>The project will support GCC in developing a long-term waste management plan that would focus on all aspects of the SWM value chain, including waste minimization, recycling, and recovery and minimizing disposal infrastructure requirement, treatment and disposal of both dry and wet waste. This would also include recycling strategy to align market linkages, enhance resource recovery & circularity and enable GCC to plan the recycling infrastructure as well as city level allied collection & sorting infrastructure in an integrated manner. These activities will lead to increase in total dry waste recovery/ recycling which will potentially reduce transportation costs of sending the dry waste to landfill and have positive environmental impacts. The improvement in upstream SWM with respect to segregation and recycling facilitated by the proposed initiative will also help reduce the air, water and soil pollution in settlements and other areas around the dumpsite.</p> <p><i>Explicit link between identified climate change risks and specific project activities:</i></p> <p>The project will ensure household are connected to the sewer network and transmission to the existing Sewage Treatment Plants. The climate benefits of adopting these waste practices will result in avoiding landfill emissions, reduced raw</p>	<p>The SWM activities financed under this DLI will lead to GHG emission reduction savings of about 2.02 tons of CO₂ for every ton of waste recycled due to resource recovery in 4 Zones of GCC. This is about 1.45 million tons of CO₂ till 2035.</p>



Activities	Adaptation Actions	Mitigation Actions
	material extraction and manufacturing, recovered materials and energy replacing virgin materials and fossil-fuel energy sources, carbon bound in soil through compost application, and carbon storage in landfills.	
RA#3: Improve Service Delivery		
DLI 9: Increased annual own-source-revenues in GCC (US\$15 million)		
<p><i>Strengthen the financial resource base of GCC to meet the expanding service delivery expenditures in solid waste, public health, and other key municipal services through steady increase in own-source revenues (OSR). This includes: (i) development and implementation of an OSR improvement action plan that includes improvements in its property tax administration system (such as coverage, and so on); and (ii) Fees for services such as SWM and parking.</i></p> <p><i>Improve revenues and establish transparent VGF mechanisms for MTC.</i> This activity will include support for improving MTC's cost recovery ratio by increasing own revenues, both through enhancement of non-fare box revenues and adoption of mechanisms for regular tariff increase for bus services. In addition, a transparent mechanism will be established to deliver VGF from GoTN to MTC</p>	<p><i>Vulnerability context:</i> Refer to (a), (b), (c), (e), and (f)</p> <p><i>Intent to address identified vulnerabilities:</i> Volumetric user charges for WSS services will help improve delivery of these basic services to all citizens, especially those vulnerable to projected climate and disaster risks, and ensure water supply that is both reliable and affordable.</p> <p><i>Explicit link between identified climate change risks and specific project activities:</i> The project will develop and implement enabling policies, regulations, incentive and disincentive mechanisms to- reduce the extent of environmental contamination due to waste, reduce littering which causes clogging of drains leading to urban flooding, and recycling/ recovery of waste.</p>	<p>The increased own-source revenue will be utilized to finance MTC to replace old fleet of passenger buses with green buses that reduce pollution levels by up to 95% as compared to old fleet of buses. This will lead to reduction of GHG emissions from the urban transport sector.</p>
DLI 10: Improved financial sustainability of WSS services, with user fees increasingly covering O&M costs (US\$15 million)		
<p>This activity will support (i) policy reforms and implementation of a progressive volumetric user charge framework for WSS services, (ii) reduction of operational inefficiencies and costs, for instance, through adoption of energy efficiency measures; and (iii) improvements in the systems for billings and collection as well as FM. The user charge framework will be designed to fully cover O&M costs of WSS service delivery.</p>		<p>Adoption of energy efficiency measures such as use of LEDs, energy-efficient pumps and other electrical appliances will lead to reduced use of fossil fuels, therefore reduced GHG emissions</p>



2.5 Assessment of Gender, Citizen Engagement and Leveraging Private Sector Aspects of the Program

Leveraging private sector. The Program seeks to leverage the private sector by (i) implementing performance-based contracts to bring in private sector for improving and expanding bus transport and water supply services in Chennai; (ii) improving revenue generation and cost recovery performance of GCC and CMWSSB and establish transparent VGF mechanism for MTC (these can provide enhanced revenue security for private sector participants); and (iii) strengthening the project structuring and contract management systems in agencies to better manage and monitor the private operator's performance.

Citizen engagement. One of the pillars for this program is establishing the vision, governance, and institutions necessary for citizen-responsive service delivery. This requires systems and capacities to interface with different stakeholders and a responsive and accessible grievance redressal mechanism for resolving complaints within a reasonable period. The program will support strengthening of systems for: (i) citizen outreach and consultation; (ii) preparation and public disclosure of annual performance reports by GCC, MTC and CMWSSB, (iii) use of consumer feedback and satisfaction surveys to enhance service delivery; and (iv) grievance redressal for all key participating agencies.

Gender. Tamil Nadu fares better on gender equality than the national average, as reflected in declining maternal mortality and higher female workforce participation. More women are elected as representatives than the mandated one-third reservation. GoTN has now raised the standard with 50 percent reservation for women in local body elections. Recruitments for public sector positions managed by the Tamil Nadu Public Services Commission also have 30 percent reservation for women. Building on GoTN's support for gender equality, *this Program explicitly identifies gender gaps in service delivery and seeks to address*. The main issues are as follow. First, positions for technical jobs reserved for women are underutilized and women often occupy a higher percentage of low paying formal and informal work positions. Second, poor access to and quality of water supply adversely affects women and girls more than men, in part because they disproportionately carry the burden of collecting water from standpipes, tankers, and handpumps. Third, primary health care has, thus far, underserved women with respect to non-communicable diseases (NCDs). Fourth, the mobility of women and girls is adversely affected by a gender blind approach to urban and transport planning and sexual harassment and gender-based violence in public spaces and public transport; this, in turn, negatively impacts women's access to jobs and leisure and their equal status in society.

Professional positions for women in GCC. The gender composition of GCC staff varies by departments. For example, the SWM department employs a large number of women but about 90 per cent of them are employed as sanitation workers. The Program will include an assessment of gender gaps in different departments and at different levels within GCC, and will support increased employment of women in professional higher-level positions within GCC [Cadres A and B], to meet the 30 percent reservation target of GoTN policy.

Water supply. Studies in Chennai confirm that, as in most other parts of India, women and girls are disproportionately responsible for collecting water from non-piped sources when they lack access to reliable in-house piped water service. By providing access to unserved households and steadily improving reliability for all connected households, the program will reduce the physical and time burden on women and girls for water collection.¹⁷ Further, by reducing prevalence of diseases associated with poor quality or inadequate water supplies, it will create direct benefits for all consumers as well as additional time savings for women, given their

¹⁷ Recent research shows that, in Chennai, time spent on water collection by unconnected households accounts for 22 percent of the coping costs of Rs. 658 per month. Amit, R.K. and S. Sasidharan. 2019. "Measuring affordability of access to clean water: A coping cost approach." *Resources, Conservation and Recycling* 141.



traditional role as caretakers in the household.

Health. A key gender gap identified in Chennai with respect to health is the utilization of services for specific diseases that affect only women, such as cervical and breast cancer. These are the most common cancers among women in India, with breast cancer constituting about 19–34 percent¹⁸ and cervical cancer constituting approximately 6–29 percent¹⁹ of all cancers in women. Screening for cancer is known to reduce mortality by facilitating early detection and treatment. However, in Chennai, only 20 percent and 13 percent of women age 15–49 have undergone examinations for cervical and breast cancer, respectively (NFHS-4, 2015-16). The figures for Chennai are lower than the state average (23 percent and 15 percent for cervical and breast cancer, respectively) and even lower compared to other southern states; the latter is in sharp contrast to Tamil Nadu's performance on other health indicators. This is largely because of (i) limited awareness about the diseases; (ii) limited understanding of the *importance* of early detection and treatment; and (iii) screening effort being limited to opportunistic screening at health facilities when women come in for other reasons rather than population-based screening that targets all women within a defined age group. In addition, among those who are hypertensive age 15–49 in Chennai, only 23 percent of women (compared to 53 percent of men) have their blood pressure under control. To address this, the program supports expansion of services for NCDs, including cervical and breast cancer screening, detection, and referrals to higher level facilities for treatment.

Gender-informed mobility. Mobility by men and women differs substantially based on the analysis of disaggregated data collected during the preparation of the Comprehensive Mobility Plan (2019) like in other cities.²⁰ Women in the age group of 20 to 60 years have a higher use of walking and buses than men, as women own fewer personal vehicles. Women undertake more chained trips, experience slower mobility, travel more outside peak hours and are accordingly sensitive to off-peak bus availability and fare integration. From a safety perspective, women are sensitive to the high level of bus overcrowding. The planning and design of services is however currently gender blind as it does not reflect such differences. The current project design reflects those priorities by establishing an institutional mechanism (Gender Lab) to support data-driven and gender-informed planning and design, adjustment in policy and training for planners, while enhancing primary modes for women through bus fleet augmentation and a complete street approach. Gender disaggregated mobility surveys will be undertaken every two years to track the evolution of travel patterns and inform planning and design of services; changes implemented in response to survey results will be recorded.

Women's safety in public spaces and public transport. Sexual harassment against women and gender-based violence in public spaces and public transport contribute to gender inequality in India and Chennai by adversely affecting women's mobility, especially their access to jobs, services, and leisure activities. According to 2019 National Crime Record Bureau (NCRB) data, Chennai has recorded fewer cases of crimes against women vis-a-vis other metro regions. However, there has been a slight increase in the number of cases between 2017 (642) and 2019 (729). In contrast to the low number of reported crimes, a study conducted by AWARE in Chennai found that more than 50 percent of women interviewed had faced some form of harassment while traveling on public transport.²¹ Chennai is one of the eight cities selected for the nation-wide safe-city program under the *Nirbhaya*

¹⁸ Singh, S., J. P. Shrivastava, and A. Dwivedi. 2015. "Breast Cancer Screening Existence in India: A Nonexisting Reality." *Indian Journal of Medical and Paediatric Oncology: Official Journal of Indian Society of Medical and Paediatric Oncology* 36(4): 207–209.

¹⁹ Bobdey, S., J. Sathwara, A. Jain, and G. Balasubramaniam. 2016. "Burden of Cervical Cancer and Role of Screening in India." *Indian Journal of Medical and Paediatric Oncology: Official Journal of Indian Society of Medical and Paediatric Oncology* 37(4): 278–285.

²⁰ ITDP, Safetipin. "Women and Transport in Indian Cities," 2017

²¹ The response indicated that 44.5 percent women faced verbal harassment from co-passengers, while a large share of respondents faced physical harassment – 83.7 percent; and non-verbal (visual) harassment – 50.8 percent.



Fund and GoTN has proposed 13 initiatives under it. Under the PforR program, the Bank will support capacity development of the new Gender Lab in GCC with an emphasis on building an integrated approach for implementing the safe-city program in Chennai and adoption of additional initiatives focusing on assessment of current scenario, policy strengthening, evidence-based improvement in transport services/infrastructures, capacity and awareness building, and robust monitoring. It will build the capacity of the 181 Women's Help Line under the program to direct survivors to the right service for support.

The Results Framework *indicators for measuring gender outcomes* will include: (i) percent of women employees hired by GCC in professional grades (Groups A and B); (ii) percent of women provided with access to improved water supply services; (iii) increase in percent of women accessing NCD services provided by GCC; (iv) percent reduction in women's and men's perceptions of lack of safety in buses and public spaces; (v) number of cases of gender-based violence (including harassment) in public transport and public spaces reported, handled, and referred to gender-based violence services; and (vi) gender-disaggregated transport survey capturing satisfaction and evolution in travel patterns.

The Program will be jointly financed by the GoTN, the World Bank, and the AIIB. The World Bank and AIIB are expected to contribute equally to provide a total of US\$300 million in external financing to the Program while the GoTN will provide the remainder US\$ 401 million. KfW is also interested in financing the Program and discussions are underway.

3 PROGRAM'S STRATEGIC RELEVANCE AND TECHNICAL SOUNDNESS

The Program has high relevance because it tackles a set of difficult service delivery problems that are adversely affecting Chennai's liveability, sustainability, and future growth trajectory. The Program has identified a critical set of urban services in Chennai including water supply, sewerage, solid waste management, urban mobility and public health, which will be supported for comprehensive improvements in city's service performance while also tackling the emerging climate change, resilience and sustainability related challenges that Chennai is facing in the context of rapid urban expansion. The selection of the urban services is well-aligned with the long-term priorities of the city as well as critical need to address the immediate challenges it is facing. Therefore, the focus of the Program is not only to improve the service levels in identified sectors but also enhance the efficiency and sustainability of the systems that need to address the rapidly increasing service demands of the city. Accordingly, the Program focuses on climate mitigation activities critical for fostering low-carbon growth in the city by investing in green transport systems and expanding the use of NMT. In addition, resilience, climate adaptation and mitigation actions are found to be critical for solving Chennai's flood-drought problem. The mitigation actions in water supply services also enhances the resource efficiency and avoids high cost coping strategy that has been adopted by Chennai in the past few years. The Program objective is also aligned with the GoTN's Vision 2023 which aims to establish Chennai as a world class city through greening its growth, enhancing resilience to disasters and climate change, and improving economic competitiveness.

The Program is strategic because it adopts a common framework for identifying issues across sectors and starts by addressing foundational issues that are constraining service delivery in each of the selected sectors and agencies in CMA. It focuses on cross-cutting systems improvements and a transition away from input-based development and service delivery models toward performance-based, citizen-responsive approaches. The Program objective of strengthening the fundamental institutional capacity for improved and sustainable urban



service delivery also aligns with the Bank's FY18-22 Country Partnership Strategy, which emphasizes the need for resource efficient growth approaches to managing India's urban areas.

The Program helps build institutions both by supporting institutional strengthening of key service agencies and by creation of supra-agency mechanisms to reduce fragmentation across agencies and jurisdictions. Three agencies—MTC, CMWSSB, and GCC—will benefit from direct support for systems and capabilities that enhance their service delivery orientation and outcomes. Support for operationalization of the CUMTA and the proposed Water Regulatory Authority will strengthen coordination—of planning, investments, and service delivery—among agencies.

The Program builds on strong government ownership, is technically sound and the activities reflect lessons from international best practices in each respective sector area. Activities complement or deepen existing government policy and investment interventions in water, SWM, health and urban mobility sectors, and have strong support and buy in from the implementing entities, state line departments and Finance department. The Program's approach, proposed activities and expenditures are in line with the targeted results areas and are informed by the Bank's experience on local government/urban service improvement PforRs in Pakistan, Morocco, Gaza and the West Bank, Ethiopia, and Vietnam, among others. It is also informed by sector specific PforRs (for example, health PforRs in Tamil Nadu and several ECA countries). The overall Program design and rationale draws from previous Bank experience with multisector metro "platform" engagements in Karachi, Dhaka, Colombo, Addis Ababa, and Lagos.

The technical soundness of the Program is also reflected in the sector-specific results that it prioritizes. The selected sectors—water, public transport, public health and SWM—have metro-wide economies of scale and spillover effects across administrative boundaries. Public sector providers are uniquely positioned to deliver these services, but they will require improvements to their technical capacities, strategic planning abilities and operational modalities (including citizen interface) to ensure longer term sustainability. The main sectoral assessments are summarized below, with additional detail provided in the separate Technical Assessment report.

- *Urban Mobility:* The Program correctly identifies and tackles three high-priority issues. First, to address institutional fragmentation in the transport sector, GoTN needs to operationalize the CUMTA, an agency that was created under the CUMTA Act of 2010, to coordinate planning and investments across transport modes such as public bus, rail, roads, and streets. Key steps are to adequately staff the CUMTA, build its capacity, and enhance its integrative planning powers by giving it oversight over the finalization and implementation of the Comprehensive Mobility Plan for the Metropolitan area, including the ability to allocate a significant share of the sector budget.

Second, the Program aims to improve bus service delivery, given its significant (but declining) share of both total trips and trips by public transport as well as strengthen MTC as a company. The bus system has seen flat or declining ridership due to factors such as the bus fleet quality, poor intermodal linkages, a fragmented fare system, and poor rider engagement. MTC is a well-performing public bus company relative to its counterparts in other Indian cities, but it is functioning well below the frontier established by world-class bus companies. MTC is also financially strained. Over the past five years, its operating revenues from passengers represented 73 percent of its operating expenses, including support for subsidized passengers (16 percent), while other non-operating revenues represented 2.6 percent, with the losses accruing to GoTN as shareholder. It is largely reliant on irregular government budgetary allocations or loans for new capital expenditure and, thereby, surviving on implicit and *ad hoc* (rather than predictable) government support. The Program supports MTC in



moving up a ladder of capability and, simultaneously, improving service delivery. The Program supports the following key changes. It embeds a performance orientation through a service contract (PTSC) between GoTN and MTC—one that provides reliable budgets based on performance. It also augments the size and quality of the fleet by contracting private operators via Gross Cost Contracts where they are paid based on service delivery outcomes and performance benchmarks. These contracts are expected to augment the fleet by about 1000 buses (29 percent), deliver an operational efficiency of 95 percent (relative to 70 percent currently) and result in the delivery of an additional 200 million bus-km of service over 2022-2025 that is also of better quality. MTC will also prepare and implement a 5-year business plan that outlines a roadmap for steady improvements in overall service performance, increased corporatization, and improved financial viability.

Third, in recognition of the fact that NMT (walking and cycling) are critical pieces of urban mobility, the program supports a mega-streets program that focuses on developing streets and public spaces that are safe as well as pedestrian- and cycling-friendly. The design of the Program activities and DLIs in this sector are informed by a suite of diagnostics and technical assistance²² provided to the agencies (CUMTA, MTC, GCC) to assess and advise on sector governance, service delivery models and planning.

- **Water Resource Management:** Technical analyses of the flood and drought cycle in Chennai reveal that the water stress felt in Chennai is attributable to inadequate management of water, rather than unavailability of water. Accordingly, the Program prioritizes the following issues. First, the Program prioritizes improvement in mechanisms for planning and management of various water sources and for addressing water allocation across users. For this, the Program supports preparation of a State Water Act to address, *inter alia*, two key gaps – absence of a water regulatory authority and ground water legislation²³. Second, the Program supports preparation and adoption of a water security options study and plan that will inform the prioritization of investments across agencies in Chennai to enhance water security. Finally, the Program supports implementation of an integrated cascade reservoir management system to help address the fact that the various reservoirs serving Chennai are owned by different agencies and operated without adequate coordination with each other.
- **Water Supply and Sewerage Services:** CMWSSB's ability to provide good quality water supply services is partly hindered by variation in water allocated by WRD, especially during dry seasons when allocation falls well below demand. In response, CMWSSB has invested in desalination plants. The assessment finds, however, this is not sufficient to ensure water supply that is both reliable and affordable. To reduce vulnerability to and variation in water availability, CMWSSB not only needs to coordinate closely with WRD to secure reliable water supply but also needs to aggressively improve operational efficiency and ramp up efforts on demand-side management. Strengthening CMWSSB's capability, service performance, and finances are necessary to achieve a water supply system that can keep up with the growth of the city and eventually deliver high-quality and reliable (24x7) service for all residents. To steadily move CMWSSB move up the ladder of improved service performance, increased corporatization, and improved financial sustainability the Program will support the

²²These include (i) an institutional diagnostic for reform and establishment of CUMTA as an integrated public transport authority based on other case examples (London, Singapore, Paris) and is informed by an international framework on urban transport models developed by the Bank; (ii) Reimbursable Advisory Service (RAS) activity with the Ministry of Road Transport and Highways for urban bus service improvement; (iii) A study on finance and funding models for urban transport in Chennai; and (iv) completion of studies and technical reports for improving approaches of urban design, streetscapes and gender in public spaces.

²³A Tamil Nadu Groundwater Act has been prepared but has been pending legislative approval for a long time.



following actions. As a step towards improving operational efficiency and service delivery, CMWSSB will enter performance-based contracts with private operators for selected high-density zones/areas, such as the core city. At the same time, it will embark upon bulk metering of entire system and commence a phased approach to metering residential and commercial connections. To enhance service-orientation, GoTN and CMWSSB will enter into a performance-based contract where budgets will be provided based on achievement of agreed—and increasingly higher targets for—service delivery benchmarks, pertaining to connections, coverage, hours of service, and quality of water. Finally, as a key step towards improving financial sustainability, CMWSSB will steadily improve its cost recovery through user charges (from a base of about 50 percent to 100 percent). The proposed activities and DLIs are based on a series of diagnostic and technical studies that examined the institutional and financial capacity of CMWSSB and the performance of the water supply and sewerage system as a whole.²⁴

- *Public Health and Solid Waste Management:* GCC is a relatively well-performing municipal corporation as compared to other cities in India, but it faces some key constraints. The Assessment confirmed that, to meet world-class standards of liveability, GCC needs to upgrade its capacity, system, finances, and service delivery outcomes. The Program will support GCC in the following areas. In terms of HR capacity, a key priority for GCC is to increase the ratio of professional staff to unskilled staff, especially to enhance its capacity to manage numerous service delivery contracts with private entities, improve service delivery in key areas, and handle increasingly sophisticated data and technology systems. Hence the Program will support strengthening of Group A and B cadre professional staff through revised staffing structure, reduction of vacancies through an expanded recruitment modality. In terms of finances, given that GCC is behind its peer cities in terms of revenue mobilization on a per capita basis and unable to finance expansion to meet growing demand for services, the Program will incentivize GCC to increase own-source revenues. In SWM, GCC has correctly emphasized dry waste reduction / recycling and the Program will support enhancement of dry waste recycling / recovery in selected zones of 4, 5, 6 & 8 as well as institutional strengthening through SWM Master Plan and systems development for contract management and performance monitoring of various aspects of SWM value chain including that of private operators involved in waste management services. With GCC serving as the frontline agency tackling the COVID19 pandemic in Chennai, the strengths and weaknesses of its health service delivery system became acutely evident. With growing needs (e.g. NCDs account for more 50 percent of the disease burden but service delivery is geared toward maternal and child health), emerging challenges (e.g. COVID-19), and increasing expectations from citizens (e.g. quality of care and expanded package of services), GCC needs to reform its urban health system through (i) an emphasis on outputs and outcomes rather than inputs, (ii) an expansion of service delivery and addressing existing systemic weaknesses, (iii) a focus on building a high-quality, people-centered health system leveraging innovations and empowering local bodies to collectively address the increasingly complex health challenges; and (iv) better coordination with the state Department of Health and Family Welfare, the private health sector, and other non-health departments for a multisectoral approach to improving health outcomes. The Program will support two priorities: access to and quality of comprehensive primary health care services & strengthened disease surveillance and public health. The Program interventions will enable access to more comprehensive primary

²⁴An institutional and financial analysis was undertaken for CMWSSB to identify gaps in HR, IT systems, tariffs, subsidies, costs and revenue management. The design of metering, NRW and network extension solutions is based on surveys and studies of the current network capacity and performance. The Bank also undertook a gap analysis of WRD to identify legal, institutional and data constraints to effective and coordinated long-term strategic planning in the Chennai region. The analysis for each built on long-standing Bank engagement in the WSS and WRM sector in Tamil Nadu, drawing from operational and analytical experience from the TN Sustainable Development Project, Irrigated Agriculture Modernization and Water Bodies Restoration and Management (IAMWARM) program, and the National Hydrology Project.



care services that include NCD services, improved referral linkages, improved quality of primary care services, and stronger disease surveillance across the public and private sectors in Chennai. It will do so by addressing systemic bottlenecks, working across sectors, and focusing on service delivery outputs and outcomes. The selected activities have been informed by global evidence, research, and best practices²⁵ as well as ongoing TA²⁶ on staffing, operations, and finance. In addition, design of the health sector Program has been informed by an earlier technical assessment prepared for the Tamil Nadu Health System Reform Program (P166373), other health sector PforRs focused on NCDs and quality of care in several ECA countries previous analytics on urban health in India.²⁷

3.1 Program Expenditure Framework

The Program's expenditure framework will include GoTN and partner investments in urban mobility, water resource management and resilience, municipal services, and finance as well as program management. Table 3 below summarizes the Program expenditure items. The identified expenditure items are fully aligned with the government priorities as set out in the Chennai 2030 program. The proposed expenditure items are targeted towards providing financing to the participating agencies for undertaking investment, reform and institutional development activities that are critical to improve the service levels and performance in CMA.

Table 4. Summary Program Expenditure Framework - by agency and sector (US\$, millions)

S. No.	Sector-wise Allocation	Total (US\$, millions)
1	Mobility (MTC and CUMTA)	158.0
2	WRM (WRD)	42.5
3	WSS (CMWSSB)	153.0
4	Municipal services (GCC ^a)	340.5
5	Program management and IVA	7.0
	Total	701.0

Note: a. This includes SWM, public health, Mega-streets, and Nirbhaya funds.

The Program budget structure is clear in terms of sources of funding, budgetary vehicles, and categories of expenditures. The Program budget will be entirely funded by each participating agency's own budgetary sources, either via state government allocations/transfers and/or its own revenues. For instance, Program expenditures related to municipal service provision will be financed through GCC's municipal budget and these are mapped to specific budget heads from GCC's accounts/budgets. Likewise, MTC and CMWSSB will finance the expenditures through the budget allocations provided by GoTN. Since WRD is a part of the state government itself, the expenditures for WRM interventions will be financed out of the state government budget itself, through the allocations made to PWD. All expenses will be programmed and incurred by the agencies between 2021 and 2026.

²⁵Kruk, M. E., Gage, A. D., Arsenault, C., Jordan, K., Leslie, H. H., Roder-DeWan, S., ... & English, M. 2018. "High-quality health systems in the Sustainable Development Goals era: time for a revolution." *The Lancet Global Health* Vol 6, No. 11, E1196-E1252.

²⁶A diagnostic on staffing and business needs was completed to assess the gap in human resource needs. SWM sector diagnostic was conducted to detail out a roadmap toward improving efficiency and financial sustainability based on international best practices for waste minimization and recycling. A financial and budget analysis of GCC was conducted to identify potential gaps in revenues for GCC operations from various sources, including improvements in property tax administration systems and other fees / tariffs that can contribute to increased own source revenues.

²⁷ Mullen et al 2016. "Urban Health Advantages and Penalties in India: Overview and Case Studies" *World Bank*; Das Gupta et al. 2017. "Flies without borders- Lessons from Chennai on improving India's municipal public health services" Working Paper, *World Bank*.

**Table 5. Summary Program Expenditure Framework – annual projections by agency and sector (US\$, millions)**

S. No.	Sector-wise allocation	Year 1	Year 2	Year 3	Year 4	Year 5
1	Mobility (MTC and CUMTA)	4.0	21.0	23.5	51.0	58.5
2	WRM (WRD)	16.0	23.8	1.45	0.70	0.55
3	WSS (CMWSSB)	11.0	40.0	50.0	25.0	27.0
4	Municipal Services (GCC ^a)	47.4	77.3	82.2	64.4	69.2
5	Program management and IVA	1.5	1.5	1.5	1.5	1.0
	Total	79.9	163.7	158.6	142.6	156.3

Note: a. This includes SWM, public health, Mega-streets, and Nirbhaya funds.

Funding sustainability and predictability is ensured by the high level of ownership of the government program and the Program – with Finance Department of GoTN directly leading and investing in this initiative to transform Chennai. GoTN has a robust track record of delivering agreed fiscal resources to the service delivery agencies in a timely manner. Importantly, the Program supports participating agencies in improving own-source revenues and receiving transfers/budget in a more predictable manner from GoTN. This will enhance the financial sustainability of the agencies and expand their access to resources for undertaking necessary capital and operational expenditures.

Fiscal analysis of the participating agencies and the indicative allocations under the Program, as presented in the table below, reflects that three agencies—GCC, CMWSSB, and WRD—will be receiving substantial incentives annually, in the range of 10-30% of their average capital budgets for last three FYs. Given the recent COVID induced fiscal stress in many of these agencies over the last year, the external financing would provide even higher incentives and would be critical in supporting fiscal recovery. For MTC the incentive is exceptionally large, given that it will receive the equivalent of 87 percent of its average capital budget for the past three years from external financing. These incentives are assessed to be sufficient to help catalyze the envisaged shift in the way services are delivered and help improve service outcomes.

Table 6. Agency level budget analysis (US\$, millions)

	CMWSSB	GCC	MTC	CUMTA	WRD
Average ²⁸ Annual CAPEX	59	212	16	0	28
Average ⁶ annual OPEX	124	284	268	0	8
Average ⁶ annual TOTAL	183	496	284	0	36
PforR- Total External financing – WB + AIIB (5 yrs.)	90	100	72	8	30
PforR - Average Annual External financing	18	20	14	2	6
Annual External Financing/Annual average CAPEX budget	31%	10%	87.5%	N/A	21%

²⁸ Average of past 3 FYs.



Table 7. Detailed Program Expenditure Framework – activities and budget heads by agency (US\$, millions)

Sn	Capex/O pex	Budget Head	Government program ('p') - 5 years	PforR Program ('P') - 5 years			Addition al direct GOTN cont.	Notes/Comments
				Govt. Funds	Externa l Funds	Total		
CUMTA								
1	O	CUMTA Establishment and Operations	12.5	5.0	7.5	12.5	5.0	SECRETARIAT – ECONOMIC SERVICES (code 3451) HUDD- New Commitment
MTC								
2		Bus Service Delivery		-	-	-		Subsidy+deficit+capital grant 2019-2020- under 3a and 3b with inflation US\$1088 m compared to proposed total of US\$1636 m in BAU
	O	3a. Service improvement from 3,700 buses to 4,700 buses including fleet augmentation through GCC	145.5	73.5	72.0	145.5	73.5	New-Assumes GCC contracting with a 20 INR deficit (2021 value) per bus km for fleet expansion with 0,500,1000,1000 buses (inflation applied); 50% coverage by PforR)
	O	3b. Service improvement with replacement of old buses through PTSC	413.0					Reduced allocation compared to today- Assumes MTC contracting with a 37.1 INR deficit per bus km (including bus renewal) inclusive of inflation-BAU INR 61.5 per km over period 2021-2025. In 2019-20 INR28.5 per km on average. Does not account for COVID Impact. Assumes PTSC covers 10% of MTC buses in FY2022, followed by 30, 70 and 100% in subsequent years.
Total - Urban Mobility			571.0	78.5	79.5	158.0	78.5	
Urban Water Resource Management and Resilience								
Water Supply and Sanitation								
CMWSSB								



Sn	Capex/O pex	Budget Head	Government program ('p') - 5 years	PforR Program ('P') - 5 years			Addition al direct GOTN cont.	Notes/Comments
				Govt. Funds	Externa l Funds	Total		
3	C/O	Service improvement, NRW reduction and metering in core city (including strengthening of distribution network - capex cost + operator fee only)	82.0	41.0	41.0	82.0	41.0	PforR program covers Zone X and XIII covering 195,000 connections including 6600 new connections. All connections will be metered, and services will be improved by zone level service operators. Costs are only for first 3 years of contract.
4	C	Water Supply Network Improvement in core city area	71.4					Government supported investments for improving water distribution network in core city (except zones X and XIII) to complement JICA's investments in expanding treatment capacity. Timeline - 5 years
5	C/O	NRW monitoring in bulk water transmission and Wastewater system, including establishing SCADA, and some HH metering.	10.0	2.0	8.0	10.0	2.0	
6	O	Providing Water Meters to commercial properties	1.3					Water meters to high water consuming customers such as large commercial buildings, business houses, etc.
7	C	Increase water and sewerage network coverage in added areas	61.0	20.5	40.5	61.0	20.5	Focus only on 5 of 15 "added" areas. GoTN allocation of \$40.5 mill to be confirmed.
		Sub-total – WSS	225.7	63.5	89.5	153.0	63.5	
Water Resource Management								
WRD								



Sn	Capex/O pex	Budget Head	Government program ('p') - 5 years	PforR Program ('P') - 5 years			Addition al direct GOTN cont.	Notes/Comments
				Govt. Funds	Externa l Funds	Total		
8	O	Investments in hydrological data monitoring and management, including hydromet stations, SCADA, satellite-based performance monitoring, etc.	2.1	0.6	1.5	2.1	0.6	
9	O	Undertake water accounting/auditing in CMA	0.4		0.4	0.4		
10	C	Establish a reservoir operation system including software system and adequate institutional arrangements	2.1		2.1	2.1		
11	C	Investments in resilient watersheds including reprofiling of drainage channels, groundwater recharge, rejuvenation of reservoirs, lake restoration, and water quality improvements	36.6	12.4	24.2	36.6	12.4	Under Government program, GoTN investments (sequence no. 1,4,7,13,14,17) to improve water storage by creating additional capacity
12	O	Comprehensive water resources assessment and investment options analysis for urban floods and droughts risk mitigation in Chennai	0.7		0.7	0.7		



Sn	Capex/O pex	Budget Head	Government program ('p') - 5 years	PforR Program ('P') - 5 years			Addition al direct GOTN cont.	Notes/Comments
				Govt. Funds	Externa l Funds	Total		
13	O	Strengthen capacities of WRD staff, farmers, and other stakeholders	0.7		0.7	0.7		
		Sub-total – WRM	42.5	13.0	29.5	42.5	13.0	
Total – UWRM			268.2	76.5	119.0	195.5	76.5	
Municipal Services, Urban Governance and Finances								
Enhancing Integration, Resilience and Quality of Service delivery in SWM								
14	O	Service Management & Performance monitoring (IT-enabled)	3.1	0.9	2.2	3.1	0.9	Includes potential hardware / IT systems
15	O	SWM Master Plan / Investment, Revenue Expenditure Mgmt. Plan	0.6	0.2	0.4	0.6	0.2	Forward looking plan for next 15-20 years to achieve comprehensive SWM management
16	O	Other Capacity Building, Training, DPRs & IEC	9.0	2.0	7.0	9.0	2.0	Covers a range of activities including information campaigns for household waste segregation, TA for treatment technologies, preparatory studies, etc. for dry waste recycling in zones 4, 5, 6 & 8
17	C	Selected investments for Material Recovery and Recycling Infrastructure	22.0	3.8	18.2	22.0	3.8	Estimated for dry waste recycling enhancement in zones 4, 5, 6 & 8
18	O	O&M Costs for SWM	110.0					
19	C	Capital investments for SWM	34.1					
Strengthening public health services								
20	O	O&M costs	29.3	15.0	13.0	28.0	5.4	Equipment, medicines, maintenance, etc.
21	O	Digital health system + capacity building + strategy development	9.8	5.0	4.0	9.0	1.6	



Sn	Capex/O pex	Budget Head	Government program ('p') - 5 years	PforR Program ('P') - 5 years			Addition al direct GOTN cont.	Notes/Comments
				Govt. Funds	Externa l Funds	Total		
22		National Urban Health Mission (NUHM)	8.0					
23	C	Investments in public health infrastructure	5.8					The objective is to cater to some of economically weaker sections of the population. GCC's plan is to eventually increase to 200 PHCs according to norms
Improving women safety in public spaces/ transport and implementing mega-streets program								
24		Nirbhaya Fund	25.9	19.9	6.0	25.9		
25	C	Mega-streets pilot program (25KM)	42.0	21.0	21.0	42.0	21.0	11.6 km of Mega-streets
Strengthening Governance, Institutional capacity, and financial sustainability for Service Delivery								
26	O	Staffing costs (Health services)	254.8	127.9	22	150	9.2	Additional staffing cost for extended hours & new UPHCs is \$30.8 m.
27	O	Staffing costs (Officers)	48.9	44.6	4.3	48.9	1.8	\$4.3 m is additional staffing cost related to new Professional Cadre (Group A & B) Officers recruited aligned with HR reforms; excludes health staff costs
28	O	First Year Action Plan for OSR enhancement / Revenue Analytics	1.5	0.5	1.0	1.5	0.5	Will look at all key OSR drivers and arrive at a comprehensive action plan to help OSR growth targets for subsequent years
29	O	GCC Credit Ratings	0.5	0.2	0.4	0.5	0.6	
30		GIS – Added area	3.7					
Total - Municipal Services, Urban Governance and Finance			609.3	241.1	99.5	340.5	47.0	
31	O	Program Management and IVA (TNIDB + PIUs in GCC, CMWSSB and MTC)	7.0	5.0	2.0	7.0	5.0	
Program Total			1,455	401	300	701	207	



Table 8. Program Expenditure Framework – by economic category and source of financing (US\$, millions)

Category Wise Investments	Govt. Program ("p")	PforR Program ("P")		Total - PforR	WB+AIIB Share of PforR
		GoTN	WB+AIIB		
Capital Investments	922	172	217	389	72.3%
Staffing costs	316	178	34	211	11.2%
TA - systems development and capacity building	67	34	28	63	9.4%
Service O&M Costs	151	17	21	38	7.0%
Total	1,455	401	300	701	100%

3.2 Program's Governance Structure and Institutional Arrangements

The implementation of the program will be undertaken by existing government institutions. A Program Steering Committee (PSC) will be established to oversee general Program implementation and ensure proactive and sustained engagement and coordination of the entities involved. The PSC will meet quarterly and be chaired by the Chief Secretary, GoTN and include officials from key state-level departments and service delivery agencies. This would include the Secretaries of Finance, MAWS (overseeing GCC and CMWSSB), Transport (overseeing MTC), Public Works (overseeing WRD), Health (coordinating with GCC) and, potentially, Housing and Urban Development.

The Tamil Nadu Infrastructure Investment Board, under the aegis of GoTN's Finance Department will be the primary implementation agency. A dedicated Program Management Unit (PMU) will be established for Program management, coordination, and monitoring under the leadership of the Program Director, who will be an ex-officio member of the PSC. TNIDB is in the process of procuring an Independent Verification Agent (IVA) that will undertake the verification of results, achieved by the sector agencies and support TNIDB in monitoring the progress of reforms implementation and achievement of annual targets under various DLIs. CUMTA's establishment and operationalization will be supported by the project, including the necessary staffing and capacity building to allow it to finalize the preparation and begin implementation of master plan activities in the sector.

All the key sector agencies (MTC, CMWSSB, GCC, CUMTA and WRD) will be responsible for implementing the respective sector focused Program activities including key reforms and investments, and for achieving the results/annual targets to access the funding available under this Program. Each agency will have a Nodal Officer and will recruit, as and when needed, consultants with adequate technical expertise required to support implementation of Program activities and key reforms.

The Program will be monitored using Government systems. The results framework (Annex 1) provides the basis on which the implementing agencies will measure and report on the progress of program implementation. TNDIDB will prepare an Annual Program Report (APR), which will include evidence of progress on all results indicators included in the Results Framework, results related to DLIs and DLRs and evidence of compliance with requirements under the Program Action Plan (PAP). The APR will build on the monitoring and evaluation systems of the different implementing entities as further to be detailed in the Program Operation Manual. The APM will be submitted to the World Bank no later than 90 days after the end of each calendar year.



The selected DLIs reflect critical elements of performance required to achieve the PDO. All DLIs are indicators in the Results Framework. The DLIs were selected to ensure that they i) are fully aligned with GoTN priorities for Chennai's development, ii) reflect foundational 'first step' actions for each IA, iii) are measurable and independently verifiable and iv) incentivize needed action or reforms during Program implementation. The DLIs are designed to be transversally supportive and compatible across sectors and serve to reinforce the overall Program objective. Results Areas and DLIs are further detailed in Annex 1.

3.3 Economic Justification

The Program is expected to provide significant economic benefits through policy and institutional reforms and improvements in delivery of critical services: Enhancements in quality of basic urban services such as health, water supply and sanitation, SWM and public transport are fundamental for improving the quality of life and economic performance of cities. Improvements to contracting methods and performance-based operations in transport, health, water, and solid waste will improve efficiency and responsiveness of public sector service agencies and expand the potential for private sector involvement in service delivery. Public transportation improvements will contribute to improved mobility, improved pedestrian safety and reduction in GHG emissions and air pollution as well as increased property values from improved streets and public spaces. Health care, WSS and SWM interventions will reduce the incidence of communicable and chronic diseases which will reduce absence from school or work due to illness. Improvement in WSS coverage and services will also result in benefits for households in the form of time savings (for example from reduction of time spent waiting at standpipes) and reduced coping costs (such as expenditures on storage tanks, pumping, and/or purchase of water from tankers). GCC, CUMTA, WRD and CMWSSB will also benefit from improved strategic planning for investments and service provision, data and monitoring systems which will improve efficiency in targeting and responsiveness to consumer demand. Improvements in e-procurement, tariff and tax collection will further strengthen the financial performance of agencies standing and sustainability of operations. Given that several of these benefits are hard to quantify, only a subset of the benefits has been included in calculation of the Economic Rate of Return (ERR) for the Program.

Using only a subset of quantifiable benefits but full costs, the Program has an ERR of 20.7 percent. The cost-benefit analysis includes the following benefits by sector and/or intervention. Benefits associated with improvement in *bus services* arise from the proportion of trips that shift to buses and away from higher-cost and more carbon-intensive modes such as personal vehicles (cars and two-wheelers) and auto rickshaws. The benefits include: (i) savings to users of new bus services, given its lower cost relative to alternatives; (ii) reduction in GHG emissions which lowers CO₂ abatement costs; (iii) reduction in accidents due to reduced congestion. The primary benefit arising from improved *public health services* is a reduction in Disability Adjusted Life Years (DALYs). In Chennai, NCDs are estimated to account for 65 percent of the disease burden, and the service improvements are assumed to lead to 1.0 percent reduction in DALYs among the population likely to use the municipal UPHCs. The benefits arising from improvement in *WSS services* are: (i) reduction in coping costs for newly connected households, including reduction in time saved in collecting water; (ii) reduction in coping costs for connected households, arising from improved quality and reliability of services; and (iii) reduction in DALYs due to reduction in incidence of water-borne diseases. For improved *WRM and flood mitigation*, the primary (quantified) benefit



is reduction in losses from flooding. For improved *SWM*, the benefits are: (i) value of waste recovered; and (ii) reduction GHG emissions (in CO₂ equivalents) due to reduced generation and treatment of waste.

The sensitivity analysis indicates that a 10 percent decrease or increase in benefits will result in ERRs of 18percent and 23percent respectively. As noted above, the ERR is a conservative estimate since benefits that are more difficult to quantify have not been included, for example, benefits from strengthening service agencies, improved efficiency and costs of procurement, reduction in water losses, increase in property value due investment such as mega streets, customer accountability and grievance redressal mechanism, etc. The analysis covers a period of 15 years. It includes capital expenditure for the period FY21 to FY26 and benefit accounting stops in 2035, even though the life of and benefits from several assets (e.g. WSS investments) are likely to be 30 years.

Summary of economic analysis and key assumptions. Table 7 below summarizes the findings from the Economic Analysis, by sector. It shows that, overall, Program has an IRR of about 20.7 percent. Each sector was also assessed separately, with only key interventions and their costs and benefits included in the analysis. This sectoral analysis shows higher **economic** returns (that the Program as a whole) because on partial costs are considered. The quantifiable economic benefits and key assumptions used in the analysis are summarized in Table 8.

Table 9. Economic Analysis

S. No.	Key sectoral intervention	Benefit (USD Mill)	IRR & Sensitivity		
			IRR	+10%	-10%
1	Expansion of bus fleet and services	779	55.25%	76.50%	33.26%
2	Improved access and quality of health services	176	18.74%	21.24%	16.16%
3	Improved WSS coverage, quality, and reliability	229	11.68%	13.44%	9.90%
4	Improved WRM and flood management	282	47.27%	50.67%	43.68%
5	Improved SWM, resource recovery, and waste reduction	141	39.60%	43.75%	35.42%
	Full project (all activities; full costs but partial benefits)	1607	20.71%	23.31%	18.01%

Table 10. Economic Benefits and Assumptions: By sector (selected Investments only)

1	Sector: Mobility
1.1	Vehicle Operating Cost Savings: Net savings to bus users when shifting from higher-cost modes (2022-2035). Additional bus trips calculated at 886 pax/day for new fleet of 1000 buses, introduced progressively: fleet utilization of 80%, and asset life of 10 yrs.
1.2	GHG reduction cuts abatement costs: Net reduction in GHG emissions due to reduction of vehicles on road due to modal shift to buses estimated at 235,000 tons of CO ₂ till 2035. All other pollutant emissions converted to cost equivalents, based on treatment costs. Appraisal guidelines for Metro projects, MoHUA, GoI, 2017 estimates cost of treatment at INR 500 per ton of CO ₂ and INR 100,000 per ton of other gases



1	Sector: Mobility
1.3	Benefits due to potential reduction of accidents. With modal shift and fewer vehicles on road, about 5% of road accidents averted (or about 1360 fatalities and 7200 injuries). Economic loss of life and injury valued at about \$16800 and \$3863 per injury (2021 price levels) ²⁹ .
2	Sector: Public Health
2.1	DALY's averted reduce economic losses: 20% of the total DALYs are assumed to be due to NCDs. Benefit is assumed: a) to be limited to population accessing UPHCs in Chennai (assumed at 47% of GCC population which is at 4.07 million currently); b) at reduction of just 1.0% of DALYs, working out to about 100 trillion DALYs till 2035. A DALY is valued at 50% of GDP per capita for Tamil Nadu
3	Sector: Water Supply
3.1	Benefits due to reduction of coping costs for households with new connections. New connections estimated to be 0.15 million, based on addition of 5% per annum on base of 0.74 million connections for 5 years. Coping costs are estimated at INR 437/month for unconnected HHs, excluding time spent, by a recent study; ³⁰ coping costs assumed to reduce by 25% once HHs are connected. Time savings for newly connected HH estimated at about 16 mins/day/HH or 1 day/month/HH and valued at Chennai's unskilled wage rate of INR 221 per day.
3.2	Benefits due to reduction of coping costs for HHs with existing connections. Coping costs for connected HH are estimated at INR 553/month by recent study (Amit and Sasidharan, 2019). Improved service quality and reliability is assumed to lower coping costs by 25%, for 20% of connected HHs.
3.3	Benefits due to reduction in DALYs. Research suggests that waterborne diseases account for about 3% of total DALYs. Of these, incremental 1.25% DALYs are assumed to be reduced owing to improved water supply services resulting in about 51.3 billion DALYs averted till 2035. A DALY is valued at 50% of GDP per capita for Tamil Nadu.
4	Sector: Water Resources Management
4.1	Averting economic losses on account of better flood mitigation. Swiss Re estimated a loss of USD 2.2 billion on account of Chennai Floods 2015. Chennai witnesses above average rainfall once in 3 years and abnormally high rainfall once in 10 years (trends since 1996). Due to absence of data, an economic loss of just 4% of USD 2.2 bn USD is assumed to be saved once in 3 years where above normal rainfall is witnessed; no savings assumed in other years
5	Sector: Solid Waste Management
5.1	Revenue from incremental waste recovery: Incremental waste recovery targeted at 15% over 5 years and sustaining further, yields a potential 1972 tons of waste recovery till 2035. Chennai generates about 950 TPD of dry waste assumed to increase at about 1.5% per annum
5.2	Reduced GHG emissions on account of waste recovered: Report by CRISIL on resource recovery in 4 Zones of GCC suggests savings of about 2.02 tons of CO2 for every ton of waste recycled. This is about 1.45million tons of CO2 till 2035. Cost of treatment at INR 500 (7 USD) per ton of CO2.

²⁹The estimated values will be updated during appraisal based on Traffic Crash Injuries and Disabilities: The Burden on Indian Society.

³⁰Amit, R.K. and S. Sasidharan. 2019. "Measuring affordability of access to clean water: A coping cost approach." *Resources, Conservation and Recycling* 141.



4 SECTOR SPECIFIC TECHNICAL ASSESSMENTS

4.1 SOLID WASTE MANAGEMENT, URBAN GOVERNANCE and FINANCE

4.1.1 Sector Context and Key Constraints

Chennai, as the fourth largest metropolitan city in India and capital of TN, faces critical demand supply gaps in-service delivery and urban management challenges. The Greater Chennai Corporation (GCC) is the largest Urban Local Body within the Chennai Metropolitan Area (CMA) and is administratively managed under Municipal Administration and Water Supply department (MAWS), Government of Tamil Nadu (GoTN). With an area of 426 sq.km and an estimated population of 7.4 million (in 2020) within its jurisdiction, the GCC is responsible for provision of key urban services including city roads (allied infrastructure and street lighting), storm water drains, Municipal Solid Waste (MSW), Health, Family welfare, and land & estate facilities. It faces critical demand-supply gaps across all these services. For instance, GCC reports only a 65% of coverage of roads with storm drain network leading to continued incidence of flooding during extreme rainfalls. Similarly, regarding Solid Waste Management (SWM), the extent of treatment and scientific disposal is only about 8%. About 24% of the city's population continues to reside in slums. With a rapidly growing population, especially in the added areas merged into it in 2011, sustaining investment in urban infrastructure and enhancing civic service delivery is crucial to sustain and improve its investment competitiveness, and quality of urban living for its residents.

GCC needs to significantly enhance institutional capacities to deliver on its investment commitments and meeting its service delivery obligations. *First, GCC's staffing patterns need to be adapted to meet the emerging urban challenges.* Give the need to address newer areas including non-motorized transport, flood resilience, smart-street planning, GCC needs to imbibe new skillsets, capabilities and put in place a revised staffing pattern especially regarding key professional and managerial cadres. A harmonized HR framework with unified Service Rules, updated staffing norms and clear directional guidelines for recruitment is a critical gap that needs to be addressed. *Second, gaps in institutional capacities need to be addressed.* GCC has an overall vacancy level of about 30% in staffing and at senior levels and among professional cadres (designated Group A / B positions), it is reported at a high 23% even as per the current staffing pattern / sanctioned positions. These vacancies reflect organizational gaps within GCC, and the resultant staffing shortages come in the way of effective project planning and execution for meeting GCC's investment commitments and hinder sustainable and inclusive service delivery.

Similarly, GCC's financial capacities needs to be significantly enhanced to meet the aforesaid challenges, besides countering COVID-19 pandemic induced fiscal stress. *Own Source Revenues (OSR) are critical for financial sustainability of GCC and needs to be strengthened.* GCC fares poorly vis-à-vis peer cities on its own source revenue (OSR). GCC's OSR was at Rs. 1555 per capita and lagged peer cities (Pune - Rs. 6431, Hyderabad – Rs. 2704, and Bengaluru - Rs. 2809). A much-needed property tax increase effected in 2018 had led to a corrective 67% growth in OSR (From Rs. 1372 crore in FY 18 to Rs. 2293 crore in FY 19), but a roll-back of this increase in 2019 has reversed these gains. GCC OSR are also critical for meeting O&M requirements of urban services provision. For instance, after waste collection and transportation services have been outsourced through performance-based contracts, O&M costs of MSW are expected to increase from Rs. 800 crores in FY 20 to an estimated Rs. 1300 crore by FY 26 and such expenditures account for over 25% of GCC's overall operational expenditures. *GCC also needs to enhance ability to raise capital financing to meet service delivery requirements.* A large debt burden and COVID-19 impact could further dent its financial standing, and capacity to invest. GCC faces a current debt overhang with outstanding loans of Rs. 2764 crore as of FY 20.

GCC has substantial gaps in downstream segments of SWM value chains. GCC is responsible for managing MSW



generated within its limits and current waste generation exceeds 5,100 tons per day (TPD). While collection rate is satisfactory, significant gaps remain in material recovery, treatment, and sanitary disposal, as given below.

Table 11. Performance of SWM Services

Indicator	2018-19 (%)	Benchmark (%)
Collection rate	95	100
Efficiency of collection of municipal solid waste	98	100
Percentage of MSW sorted	34	100
Material recovery rate from MSW stream	16	80
Percentage of MSW disposed in sanitary facilities	8	100

Source: *Performance on Service Level Benchmarks. GCC, 2019*

Lack of disposal facilities has resulted illegal dumping (Perungudi and Kodungaiyur), littering and burning that have resulted in rapid environmental degradation and serious public health issues. There is no sanitary landfill established within GCC. This has also amplified Chennai's vulnerability to climate change, on account of untapped GHG emissions and flooding, as seen in 2015. Swachh Survekshan 2020 (Cleanliness survey) is an annual survey of cleanliness, hygiene and sanitation in cities and towns across India. The survey is led by the Ministry of Housing and Urban Affairs and mainly based on resident feedback through Swachhata App. In 2020, Chennai fell from 61st rank in 2019 to 312 in this nation-wide annual survey. Chennai is ranked 45th among the 47 cities with a population of more than 10 lakh in the country, demonstrating considerable scope for improvement, including for front-end activities.

4.1.2 Sector Specific Government Program ('p')

Vision Tamil Nadu 2023. The Government program for GCC is anchored in the goals and outcomes envisaged under **Vision Tamil Nadu 2023**, the state's guiding document for infrastructure development. The vision document articulated the goals and development outcomes for the state for 2012-2023 and identified an infrastructure investment project pipeline at a total estimated cost of USD 203 billion. This Government Program identified **10 priority thematic areas**, including provision of world-class infrastructure, protection against vulnerability, improving the quality of institutions and governance, and creating 10 world-class cities (including Chennai). This provides the overarching framework for **transformation of Chennai through** four key themes identified therein for realizing this vision that will be operationalized through the govt. program as follows.

Theme 1: Transforming Chennai city in Tamil Nadu as a world class city

Chennai as the capital city of TN, is among the main cities identified for such transformation in Vision Tamil Nadu 2023 with GCC playing the central role for the same. This is also in the context of Chennai being poised to emerge as a mega polis in India with its population expected to cross 10 million over the next decade. This scale of urban growth coupled with expectations of a vastly improved quality of life of aspirational residents living in and moving to Chennai is creating additional demand for services even as existing service gaps remain unmet. The primary economic drivers for Chennai city include the industrial sector (specifically in automobile and manufacturing), Information Technology (IT), banking and financial services, and trading. In addition, education and health sectors are also important economic drivers of Chennai City. GCC, with an annual budget of about US\$ 550 million currently, seeks achieve the transformation through a range of initiatives spanning urban infrastructure, service delivery, citizen participation, institutional and financial aspects as elaborated further below.

Theme 2 Improving quality of institutions and governance at GCC



As part of the government program, GCC will focus on strengthening its institutional and governance capacities and equip itself to deliver on its infrastructure provision and service delivery commitments. The focus of the Government program will be to address the with respect to its organizational and managerial capacity. GCC currently has about 23,923 sanction staff posts that is classified in four categories (Group A to D) with currently around 30% vacancy levels. The Group A and B officials represent the professional cadre (engineers, etc.). The overall program for strengthening institutional capacities includes the following elements: (i) rationalize the lower levels cadres by relying on more outsourcing such as noted above for SWM (that has the highest number of staff in Group C & D); (ii) Improve quality of Group A & B cadres through improved recruitment modalities including through state level Tamil Nadu Public Service Commission (TNPSC), besides other training and capacity building initiatives; (iii) Reduce vacancy levels in Group A and B cadres from about 23% currently to less than 5% by end of the program; and (iv) Revised staffing norms / positions at GCC to address the skill gaps within Group A and B cadres such as in emerging areas of GIS mapping, IT, SWM, etc.

GCC's program for financial strengthening, in part to address the COVID induced fiscal stress, covers both revenue as well as capital financing as follows. (i) Strengthening Own Source Revenues (OSR): OSR contributes about 68% of total revenue income of GCC. One of the main components of OSR is property taxes and earlier, when GCC effected a long-pending increase in property tax rates in FY 19, it contributed to about 70% growth in overall OSR. This revision was undertaken based on recommendations of a rationalization committee that was appointed to revise property taxes for GCC after the Chennai High Court directed GoTN to revise property taxes for Chennai city. The new tax regime introduced in 2018 tried to bring in a sound and logical methodology to determine Annual Rental Value (ARV), based on location specific base rate arrived linked to 'Guideline Value' (property sale prices) set by registration department of GOTN. GCC capped increases to 50% for residential properties and 100% for non-residential properties. However, in November 2019, GoTN decided to roll-back this increase in property taxation for all ULBs in TN, including Chennai. There is also a property tax committee in GoTN that has been constituted to investigate this issue after the abeyance. Hence the GCC program has a strong focus on restoring and enhancing financial viability with particular emphasis on property taxes in terms of both policy / structural reforms as well as administrative improvements in collections, billing, etc. In addition, GCC will also focus on enhancing other key sources of OSR such as parking charges, professional taxes, and rents from municipal properties; (ii) Strengthening Capital Financing: GCC also faces a debt overhang with outstanding loans of Rs. 2764 crore as of FY 20 raised through both commercial and govt. sources. Given the stringent lockdowns and adverse economic impact of COVID-19 pandemic, there is also urgent need to restore GCC's creditworthiness for restoring its ability to sustain debt. Besides boosting OSR as noted above, this will include measures to undertake more capital projects through Public Private Partnerships (PPPs) – such as for incineration plants in SWM based on tipping fees that GCC has recently concluded – as well as improved financial reporting / disclosure and undertaking periodic credit rating of GCC to facilitate commercial borrowings in the medium to long term.

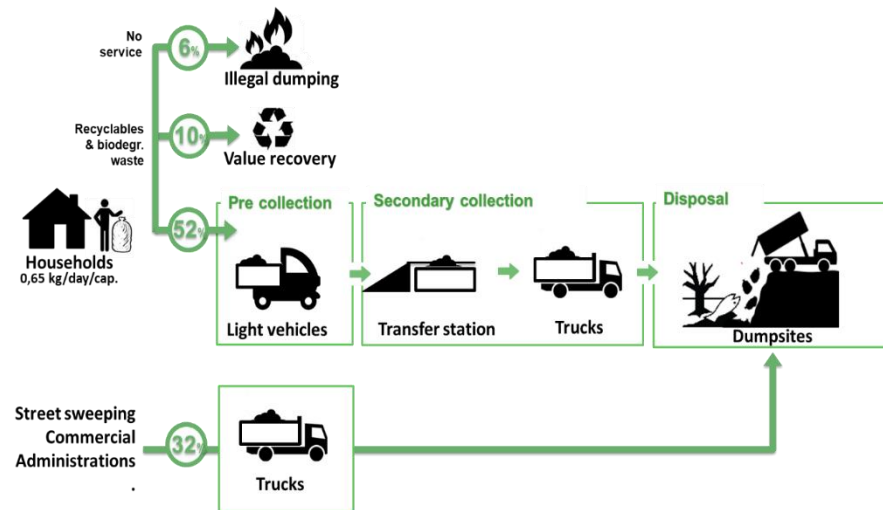
Theme 3: World Class Infrastructure for Chennai

GCC has embarked upon a comprehensive program to address the deficiencies along the entire SWM value chain. GCC has planned to increase its spending on urban infrastructure to meet the current and projected demand-supply gap in urban services delivery. Towards this, GCC has identified and prepared an investment plan of nearly US\$ 7 billion over the next decade including sectors of urban mobility / city roads (both arterial and



inner-city roads), urban spaces and non-motorized facilities, flood resilience (waterways, storm drains and water bodies), public health and municipal Solid Waste Management (SWM). As regards SWM, Chennai's municipal waste generation is estimated at 5,100 tons per day (TPD) of which 51% is organic also called 'wet waste'. While a reported 95% of MSW is collected and transported, processing capacity at ~500 TPD for organic waste (19% of generation) and ~300 TPD for dry recyclables (12% of generation) fall abysmally short of demand. Resource recovery is low (16%) and well below potential. The current operational structure of SWM in Chennai is as follows:

Figure 2. Operational Structure of MSW in Chennai



(Source: WB, 2020)

Consequently, GCC has embarked upon an ambitious program for addressing gaps across the whole SWM value chain with following main components: (i) Improving primary collection and transportation through private performance-based contracts in 11 out of 15 zones with a common set of Key Performance Indicators (KPIs) ; (ii) Increasing capacity with regard to resource recovery / recycling for both dry and wet fractions; (iii) Upgrading treatment facilities for the dry fraction such as RDF production for Dalmia Cements as well as wet biodegradable fraction through micro-composting; and (iv) Addressing sanitary disposal by commencing closure and remediation of Perungudi dumpsite (one out of the two dumpsites) with budgetary support from GoTN.

In January 2020, GCC formulated revised and new byelaws for municipal solid waste (MSW) in 2019, which has since been notified in January 2020 vide. G.O (2D) No.9, MAWS, dated 10.01.2020, in conformance with the Solid Waste Management Rules, 2016 formulated by Government of India. Among other things, the new byelaws cover duties of waste generators, responsibilities of GCC, and levy of penalties. The MSW interventions under the Government program will build GCC's institutional capacity and systems. It will support the development of a comprehensive 20-year SWM masterplan for Chennai following an integrated SWM approach that adopts the principles of waste-hierarchy in terms of waste reduction, reuse, recycling, recovery, and disposal. GCC has engaged private sector operators through several performance-based contracts for waste collection services, treatment facilities and recycling facilities. The program will support GCC in developing a comprehensive service performance management and monitoring system for SWM to monitor service delivery and manage private operators. Finally, the program will support the development of material recovery / recycling facilities in selected zones of 4, 5, 6 & 8 to enhance recovery and recycling efficiency; this will, in turn, help minimize waste treatment



and disposal requirements. In addition, the government program will also finance the O&M expenditures related to payments of the service contracts, staffing costs, and capital expenditures for waste processing infrastructure.

4.1.3 Sector Specific PforR Program ('P')

The PforR Program will focus on supporting activities across three interlinked results areas (RAs) that are directed linked to the three pillars of the government program. Envisaged over a five-year period between FY 22 and FY 26, the objective of this support is to help GCC expand its capacities to prioritize and accelerate investment through systematic actions, targets and disbursement-linked indicators (DLIs) along three RAs, namely (i) *improved governance and institutions for service delivery*, (ii) *improved financial sustainability and accountability*, and (iii) *enhanced service delivery*. Taken together, these actions are dovetailed to support GCC in planning, managing, and maintaining its infrastructure investment more effectively, towards inclusive access of urban services to its residents. The program is structured as a **5-year** results-based financing support program spread over FY 22 (Year 1) to FY 26 (Year 5). The Program's geographical scope corresponds to GCC's geographical limit, spread over 476 sq.km with a population of 6.7 million in 2011. Some of the actions for instance, under Results Area 3 pertaining to pilot Resource Recovery Centers (RRCs) for MSW service improvement will focus on zones 4, 5, 6 and 8 within GCC.

4.1.4 Technical Assessment of Key Pillars and Activities

RA 1 Strengthening Governance and Institutions for Service Delivery

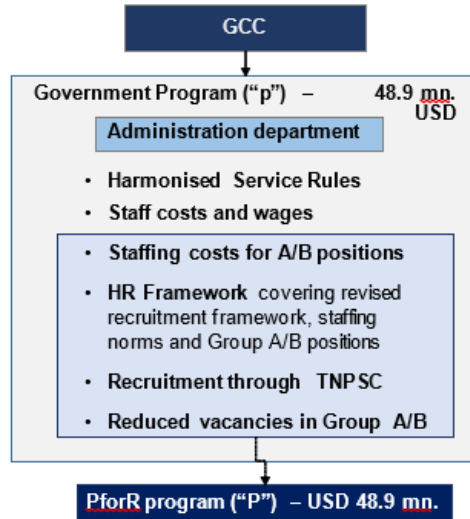
The disbursement linked indicator (DLI) under this RA of the PforR program is *reduction in vacancies in staffing under Group A and Group B categories*. In all, GCC has 8 cadres/service rules that govern the staff at GCC as follows - General (administration, accounts, and legal positions), Revenue, Engineering, Electrical, Public Health, District Family Welfare Bureau, Information Technology and Conservancy services. The rules, regulations, and processes for employees for each of these cadres are guided under by different rules/byelaws which have been notified in different ranging from 1970 to 2009. At present, vacancy levels in Group A and B staff (covering all of the professional and senior managerial positions) at GCC translate to 23% of the 1873 sanctioned staff positions. Hence the GCC Program focuses on strengthening Group A and B cadre of GCC through the following actions: (i) Improve quality of Group A & B cadres through improved recruitment modalities including through state level Tamil Nadu Public Service Commission (TNPSC); (ii) Reduce vacancy levels in Group A and B cadres from about 23% currently to less than 5% by end of the program; and (iii) Revised staffing norms / positions at GCC to address skill gaps within Group A and B cadres including in emerging areas of GIS mapping, IT, SWM, etc. Refer Figure 1 for a snapshot of activities under this RA in relation to the corresponding pillar of the Government Program.

The vacancies will be filled through a combination of direct recruitments and promotions and is envisaged to be facilitated with support for direct recruitments through the Tamil Nadu Public Services Commission (TNPSC). Earlier direct recruitments were done by GCC through a notice to the Employment exchange followed by a test/ interview process conducted either by GCC or through process managed by designated third-party agencies like Anna University. In some cases, the process for direct recruitment including written tests and interviews have been led by internal GCC committee. In December 2019, GCC has submitted a proposal to GoTN identifying 972 vacancies (across Groups A-C) and a request for a Government Order to allow filling these positions through the Tamil Nadu Public Service Commission (TNPSC). The request was made to leverage the standardized competitive method for selection of candidates followed by TNPSC, along with attendant benefits of speed, transparency, and a wider universe of candidates to choose from. Under its proposal to GOTN, GCC has requested support to recruit 972 positions through TNPSC of which 161 positions are in Group A and B. These 161 positions translate to 36% of the reported vacancies in Group A and B. GCC expects to fill the remaining positions through annual promotions



from junior positions.

Figure 3. RA1 - Strengthening Governance and Institutions: Government Program and PforR Program



Source: Discussions with GCC and World Bank, CRIS research

RA 2 Improving financial sustainability and accountability

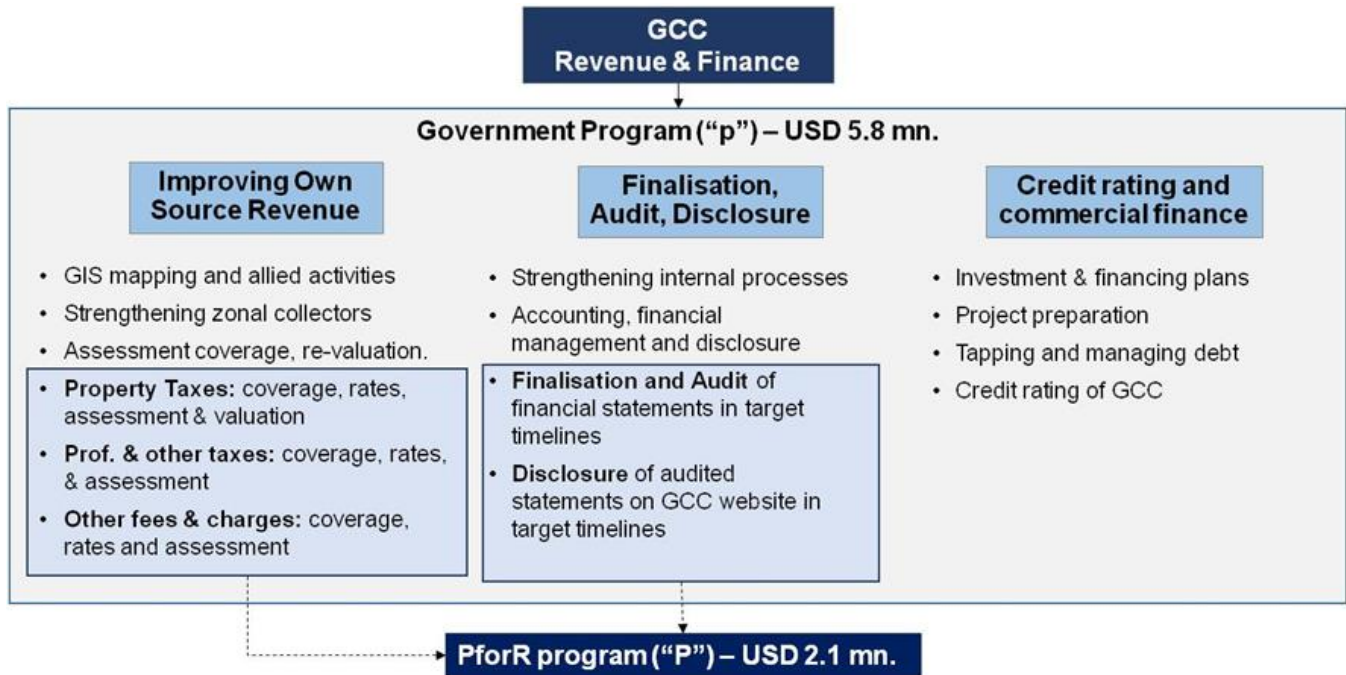
This DLI focuses on strengthening own source revenue (OSR) of GCC. This will include preparation of an 'Action Plan' by GCC in the first year for enhancing various components of OSR. Refer *Figure 4* for a snapshot of activities under this RA in relation to the corresponding pillar of the Government Program.

The sub-program has two main components:

- (i) Strengthening coverage, billing, and collection of property taxes in Chennai city. GCC has currently about 1.2 million properties (both residential and commercial) on its records and is undertaking a drone-based mapping exercise that is uncovering many un-assessed and misclassified properties and bringing them into the net is expected to contribute at least 40-50% growth in property taxes over time. This sub-program does not consider any potential policy actions by GoTN regarding reinstatement of the earlier property tax revision and subsequently held in abeyance.
- (ii) Strengthening other sources of OSR: This will include measures to enhance other key sources of OSR, including: (i) Professional taxes that accounts for about 18% of OSR in recent years and has emerged as an important revenue stream. However, the level of profession tax is limited by the cap set under Clause (2) of article 276 of Constitution of India which caps annual profession tax at Rs. 2500 per individual. Professional tax in GCC was revised in April 2018 to match this limit (for annual salary above Rs. 1.5 lakhs). Hence the focus will have to be increasing coverage; (ii) Rentals, Fees, User charges and Hire charges yielded about 12% of OSR. The sub-program will support rolling out of GCC's recent initiative to introduce user charges for SWM. Similarly, GCC's plans to formalize and regulate parking fees on a city-wide basis are also expected to yield increases in such revenues from near negligible levels currently. In addition, a re-basing of rentals in properties and land owned by GCC is also a possible revenue enhancement opportunity.



Figure 4. RA2 - Financial sustainability & accountability: Government program and PforR program



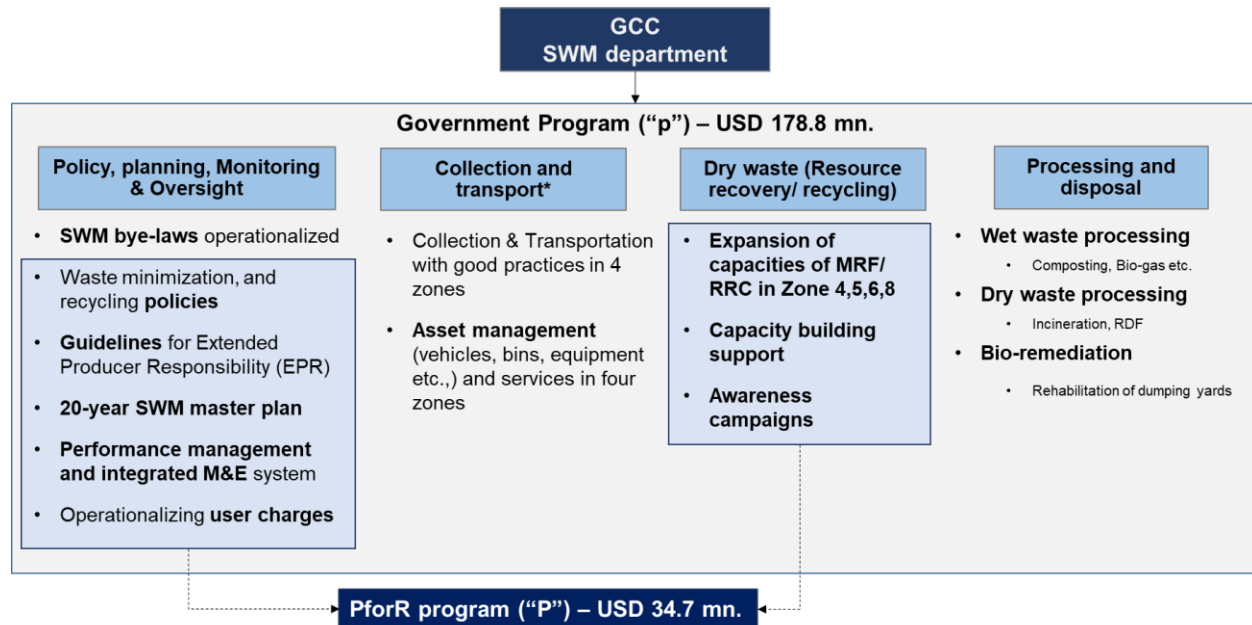
Source: Discussions with GCC and World Bank, CRIS research

Sustaining and improving credit ratings and improvement in timely audit and disclosure of financial statements are envisaged as non-DLI activities under the PforR program was accorded a rating of 'A' in February 2020 and has been accessing commercial loans from banks on a regular basis. As of August 2020, GCC had a total debt of Rs. 2764 crore. Loans from State Bank of India (SBI) in the form of both term loans and overdraft accounted for 37% of the debt while TNUDF loans accounted for another 29%. Retaining and improving its credit rating will be crucial to its capacity to consistently raise debt for capital investment at competitive rates, from either banking or municipal bond channels. This sub-program will support GCC in undertaking periodic rating exercises. As GCC improves its OSR, it should seek to return to tapping market borrowings. This action needs to also be preceded with implementation for frameworks to prepare medium-term investment plans, and financing strategy on a rolling basis.

RA 3 Enhancing infrastructure provision and service delivery SWM

This non-DLI result area focuses on support to activities to:(i) strengthen policy& institutional frameworks and (ii) to enhance the level of resource recovery / recycling of dry waste. Refer Figure 5.

Figure 5. RA 3Enhanced service delivery, in MSW - Government program and PforR program



*Excludes Collection & Transportation contracts through PPP in 11 (of 15) zones

This would comprise the following activities:

- **20-year Master Plan for SWM.** This will involve support to GCC in developing a long-term waste management plan that would focus on all aspects of the SWM value chain, including waste minimization, recycling, and recovery and reduce disposal infrastructure requirement, treatment and disposal of both dry and wet waste fractions. This would also include a recycling strategy to align market linkages, enhance resource recovery & circularity and enable GCC to plan the recycling infrastructure as well as city-level allied collection & sorting infrastructure in an integrated manner. In addition, this plan would also incorporate an expenditure management plan to address weak financial sustainability and O&M cost recovery (at about 1-2 % currently) and support implementation of new by-laws for municipal solid waste (MSW) in 2019, which has since been notified in January 2020 vide. G.O (2D) No.9, MAWS, dated 10.01.2020, in conformance with the Solid Waste Management Rules, 2016 formulated by Government of India. Hence this plan would also support 'ring-fencing' of SWM budget linked to roll out of these user charges.
- **Waste minimization and recycling policies:** The objective is to develop and implement enabling policies, regulations, incentive, and disincentive mechanisms to reduce the extent of environmental contamination due to waste, reduce littering and boost waste diversion. This would include supporting the updating and implementation of local level by-laws on solid waste and plastic waste management, as mandated by national SWM and PWM rules. A phased strategy should be developed to reduce plastics, encourage re-use, and recycle, incentivize alternatives and innovations on post-use solutions. This activity would potentially include: (i) consider fiscal tools to reduce/ban imports of non-recyclable plastic products, (ii) develop regulations to ban single use plastics (iii) introduce Extended Producer Responsibility (EPR) for plastic packaging to reduce waste management costs and bridge the gap between costs of recycling usually exceeding revenues from sale of recyclables.
- **Integrated SWM service performance management system:** With a territory of 426 sq.km, effective



service management in Chennai would greatly benefit from information technology to track actual service delivery. GCC needs a comprehensive service performance management system for quality of service, operational routing and tracking, citizen satisfaction. The activity would support implementation of an integrated IT-based platform providing a detailed and holistic view of operational performance, contractual compliance and strategic needs of client authorities and service providers.

- Enhancing capacity of Resource Recovery Centers (RRC) / Material Recovery Facilities (MRFs) for dry recyclables in selected zones:** Currently for about 2,500 TPD of dry waste, GCC has only about 330 TPD of RRC / MRFs across the 15 zones that comprise Chennai. This sub-program will support waste diversion through enhancement of sorting and recovery performance of GCC in selected zones, viz. in zones 4, 5, 6 & 8. This will be primarily done through three sets of interventions comprising improving segregation of waste at household level, streamline logistics for collected dry waste and upgrading capacity of selected RRC / MRFs for recycling in these four zones and at only those locations where no land acquisition or land availability / resettlement issues are involved. Currently there are about 46MRFs / MRCs in these four zones staffed with 144personnel for handling dry waste. The increase in rate of recycling would be achieved through increasing capacity by about 100 TPD in 7 MRFs / MRCs that already have the required land of about 3000 sq. ft or more, wherein the capacity would be enhanced through better layouts, upgrading of equipment capacity and training. This will be complemented with IEC, awareness campaigns, capacity building, etc. to promote and incentivize behavior change for these facilities (such for increasing levels of at source segregation) and enhance level of recycling. The current level of recycling of dry waste in these four zones is about 4.8% and this sub-program will aim to increase this to at least 15% by end of Program period. Apart from resource recovery, this initiative could potentially eliminate negative environmental impacts and transportation costs of moving an estimated 56,600 tons annually to landfill over a 5-year period.

4.1.5 Sector Specific Results Chain

A brief summary of the 'Results Chain' for the HR and OSR DLIs / SWM results indicator is as follows:

- DLI1: Reducing vacancy rates in professional cadres (Group A and B) in GCC.** The inputs for this are enabling Government Order(s) covering:(i) Expanded recruitment modality for these cadres to use Tamil Nadu Public Service Commission (TNPSC); and (ii) Revised staffing structure for Group A and B to reflect emerging urban management priorities (new areas such as GIS, environment, etc.) and capacities. The activities / outputs will comprise GCC running the recruitment / promotion process to fill the vacancies and reduce it less than 5% by end of Program period. The same is expected to result in the outcome of enhanced institutional capacity at GCC.
- DLI 9: Increased own-source revenues in GCC.** The inputs for this activity are: (i) Financial resources for revenue enhancement activities of about US\$ 2 million; and (ii) Expert advice and knowledge inputs on revenue management. The activities / outputs will include: (i) Preparation of an action plan for revenue enhancement; (ii) Improved property tax coverage and yields based on GIS mapping and operationalized through issuance of revised property tax billing and collections; and (iii) Rolling out new Solid Waste Management Charges through issuance of bills for SWM charges and collections from households and commercial / industrial establishments. These are expected to lead to the outcomes of enhanced own-source revenue to the extent 60% by end of project period and consequent improved financial capacity.
- Intermediate Indicator (IR) on Improved SWM Efficiency:** The inputs for this activity are: (i) Expert advice and Consultant support for preparation of SWM Masterplan; (ii) Support from consultant and IT firms to



set up service monitoring and performance management system; (iii) Equipment and infrastructure for dry waste recycling logistics and capacity in zones 4, 5, 6 & 8; and (iv) IEC campaigns, capacity building etc. The activities / outputs will include: (i) Preparation of an SWM Masterplan; (ii) Setting up of functional(IT-enabled) SWM service monitoring and performance management system; and (iii)Enhanced capacities for dry waste recycling / resource efficiency in zones 4, 5, 6 & 8. These are expected to lead to the outcomes of enhanced systems and institutional capacity in GCC for SWM and increased levels of dry waste diversion / recycling that would otherwise have ended up at the dumpsites leading to environment benefits including reduced GHG emissions.

4.1.6 Sector Specific Program Expenditure Framework

The Government program and the PforR program will be structured to run concurrently over 5-years spread over FY 22 (Year 1) to FY 26 (Year 5), with FY 21 as Year 0. The size of the Government program is estimated at USD 178.8 million and the PforR program is estimated at USD 35 million.

Alignment with government priorities: The RAs, activities and DLIs identified under the PforR program flow from GoTN priorities and the Government program as explained earlier. Activities identified under the PforR program fully meet the requirements / mandates as per GCC's municipal legislation. GoTN will provide the enabling Govt. Orders (GOs) for GCC to carry out the activities towards meeting the DLIs under the Program as outlined in the Year-1 DLI actions.

Budget Structure and Sustainability

GCC Budget structure / Fiscal Analyses Summary: The Program budget structure is clear in terms of sources of funding, budgetary vehicles, and categories of expenditures. The GCC budget will be vehicle for the Program and all Program expenditures are mapped to specific budget heads from GCC's accounts and budget. The Program budget is primarily funded by city's municipal resources, either via its own budget or transfers and allocations via GoTN, besides some additional financial support from GoTN. GCC's receipts in the form of devolution transfers from GoTN are determined in a formulaic manner based on recommendations of the State Finance Commission and are transferred on a monthly basis by GoTN. There is no fully ring-fenced budget for SWM, though these clear budget heads various SWM costs including revenue and capital expenditure items. These SWM costs are met out of the overall revenues of GCC. In addition, GoTN had consistently been supporting GCC with capital expenditure grants under schemes and funds like the Chennai Mega City Development Fund (CMCDM). An overview of GCC budget/ financial statement is as presented below.

Table 12. GCC Financial Performance Snapshot FY16 to FY19 (in Rs. Crores)

Particulars	Rs. crore			
	FY 16	FY 17	FY 18	FY 19
Own Source Revenue	892	1,017	1,240	2,130
Property Taxes	545	555	571	1,423
Professional Taxes	219	302	414	415
Other tax	2	4	5	18
Rental, Fee and user charges, Sale & hire	126	157	250	274
Other income	147	161	132	164
Grants	1,116	903	654	832
Devolution grants	604	551	497	637



Assigned revenue	512	352	158	195
TOTAL REVENUE INCOME Rs. Crore	2,155	2,081	2,026	3,126
Establishment	983	1,055	1,173	1,375
O&M Charges	128	112	115	108
Administrative	526	769	651	673
Interest and Finance charges	51	106	136	164
Others	3	5	10	5
TOTAL REVENUE EXPENDITURE	1,691	2,047	2,085	2,325
Op. Surplus Rs.	463	34	-59	801
GoTN Capital grants	631	415	373	656
GoI Capital grants (Smart Cities Mission and others)	39	3	29	91
Loans	260	808	895	216
Own funds	816	376	389	596
Capital receipts	1,707	1,598	1,657	1,467
Capital Expenditure	N.A.	1,920	1,922	2,136

Source: GCC. For FY 16 to FY 19.

Sustainability: As mentioned earlier, GCC has a robust own revenue base and gets nearly 80% of its OSR from stable property tax and professional tax streams and it generates an operating surplus after meeting all its revenue expenditures. Hence the Program expenditures that are primarily within the scope of GCC budgets are sustainable. Untied devolution transfers from GoTN happen on monthly basis and are through a stable formulaic regime determined through the State Finance Commission and hence predictable. Notwithstanding recent challenges to its OSR due to roll-back of property tax and the fiscal stress on account of COVID-19, GCC's revenue base with a good balance of own source revenue and stable fiscal transfers from the state have been reasonably stable reporting operating surplus consistently. Chennai is the capital city of Tamil Nadu and has a vibrant and well-diversified economic base and as the economy recovers from the COVID-19 pandemic, revenues of GCC are expected to improve in the medium term.

GCC OSR Growth Projections / DLI: The DLI on Own Source Revenue (OSR) targets a growth of about 55-60% over the baseline OSR in FY 2017-18 by end of the Program period based on mainly administrative actions within the control of GCC and does not factor in policy approval from GoTN for property tax revision. This projected OSR growth is based on three main components and corresponding actions as described below.

'Natural' annual growth –The future 'natural' annual growth rate in OSR has been assumed at a more modest level of around 2% (based on past trends excluding one-off impacts), including growth in property tax at about 2% annually (in line with growth during FY 16 and FY 18) due to general addition of properties, etc., and profession tax growth and user charge growth that is expected to taper lower at 0.5%³¹ per annum and 4% per annum, respectively. Hence overall, this is expected to contribute about 19% growth by end of Program period relative to FY 18 OSR baseline.

Strengthening property taxes through GIS mapping: Property taxes are a critical component of OSR accounting for about 46% of the same (as of FY 18). GCC has already embarked upon initiatives to strengthen the property

³¹ Professional tax, which has otherwise been the most buoyant revenue stream in recent years started stagnating in FY 19 and GCC's professional tax levy is already done at the maximum rate of Rs. 2500 per year as stipulated by Government of India, with no. of assessments also close to the work-force participation levels, growth in professional tax will be muted.

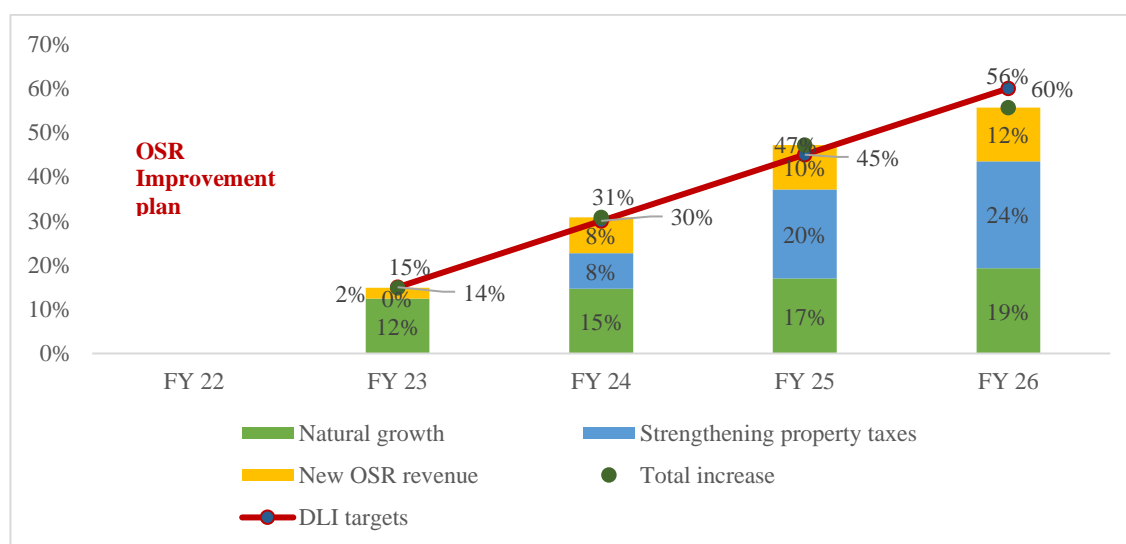


tax administration including coverage and yields through GIS surveys accompanied by re-assessments of properties. GCC has completed GIS survey (drone survey & field survey) for 92 wards comprising the core city area. It estimates the potential increase in demand in these wards at about Rs. 250 crores per annum based on analyses of 49,419 under-assessed properties & 106,921 unassessed properties identified from such survey. Similar actions in the remaining 108 wards in the added areas are expected to add an incremental Rs. 50 crores in annual property tax revenues (estimated to be less than core area primarily because these newly added areas had a more recent revision in property taxes as compared to the core city at the time of amalgamation). All these actions are expected to be completed by Year 3 of the Program. Hence overall these actions related to property coverage / yields are expected to lead to overall 24% growth by end of Program period in OSR relative to FY 18 levels.

Growth in other (new) OSR revenue streams – Here GCC will complement the above actions with efforts to enhance growth from other revenue streams. GCC has identified two quick-win revenue streams namely, SWM user charges that have been already approved and now waiting to be rolled out by issuing demand notices / bills to households, commercial establishments, etc. as well as parking fees, rents from municipal properties, etc. and expects to realize about Rs. 150 crores gradually per annum from these revenue streams (~Rs. 90-100 crores from solid waste user charges and Rs. 50 crores from parking fees, rents from municipal properties, etc.) by FY 26. This source is expected to contribute about 12% OSR growth relative to FY 18 base by end of Program period.

GCC is projected to achieve about 55% -60% growth in OSR comprising the three main streams (19% growth due to natural growth, 24% growth due to improved property tax administration, GIS mapping, etc. and 12% from new OSR revenue streams such as rolling out of new SWM charges that are already approved, etc.) and related actions. To support this DLI target / OSR growth, the first year DLI accordingly envisages an OSR improvement plan.

Figure 6. OSR Growth vis-à-vis Base Year of FY18



Source: GCC, CRIS analysis

Risk Analyses

Overall, the risks to the GCC Program are considered 'Moderate'. The design of DLIs have considered the potential risks as noted below. The main risks and mitigation measures are as follows:

Table 13. Risks to GCC Program



	Risk	Mitigation
1.	OSR DLI – GCC may find it difficult to raise own source revenues	(i) The DLI targets for OSR have been set based on largely internal actions of GCC within its control (such as improved coverage of properties, etc.) and not contingent on any GoTN policy action. Further, this is a scalable DLI and proportional grants would be released; (ii) Given the COVID induced fiscal stress on GCC, there are strong incentives for GCC to enhance own revenues (iii) There is a High Court directive to GCC to enhance property taxes; (iv) Under fiscal rules of GOI, states have recently been allowed additional borrowing if property tax reforms are carried out and this is a strong incentive for GoTN to support GCC in enhancing own source revenues.
2.	HR DLI linked to vacancy reduction – GoTN may not issue enabling GOs for TNPSC recruitment / revised staffing positions	(i) This reform was initiated by GCC even prior to Chennai Partnership and hence has high ownership within GCC; (ii) It has no direct citizen interface / implications; (iii) TNPSC recruitment is common across many other govt. entities; (iv) The on-going HR study (to be finalized by end December 2020) for revised A & B staffing pattern indicates that vacancy levels will remain in similar range to existing level of 23% (439 vacancies); (v) Out of the 439 vacancies, only about 37% is to be filled through direct recruitment and the rest through promotions / deputations that are within the control of GCC and do not require an enabling GO; (vi) This DLI entails about 5% reduction in vacancies per year through recruitment, in-house promotions or outsourcing, which appears feasible.
3.	Technical and Institutional complexity of SWM sector and recycling interventions	(i) Preparation of overall SWM Masterplan is one of the upfront activities that will help inform the direction, design, and implementation of interventions; and (ii) Technical assistance activities are incorporated within the program to provide capacity support to GCC

Table 14. GCC Program Expenditure Framework

S.no	Budget Head	Total “p” Budget (USD million)	PforR Program (“P”) (USD million)	PforR Operation Est. (FY 22-26) (USD million)		
				GoTN / GCC	WB/AIIB	Total
Strengthening Governance & Institutions for Service Delivery		48.9	48.9	44.6	4.3	48.9
1	Staffing costs (Group A & B cadre)	48.9	48.9	44.6	4.3	48.9
Enhancing Integration, Resilience and Quality of Service delivery in SWM		178.8	34.7	6.9	27.8	34.7
2	Service Management & Performance monitoring (IT-enabled)	3.1	3.1	0.9	2.2	3.1
3	SWM Master Plan / Investment, Revenue Expenditure Mgmt. Plan	0.6	0.6	0.2	0.4	0.6
4	Other Capacity Building, Training, DPRs & IEC	9.0	9.0	2.0	7.0	9.0
5	Selected investments for Material Recovery and Recycling	22.0	22.0	3.8	18.3	22.0



6	O&M expenditure - SWM	110.0	110.0			
7	Other Capital expenditure – SWM	34.1	34.1			
Improving financial accountability and sustainability		5.7	2.0	0.6	1.4	2.0
8	First Year Action Plan for OSR enhancement / Revenue Analytics	1.5	1.5	0.5	1.1	1.5
9	GCC Credit Ratings	0.5	0.5	0.2	0.4	0.5
10	GIS Mapping	3.7				

Budget Heads: The budget head in GCC that would be used for tracking Program expenditures pertaining to staffing costs for Group A & B cadres noted above would be the existing Account Code ‘210100101’ for ‘Salaries & Allowances – Officers’. For all other expenditure items, new budget heads would be created for Chennai Partnership.

Program Action Plan

Program Action Plans / Other supporting actions under Program Operations Manual (POM): The following table summarizes the key actions required to help achieve the DLIs / DLRs under the three RAs.

Table 15. GCC Key Actions

Action Description	DLI / Results Indicator	Due Date	Responsible Party	Completion Measurement
Appointing a Nodal Officer by GCC	Overall GCC Program	Within 1 month of start of project	GCC	Nodal Officer designated
Engagement of Consultant for preparation of action plan on Own Source Revenue (OSR) growth	OSR DLI (Percentage increase in annual OSR revenue over baseline)	Within 3 months of start of project	GCC	Consultant appointed as per an approved TOR.
Setting up of ‘SWM Expert Committee’ with external experts to oversee SWM interventions under the program	SWM results Indicator (Percentage increase in resource recovery / recycling from dry waste)	Within 3 months of start of project	GCC	Establishment of SWM Expert Committee with members identified.
Formulation of a detailed action plan for filling up of vacancies through promotion / recruitment as per revised staffing pattern.	HR DLI (Reduction in vacancy rates of Group A & B cadre of GCC)	Within 6 months of start of project	GCC	Action Plan finalized and approved within GCC with detailed processes and timelines for selection of candidates, interviews, appointments, etc.



4.2 PUBLIC HEALTH SERVICES

4.2.1 Sector Context and Key Constraints

Chennai – like Tamil Nadu – has made significant progress in improving RMNCH outcomes through better access to services. Over 99% of births in Chennai are delivered by skilled personnel, and nearly 80% of pregnant women receive at least four antenatal care (ANC) visits (NFHS-4, 2015-16).³² Contraceptive prevalence rate (CPR) for modern methods among married women of reproductive age (15-49 years) is over 60% (NFHS-4, 2015-16). Although the figures have declined over the last few years, full immunization of children age 12-23 months remains relatively high at 86% (NFHS-4, 2015-16).³³

However, despite high utilization of RMNCH services, quality of care is an emerging issue. Births delivered by caesarean section is 29% (NFHS-4, 2015-16), substantially higher than the globally recommended 10-15%. This high caesarean section rate indicates that more mothers are being put at unnecessary risk of surgery and is an indicator of maternal health care quality. Despite nearly 80% of pregnant women receiving at least four ANC visits, only 52% of pregnant women receive full ANC³⁴ (NFHS-4, 2015-16), another indicator of maternal health care quality. Furthermore, only 68% of women receive critical postnatal care (PNC) within two days of giving birth. (Table X) As institutional deliveries are nearly universal in Chennai (99%), it is an unfortunate missed opportunity that PNC utilization is not higher. When compared to other districts in Tamil Nadu, Chennai has much room for improvement on ANC and PNC (Figure 7). In addition, there is also room for improvement on quality of family planning services and counselling. Of all women using modern methods of family planning, 94% are using female sterilization, which is an incredibly high figure and raises questions of both available method mix and quality of counselling (NFHS-4, 2015-16). Only 33% of female non-users of family planning reported having a health worker ever talking to them about their options, and 11% of current users were never told about side effects of their current method (NFHS-4, 2015-16).

Table 16. Recommended Number and Quality of Antenatal and Postnatal Care in Chennai

	Received at least 1 ANC Visit (%)	Received at least 4 ANC Visits (%)	Received All Types of ANC (%) *	Deliveries with Postnatal Check for Mother within 2 Days of Birth (%)
India	82.7	51.2	21.0	62.4
Tamil Nadu	91.4	81.1	45.0	74.0
Chennai	92.5	78.3	51.6	67.8
Hyderabad	96.8	85.5	60.6	80.3
Mumbai-Suburban	93.0	82.0	31.3	81.8
Mumbai	92.0	80.7	43.5	84.8
Bangalore	73.1	48.1	27.5	68.1
Ahmedabad	97.5	95.9	54.1	67.5
Kolkata	91.1	84.6	32.7	82.9

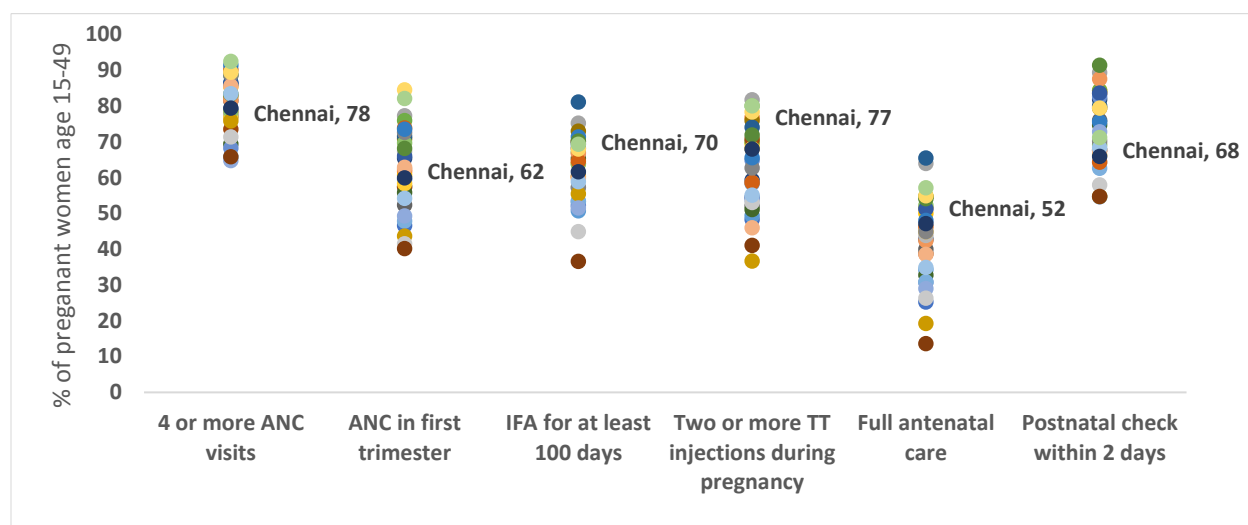
³²The data on service utilization is from the Chennai District Factsheet of the National Family Health Survey (NFHS-4), 2015-16.

³³Full immunization: BCG, measles, and 3 doses each of polio and DPT

³⁴Full ANC: at least 4 ANC visits, at least one tetanus toxoid injection, and iron folic acid tablets or syrup taken for 100 or more days.

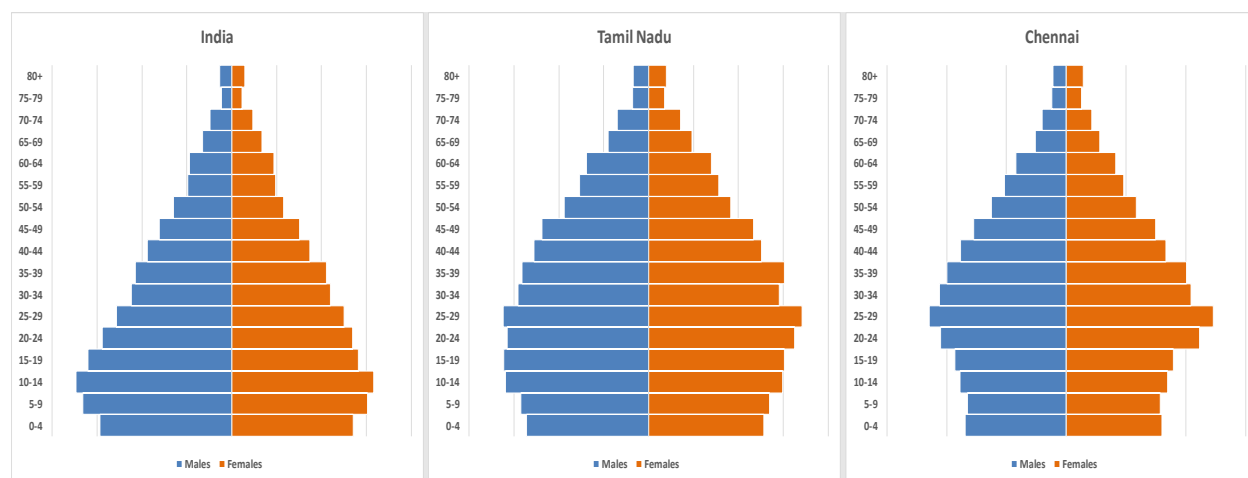


Figure 7. Percent of pregnant women receiving components of ANC and PNC by District, 2015–16



Furthermore, the epidemiological transition has resulted in a significant increase in non-communicable diseases (NCDs) across the state, and Chennai is similarly dealing with a dual burden of disease as it confronts the growing burden of NCDs. While Tamil Nadu is considered to have an aging population, this is even more the case for Chennai. (Figure 8) An aging population also indicates evolving health care and health system requirements that will need to be met. Cardiovascular disease, diabetes, and cancer are the leading causes of death for those above the age of 40. In Chennai, one-third of adults are overweight or obese, and approximately 15% of adults are diabetic with high blood glucose levels and 10% are hypertensive with high blood pressure (NFHS-4, 2015-16).

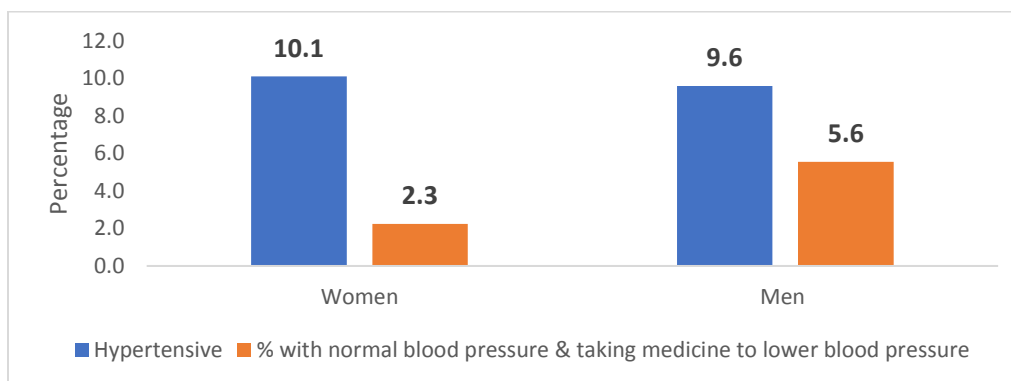
Figure 8. Population pyramids for India, Tamil Nadu, and Chennai (2017)



More concerning is that NCDs are not screened or managed adequately. For example, of the 10.1% of women and 9.6% of men age 15-49 in Chennai who are hypertensive, only 23% of women and 53% of men have their blood pressure under control, indicating only 2.3% of women and 5.6% of men in Chennai are managing their hypertension well. (Figure 9) Furthermore, only 20% and 13% of women age 15-49 have undergone examinations for cervical and breast cancer, respectively (NFHS-4, 2015-16). These data suggest that there are both supply and demand side challenges to the management of risk factors for NCDs as well as quality of NCD management.

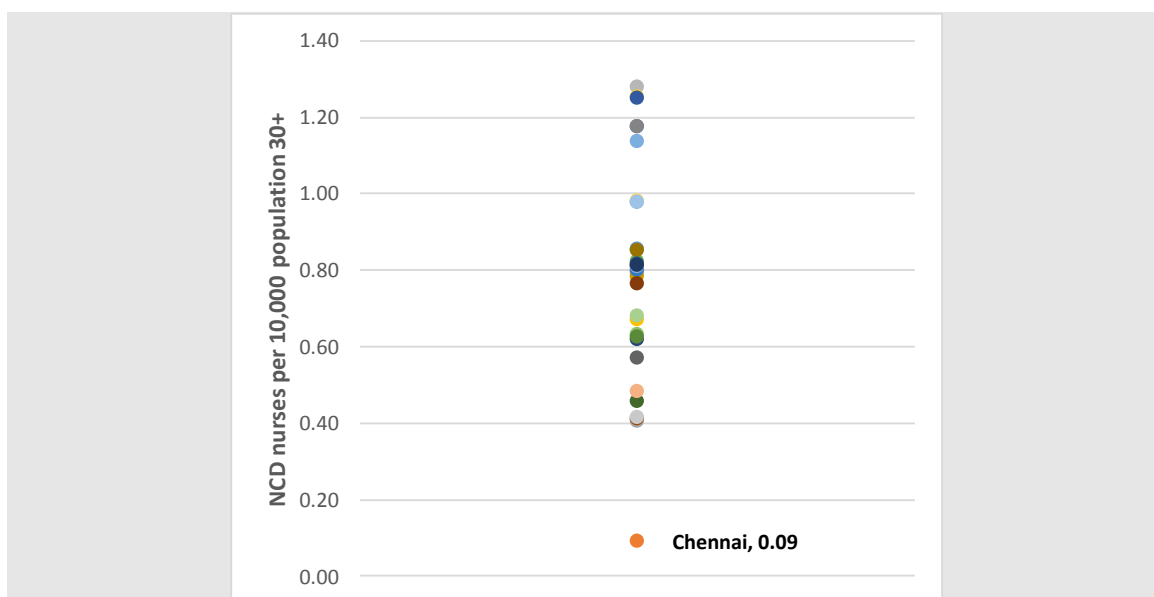


Figure 9. Management of Hypertension Among Women and Men, 2014–15



Moreover, the public sector primary health care system in Chennai (similar to the rest of India) primarily caters to RMNCH services. For example, substantial gaps remain in the number of human resources for health (HRH) allocated for the provision of NCD care across Tamil Nadu, and Chennai has only 0.09 NCD nurses per 10,000 population 30 years or older (the lowest in the state) (Figure 10). The outcome is overcrowding of secondary and tertiary care facilities for ailments that could have been managed at the primary level and resulted in delayed identification and access to care, collectively contributing to avoidable adverse events and high out-of-pocket-payments.

Figure 10. Number of NCD Nurses per 10,000 Population 30 Years or Older, by District



Disease surveillance and public health management in Chennai is based on the integrated disease surveillance program (IDSP). The IDSP, started in 2004, aims to strengthen a decentralized laboratory-based, IT-enabled nationwide disease surveillance system for epidemic-prone diseases to monitor disease trends and to detect and respond to outbreaks through trained Rapid Response Team (RRTs). Under IDSP, data is collected on epidemic-prone diseases on a weekly basis (Monday–Sunday). The information is collected on three specified reporting formats – namely “S” (suspected cases), “P” (presumptive cases) and “L” (laboratory confirmed cases) – completed by health workers, clinicians, and laboratory staff, respectively. The weekly data provides information on the



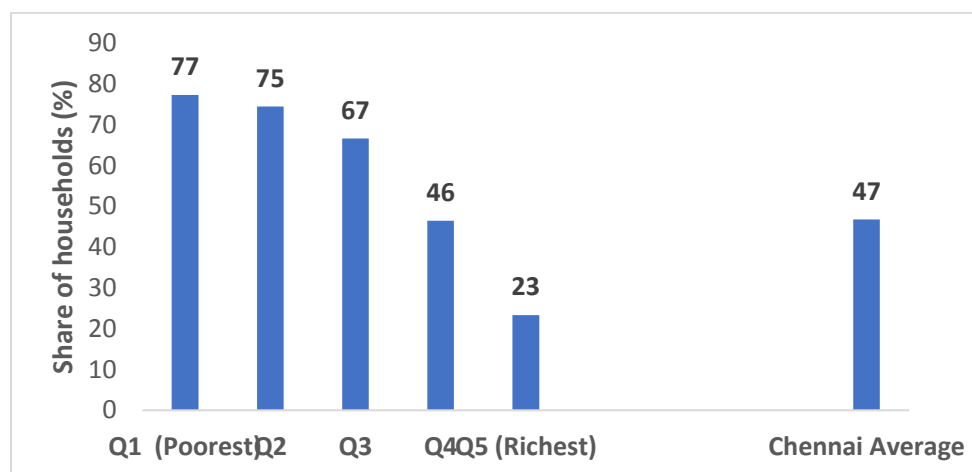
disease trends and seasonality of diseases. Whenever there is a rising trend of illnesses in any area, it is investigated by the RRT to diagnose and control the outbreak. Data analysis and actions are being undertaken by respective State/City/District Surveillance Units.

Disease surveillance and public health is relatively strong in Chennai, compared to other major urban centers in India. Chennai is estimated to have over 6,000 health facilities from the public and private sectors. In addition, the Communicable Diseases Hospital offers both inpatient and outpatient services and functions as the largest sentinel site for identification of communicable disease outbreaks for Chennai and also helps in mapping hot spots prone for outbreaks. The hospital has an advanced laboratory performing culture and sensitivity test as well as RT-PCR tests which helps in confirmation of etiological agents during outbreaks. Finally, to contain vector borne diseases, the GCC undertakes vector surveillance and control measures which get more intensified during high transmission seasons for malaria and dengue. The control measures include elimination of breeding places, periodic spraying of insecticides and community education to eliminate the sources and use bed nets. The veterinary services in the city focus on promoting animal health and ensure hygienic practices in wet markets and slaughterhouses. The veterinary surveillance helps to identify animal health diseases with potential human spread such as rabies, leptospirosis, anthrax and undertake appropriate containment measures.

Despite this success, opportunities for further strengthening the system exist and have been highlighted through the COVID-19 emergency. For example, there is an opportunity to strengthen IDSP reporting as public facilities are providing surveillance reports less consistently than expected and with a focus during high transmission periods (e.g. during malaria season). In addition, private sector facilities are not regularly providing surveillance reports as systematically as public facilities. There are also opportunities for better coordination and collaboration with other departments for stronger public health preparedness and response, including with water and sanitation.

As a result of the commitment of the Government of Tamil Nadu (GoTN) to strengthening public provision of services, most of the population seeks care from public facilities, including a large proportion in Chennai. Almost 63 percent of the state's population choose public facilities when a household member is ill (which is higher compared to other states except for Kerala), with households in rural areas using public facilities more than those in urban areas. In Chennai, with its largely urban setting, 47% of households use public sector facilities when seeking care. Notably, the poor in Chennai are more likely to seek care at public facilities – 77% of households in the poorest wealth quintile typically seek care at government facilities, compared to only 23% of households in the richest wealth quintile. (Figure 11) Even more notably, more households in Chennai are using public sector facilities now compared to 2005-2006. On average in Chennai, 34% of households reported seeking care at public facilities in 2005-2006, compared to 47% in 2015-16. Among the poorest quintile of households in Chennai, 63% sought care in public facilities in 2005-06 compared to 77% in 2015-16. This implies that there is a demand for further strengthening GCC's public sector health facilities, which is also a pro-poor strategy.

Figure 11. Share of Households in Chennai Reporting Seeking Care at Public Facilities when a Member of the Household is Ill, 2015-16



Data source: NFHS-4, 2015-16

Part of the success for disease surveillance and core public health functions in Chennai can be traced back to Tamil Nadu retaining the separation of public health and medical services (Figure 12). This provides it an organizational advantage relative to other states to keep the necessary focus on the preventive and promotive aspects as well as the multisectoral coordination role required for public health³⁵. Despite the separation of roles, the public health and medical services work fairly closely together in GCC. In addition, the City Health Officer manages veterinary services which allows oversight of zoonotic diseases (those that are transmitted from animals to humans), slaughterhouse hygiene and meat safety. This is not the case in other urban organizational structures. Having both human and animal health surveillance under one administration helps better One Health Coordination in the City. There is also evidence of fairly successful inter-departmental coordination in Chennai, active outreach to and focus on slum populations, and a supportive role of the TN DoHFW. However, the disadvantage of the separation of public health and medical services is that service delivery can at times be disjointed, and it has been difficult to manage career paths of staff recruited by one or the other³⁶.

Figure 12. GCC Organ gram for Health



Unlike most urban areas in India, Chennai also has the advantage of significant resources and capacity (in part due to historical legacies), which enables it to provide health services through its own network of health

³⁵Das Gupta et al. 2017. "Flies without borders- Lessons from Chennai on improving India's municipal public health services" Policy Research Working Paper 8197, World Bank.

³⁶Mullen et al 2016. "Urban Health Advantages and Penalties in India: Overview and Case Studies" World Bank: Washington DC



facilities. Government focus on primary health care in India has been mostly in rural areas. Only relatively recently has attention been turned to urban primary health care with the onset of the National Urban Health Mission (NUHM) in 2013. State governments are responsible for health services and other closely related sectors (e.g. water and sanitation). However, state governments do not have fiscal autonomy commensurate with their constitutional responsibilities, and the central government's fiscal power underlies some state government responsibilities, including health³⁷. Moreover, states are responsible for local government, though with the 73rd and 74th amendments adopted in 1992, local governments were empowered to be responsive to local demands, including for better social services. However, the language related to urban areas (vs rural areas) was weaker and somewhat of an afterthought, and the pace of decentralization and development of robust urban management, governance, financing, and service delivery systems across India has been uneven and slow³⁸. It is within this context that the NUHM is being implemented, and state health departments can choose to hand off implementation to urban governments, which has been the case for Chennai with respect to NUHM specifically and primary care more generally.

While Chennai has been relatively successful compared to other major urban centers in health service delivery and public health, there remain some systematic weaknesses. For example, as discussed, there are shortages in HRH, especially to address the growing needs, including for NCDs. In addition, the referral system between primary care facilities and higher-level facilities is weak, which hinders integration across facilities managed by GCC and those managed by the Tamil Nadu Department of Health and Family Welfare (DoHFW) and thus continuum of care for patients. The public health system which has responsibility for response and containment of communicable disease outbreaks and the clinical care which generates routine surveillance data also remain distinct entities despite having one common Joint Commissioner for Health (Figure 3.6). This fragmented and weak referral system leads to inefficient high use of secondary and tertiary level care for things that could be dealt with at primary care level, resulting in delayed identification and access to care which contributes to avoidable acute adverse events and high out-of-pocket-payments. The weak referral system is also reflective of the opportunity for stronger coordination mechanisms between the state DoHFW and GCC's health department. There is also weak coordination between the public and private sector health facilities. In addition, more active citizen engagement will be critical in effectively reaching populations for health promotion and prevention. GCC along with resident welfare associations, Mahila Arogya Samitis and NGOs can organize and conduct more social and behavior change communication, outreach and hygiene and sanitation drives, particularly in slums. Finally, multisectoral linkages and coordination – while better than other major ULBs due in part to the administrative set-up of GCC – can be further strengthened between health, water and sanitation, and transport departments.

4.2.2 Sector Specific Government Program ('p')

The Vision Tamil Nadu 2023, formulated by GoTN in 2012, outlines the strategic development priorities for the state of Tamil Nadu through ten themes / outcomes to be achieved and strategies to be adopted for the same. This provides the overarching framework for transformation of Chennai through four key themes identified therein for realizing this vision that will be operationalized through the govt. program as follows: (1) Transforming Chennai city in Tamil Nadu as a world class city, (2) World class infrastructure in Chennai, (3) Improving quality of institutions and governance at GCC, and (4) Health for all in Chennai.

"Health for All" in Chennai: The GCC – through its network of 140 Urban Primary Health Centers (UPHCs), 16 Urban Community Health Centers (UCHCs), three maternity homes and a Communicable Diseases Hospital – is

³⁷Ibid.

³⁸Ramanathan, R. 2007. "Federalism, Urban Decentralisation and Citizen Participation." *Economic and Political Weekly*. Vol 2, No. 8; Mullen et al 2016. "Urban Health Advantages and Penalties in India: Overview and Case Studies" World Bank: Washington DC



responsible for providing primary and secondary health services and core public health services including Integrated Disease Surveillance (IDSP). The GCC also receives support from both state finances as well as centrally sponsored schemes (CSSs) to support its health program (National Urban Health Mission [NUHM] and National Tuberculosis Elimination Program [NTEP]). The provision of universal access to healthcare for all citizens is well-embedded in Vision 2023 and is expected to contribute to human capital accumulation and increasing rank in the Human Development Index (HDI). Vision 2023 envisages Tamil Nadu to become not only the best state in India but also attain performance levels of developed countries. Chennai has to lead this effort, and rapid urbanization has made this difficult with urban poor being particularly disadvantaged in accessing high quality, affordable health care. Some of the key initiatives to support universal access to healthcare that are embedded in the government program include (a) increasing capacity to provide primary and secondary healthcare, (b) strengthening disease surveillance and pandemic preparedness, including strengthening of laboratory networks, and (c) implementing an integrated digital health system. Collectively, effective implementation of these initiatives will enable GCC to address the needs of its citizens in addressing the dual burden of disease: the unfinished agenda on reproductive, maternal, newborn and child health (RMNCH) and the growing burden of non-communicable diseases (NCDs).

4.2.3 Sector Specific PforR-Program ('P')

Strengthening GCC's delivery of high-quality primary health care and public health services by GCC

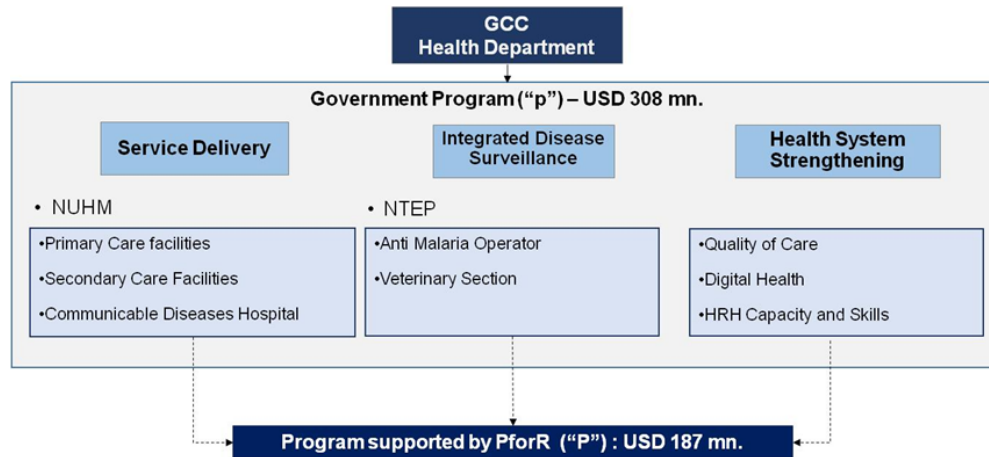
The recent health sector reform efforts in India have primarily focused on rural health care, and urban health care delivery – especially related to preventive, promotive and primary health care – has been a neglected area.

In particular, urban slums have not been sufficiently prioritized. The COVID-19 pandemic further highlighted the potentially critical role of primary health care workers, especially in urban areas, in responding to public health emergencies as the first point of contact with communities, as well as in ensuring continuity of essential services. This potential remains underutilized due to limited mechanisms for building their capacities for expanded service delivery, a weak community surveillance system and poor systemic mechanisms of engaging communities.

With growing needs (e.g. NCDs), emerging challenges (e.g. COVID-19), and increasing expectations from citizens (e.g. quality of care and expanded package of services), GCC needs to reform its urban health system through (i) an emphasis on outputs and outcomes rather than inputs, (ii) an expansion of service delivery and addressing existing weaknesses, and (iii) a focus on building a high-quality, people-centered health system leveraging innovations and empowering local bodies to collectively address the increasingly complex health challenges. The Program activities will address a few key areas to improve both access to and quality of health services supported by GCC to enable access to comprehensive primary health care, improved quality of care, and stronger disease surveillance by addressing systemic bottlenecks. The underlying government program, totaling US\$308 million, and the PforR-supported Program, totaling US\$187 million, are summarized in Figure 13 below.



Figure 13. GCC's government program and PforR-supported Program



4.2.4 Technical Assessment of Key Pillar and Activities

International Experience

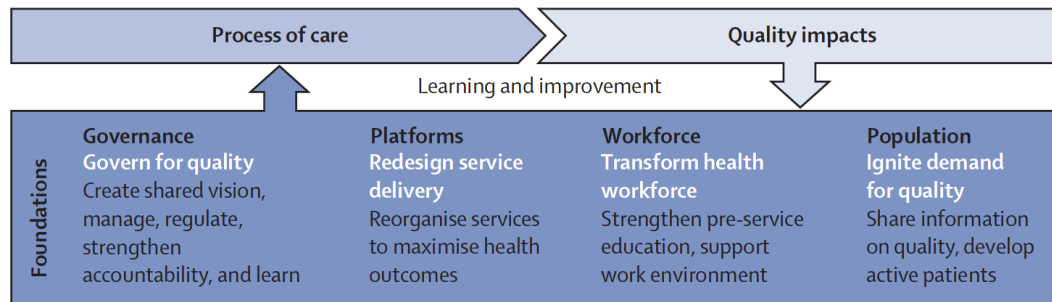
As highlighted in the Lancet Global Health Commission on High Quality Health Systems in the SDG Era, **poor quality of care is now a bigger barrier to reducing mortality than insufficient access.**³⁹ The Commission proposes a framework to both measure and improve quality of care while not compromising the focus on access to services. It also recommends four universal actions to improve quality to achieve a high-quality health system (Figure 14). Quality should be measured in terms of processes of care and quality impacts (the top two boxes of the figure below). Additionally, quality should be improved through four universal actions that change foundational elements of the health system (the bottom box of the framework):

- Govern for quality
- Redesign service delivery
- Transform health workforce
- Ignite demand for quality

³⁹Kruk, M. E., Gage, A. D., Arsenault, C., Jordan, K., Leslie, H. H., Roder-DeWan, S., ... & English, M. 2018. "High-quality health systems in the Sustainable Development Goals era: time for a revolution." *The Lancet Global Health* Vol 6, No. 11, E1196-E1252.



Figure 14. Four Universal Actions to Achieve a High-Quality Health System (Lancet Commission)



Most high-income countries use accreditation to guarantee quality of care and improve patient safety, and accreditation has been shown to result in other quality-improving interventions at the facility-level.⁴⁰ While the impact of accreditation on quality of care has been mixed,^{41,42,43} studies have found that accreditation often leads to other quality-improving interventions at the facility level.⁴⁴ Preparation for accreditation results in significant improvements in the pre-accreditation period. While the pace of improvements plateaus post accreditation, accreditation has been found to have a residual effect—with health facilities performing significantly better three years post-accreditation than they did at baseline.⁴⁵

Publicizing performance data on health facility quality has been found to improve the quality of care by stimulating hospitals to improve their performance and to introduce quality improvement activities.^{46,47,48,49} In addition, making data publicly available is an important way of building trust in the health system. Before making data available publicly, the right data also needs to be available. Data on quality of care is limited. Through this Program, quality of care will not only be measured more explicitly through an M&E framework developed as part of the quality of care strategy but also used for assessing performance. What is not measured cannot be changed – or improved.

⁴⁰Desveaux, L., Mitchell, J. I., Shaw, J., & Ivers, N. M. 2017. "Understanding the impact of accreditation on quality in healthcare: A grounded theory approach." *International Journal for Quality in Health Care*, 29(7), 941-947.

⁴¹Brubakk, K., Vist, G. E., Bukholm, G., Barach, P., & Tjomsland, O. 2015. "A systematic review of hospital accreditation: the challenges of measuring complex intervention effects." *BMC health services research*, 15(1), 280.

⁴²Alkhenizan, A., & Shaw, C. 2011. "Impact of accreditation on the quality of healthcare services: a systematic review of the literature." *Annals of Saudi medicine*, 31(4), 407.

⁴³Greenfield, D., & Braithwaite, J. 2008. "Health sector accreditation research: a systematic review." *International journal for quality in health care*, 20(3), 172-183.

⁴⁴Desveaux et al., 2017.

⁴⁵Devkaran, S., & O'Farrell, P. N. 2014. "The impact of hospital accreditation on clinical documentation compliance: a life cycle explanation using interrupted time series analysis." *BMJ open*, 4(8), e005240.

⁴⁶Hibbard, J. H., Stockard, J., & Tusler, M. 2003. "Does publicizing hospital performance stimulate quality improvement efforts?" *Health Affairs*, 22(2), 84-94.

⁴⁷Lindenauer, P. K., Remus, D., Roman, S., Rothberg, M. B., Benjamin, E. M., Ma, A., & Bratzler, D. W. 2007. "Public reporting and pay for performance in hospital quality improvement." *New England Journal of Medicine*, 356(5), 486-496.

⁴⁸Fung, C. H., Lim, Y. W., Mattke, S., Damberg, C., & Shekelle, P. G. 2008. "Systematic review: the evidence that publishing patient care performance data improves quality of care." *Annals of internal medicine*, 148(2), 111-123.

⁴⁹Herrera, C. A., Lewin, S., Paulsen, E., Ciapponi, A., Opiyo, N., Pantoja, T., ... & Okwundu, C. I. 2017. "Governance arrangements for health systems in low-income countries: an overview of systematic reviews." *The Cochrane Library*.



A systematic review of interventions aimed at improving health worker performance found that while training is effective in improving quality of care, the effect is substantially larger if training is combined with supervision.⁵⁰ Implementation of protocols and guidelines has been found to be effective in improving the quality of patient care,^{51,52} but evidence suggests the development and dissemination of protocols and guidelines does not automatically lead to implementation.⁵³ Provider buy-in is critical for ensuring adoption. In addition, continuous professional development helps ensure that trainings are not fragmented but rather integrated into a broader plan for acquisition of knowledge, skills, and career development.

In addition, NCD interventions – by strengthening comprehensive primary health care and outreach activities – under the Program focus on the following areas: (a) health promotion and NCD prevention; (b) screening of NCDs among the eligible population; (c) treatment and follow-up; and (d) improving monitoring and evaluation related to NCDs. Screening is essential for early detection of NCDs. Cervical screening, for example, can significantly reduce mortality by early detection and treatment and has been identified as a highly cost-effective intervention in India.⁵⁴ Screening of hypertension and treatment with antihypertensive drugs is considered a ‘best buy’ for NCD prevention and control. Primary prevention is essential for those who are at high risk of NCDs. Evidence shows that control of risk factors is associated with a substantial reduction in cardiovascular mortality.⁵⁵ At a minimum, global experience suggests that patients availing health services at facilities should be screened at least once a year (i.e. opportunistic screening).⁵⁶ Social and behavior change communication campaigns have been found to be effective in changing lifestyle behaviors and risk factors. Furthermore, given the multisectoral nature of the Program, there are also opportunities to strengthen linkages across sectors to address NCD risk factors (e.g. with transportation and urban mobility for making the city more suitable for physical activity).

By focusing on the latest global evidence, the Program is technically sound and will emphasize the importance of quality of care in addressing the key constraints to service delivery and building a resilient and high-quality health system. There are two Pillars that the Program supports in health: (i) Enhanced access to and quality of comprehensive primary health care, and (ii) Strengthened disease surveillance and public health. The Program will support both of these pillars with interventions across the four universal actions of the 2018 Lancet Global Health Commission on High Quality Health Systems in the SDG Era⁵⁷: governing for quality, redesigning service delivery, transforming health workforce, and igniting demand for quality among citizens. (Figure 15) The interventions supporting Pillar I – including extended hours for high-demand UPHCs, private sector engagement, increasing use of polyclinics, development of a quality of care strategy, improved measurement of quality, NQAS

⁵⁰ Kruk et al. 2018.

⁵¹ Smith and Nguyen, 2013.

⁵² Prabhakaran, D., Jeemon, P., Mohanan, P. P., Govindan, U., Geevar, Z., Chaturvedi, V., & Reddy, K. S. 2008. “Management of acute coronary syndromes in secondary care settings in Kerala: impact of a quality improvement programme.” *Natl Med J India*, 21(3), 107-11.

⁵³ Steyn, K., Lombard, C., Gwebushe, N., Fourie, J. M., Everett-Murphy, K., Zwarenstein, M., & Levitt, N. S. 2013.

“Implementation of national guidelines, incorporated within structured diabetes and hypertension records at primary level care in Cape Town, South Africa: a randomised controlled trial.” *Global health action*, 6(1), 20796.

⁵⁴ Goldie, S. J., Gaffikin, L., Goldhaber-Fiebert, J. D., Gordillo-Tobar, A., Levin, C., Mahé, C., & Wright, T. C. 2005. “Cost-effectiveness of cervical-cancer screening in five developing countries.” *New England Journal of Medicine*, 353(20), 2158-2168.

⁵⁵ Ford, E. S., & Capewell, S. 2011. “Proportion of the decline in cardiovascular mortality disease due to prevention versus treatment: public health versus clinical care.” *Annual review of public health*, 32, 5-22.

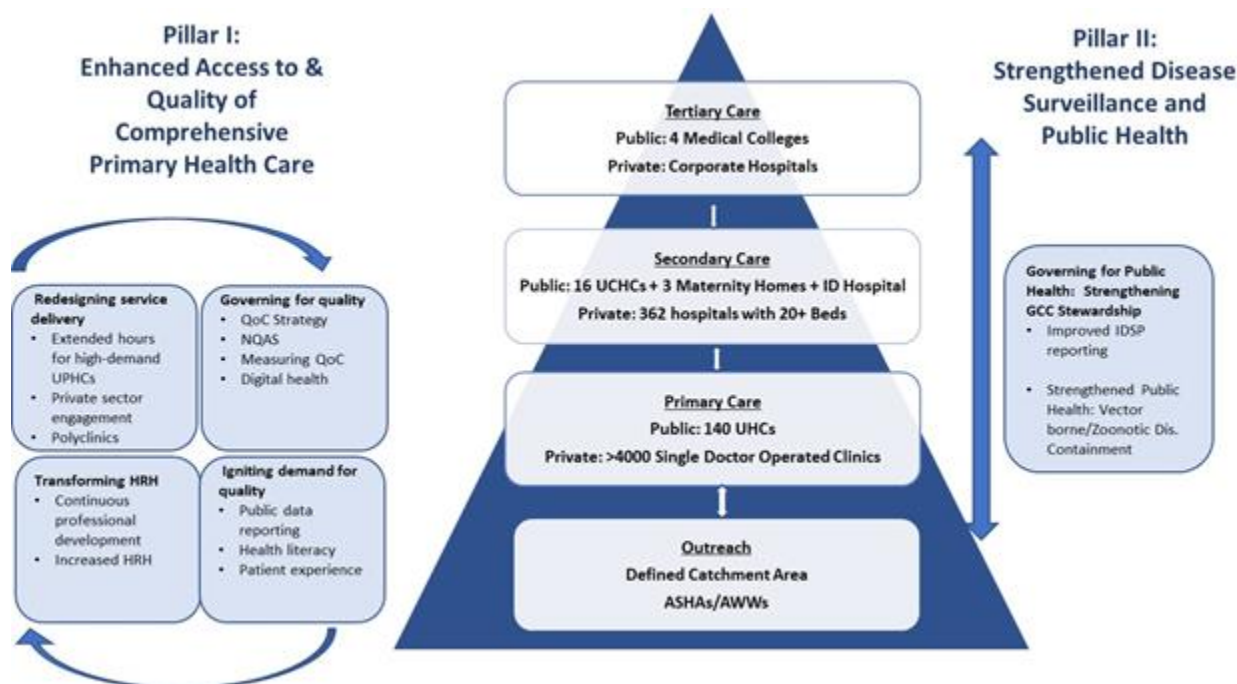
⁵⁶ Disease Control Priorities 3 2017.

⁵⁷ Kruk, M. E., Gage, A. D., Arsenault, C., Jordan, K., Leslie, H. H., Roder-DeWan, S., ... & English, M. 2018. “High-quality health systems in the Sustainable Development Goals era: time for a revolution.” *The Lancet Global Health* Vol 6, No. 11, E1196-E1252.



certification of UPHCs/UHCs, strengthened and integrated digital health, increased HRH and their continuous professional development, increased citizen engagement, improved health literacy, better patient experience efforts, and public reporting of data – are aligned with best global practices, and the focus on competent care processes and patient experience rather than structural interventions to improve quality is supported by global evidence.^{[1],[2]} The interventions supporting Pillar II – improved consistency and completeness of IDSP reporting of infectious disease outbreaks across public and private sector, vector borne and zoonotic disease containment – are core to the effective strengthening of disease surveillance and public health functions of GCC.

Figure 15. GCC's PforR-supported Program for high-quality primary health care & public health services



Soundness – Pillar I: Enhanced Access to and Quality of Comprehensive Primary Health Care

The Program aims to transform urban health care delivery to support expanded access to high-quality comprehensive primary health care (CPHC), especially for urban poor, that covers not just RMNCH but also NCD services. Access to and quality of CPHC will be improved through interventions aligned with the four universal actions. Improving **governing for quality** will include interventions such as (i) adoption and implementation of a quality of care strategy, (ii) quality accreditation of facilities through National Quality Assurance Standards (NQAS), (iii) explicit measurement of quality of care, and (iii) strengthening digital health. Currently, there is a weak focus on quality of care. The quality of care strategy will use global experience from the *Lancet Commission* combined with learnings from the recent development of a Tamil Nadu state-level quality of care strategy and adapt it to Chennai's urban setting. The emphasis will be on “macro” interventions that focus at the system-level that motivate foundations changes and are long-term in nature and at large scale. Most quality of care interventions globally (75%) – as well as within India and Tamil Nadu – have been focused more on the “micro” level.⁵⁸ These

⁵⁸Kruk, M. E., Gage, A. D., Arsenault, C., Jordan, K., Leslie, H. H., Roder-DeWan, S., ... & English, M. 2018. “High-quality health systems in the Sustainable Development Goals era: time for a revolution.” *The Lancet Global Health* Vol 6, No. 11, E1196-E1252.



“micro” interventions tend to be implemented at the facility level to motivate individual providers’ behavior change and are short-term in nature and on a localized scale. However, “micro” interventions, while they have value, have been proven less effective and impactful than “macro” interventions. Thus, the quality of care strategy will aim to include “macro” interventions. The strategy will include an M&E framework to effectively measure and monitor quality with a focus on competent care processes and patient experience (rather than only structural, input-oriented elements of quality).

The health department of GCC is currently using a set of IT tools and platforms supporting several programs including but not limited to RCH, NCD, NTEP, RBSK, and UHC. However, there are several challenges in the existing systems including fragmented systems working in silos without connections or data flow between systems; absence of robust change management procedures; lack of standardization across platforms; IT platforms developed with poor safety protocols leading to increased security risk such as data theft; absence of unique master index for patients, medical records and diseases; absence of data dictionary and coding standards; and poor user interface. The Program will try to address challenges identified in the existing system by creating a mechanism to integrate existing IT tools and platforms and develop new IT tools and platforms to create a comprehensive digital health system for the GCC. The revamped digital health system would follow the key building blocks of National Digital Health Mission (NDHM)⁵⁹. The Program will support GCC to develop a comprehensive digital health strategy focusing on how a phased modular digital health system should be planned.⁶⁰ The Program will also support integration, development, piloting, deployment, management, maintenance and capacity building for a revamped digital health system of the GCC which is also aligned with the Tamil Nadu state-level efforts on digital health management information systems.

Primary care services are provided on a limited basis, both in terms of opening hours (8am-3pm) and daily provision of a comprehensive package of services (currently primarily focused on RMNCH). A number of interventions will also support **redesigning service delivery** to enable the provision of CPHC including extended hours of operation for select, high-demand UPHCs, private sector engagement to deliver comprehensive primary health care services, and polyclinics to enable specialty services to the most disadvantaged. The GCC will explore and pilot various innovative strategies including piloting public private partnership (PPP) models for improving access to and quality of care, especially to ensure delivery of services to the slum population. In addition, the Program will support the polyclinic model (i.e. more doctors specializing in different fields) at UPHCs to enable a broader range of services that can be provided. The Program will also support the conversion of UPHCs to UHCs, which will be aligned with GCC’s aim (as well as GOI’s) to expand the provision of CPHC.

Transforming the health workforce will involve increasing the number of health professionals, improving their provision of quality services, and supporting their continuous professional development. Gradually increasing the health work force will be achieved through GoTN’s commitment to provide financing to support an expanded health workforce through sanctioned posts. Effective engagement of private healthcare providers in primary health care delivery as described above will complement the increased posts supported by GoTN. Quality of services will be improved by shifting the focus to a patient-centered approach to service provision, including

⁵⁹Key building blocks: (a) identification: unique identification of persons, facilities, diseases and devices; (b) people-centered: maintaining confidentiality, security and privacy of health records; (c) service access/delivery: omni-channel access/delivery; and (d) interoperability: the most important aspect of a digital health system is interoperability, which is not only a pre-requisite for development of integrated digital health services and continuum of care but also for the autonomous development of innovative value-added services by entrepreneurs.

⁶⁰ Key modules that will be considered include: (a) public centric module focusing on awareness generation, population-based interventions etc., (b) patients/users (at facility) module focusing on e-hospital solution including EHR & EMR; (c) providers (clinical and non-clinical) module to support providers at facilities; and (d) administrator/program manager module focusing on business intelligence, dashboard etc.



strengthening providers' patient interactions and engagement, soft skills, and bedside care. To support continuous professional development of the health workforce, GCC will implement the *Tamil Nadu Quality Enhancing Structured Training (TAN-QuEST)* which was recently adopted by the Tamil Nadu DoHFW. The philosophy of TAN-QuEST is to ensure the "right persons at the right time with the right skills & attitudes".

Finally, to **ignite the population's demand for a high-quality health system**, a number of interventions will be strengthened and initiated as part of GCC's quality of care strategy. Citizen engagement, health literacy, health-seeking behavior and adoption of healthy behaviors will be improved through social and behavior change communication and strengthened outreach and community engagement activities. While patient satisfaction is already being assessed in Tamil Nadu through the *MeraAspatal* app at secondary care hospitals, the Program will support the implementation of patient experience surveys at UPHCs as a tool to not only measure patient experience but also make actionable changes in service provision. Finally, health data will be reported publicly to empower citizens about the health sector. The improved digital health platform will in part facilitate the public reporting of health sector data.

Disbursement-Linked Results Supporting Pillar I: A disbursement-linked result (DLR) on the provision of at least seven of the twelve services as outlined in the urban health and wellness center (UHWC) guidelines will be included in the Program to capture achievements on expanded primary health care provision. DLRs on development of a quality of care strategy and quality accreditation of health facilities will also support results on this Pillar. (Table 15)

Soundness – Pillar II: Strengthened Disease Surveillance and Public Health

The Program will support strengthening of GCC's disease surveillance through a number of expanded and new initiatives with a strong focus on strengthening systems and promoting cross-sector linkages. The critical foundation for the surveillance system is information that should be regularly reported by the peripheral health facilities. This enables trend analysis and identification of unusual events that provide early warning for impending outbreaks and identification of hot spots for endemic diseases. A review of past reporting trends indicated that such reporting tends to slack during non-peak seasons of common diseases such as Dengue and Malaria and reporting by private sector - an important provider of healthcare - is less consistent. Therefore, the focus of Pillar II will be on strengthening information systems. All public facilities managed by GCC (140 UPHCs, 16 UCHCs, 1 communicable disease hospital) and private facilities with at least 20 beds will be required to provide weekly reports of provisional cases (P forms). In addition, the remaining single doctor private clinics provide SOS reports if they notice any unusual events. Ensuring consistency and timely reporting of P forms is critical for effective disease surveillance. Therefore, the Program will emphasize timely and consistent reporting for at least 42 weeks of every year, as captured in an associated DLR.

Pillar II also supports strengthening inter-sector coordination with strong emphasis on One Health plans to establish systems to monitor Anti-Microbial Resistance (AMR) patterns among in-patients admitted in its facilities. This potential for expanding the AMR to systematic sequential testing of sewer samples in partnership with the Chennai Metro Water Supply and Sewerage Board (CMWSSB) will be explored during the implementation to further strengthen cross-sectoral collaboration. The health department also undertakes surveillance of vector borne diseases and implements measures to eliminate breeding areas of vectors as well as insecticidal spraying. This will be further strengthened by creating annual hot maps of breeding sites including the possibility of developing joint action plans with CMWSSB for their elimination ahead of seasonal peaks. The health department has the responsibility for veterinary health which ensures more effective "one health" coordination in identifying and responding to zoonotic diseases of human relevance (e.g. Bird flu, Rabies, Bovine Tuberculosis, Leptospirosis,



and Anthrax) by undertaking regular inspections of slaughter houses, milch cattle farmsteads, poultries and wet markets to ensure hygienic practices to minimize risks of zoonotic disease transmission.

Disbursement-Linked Results Supporting Pillar II: A DLR on both public sector and private sector health facilities annually reporting P forms at least 80% of weeks will support the achievement of results for strengthened disease surveillance and public health. (Table 15)

Table 17. Disbursement-Linked Results for Health

No.	Disbursement Linked Indicator	Unit of Measure	Baseline July 2020	Year 1 Target	Year 2 Target	Year 3 Target	Year 4 Target	Year 5 Target	Data Source/ Methodology	Verification Entity
Strengthening GCC's health system through improved access to and quality of care										
5	Strengthening GCC's health system through improved access to services and quality of care (*Indicates timebound DLRs)			(i) Development and adoption of Quality of Care Strategy and Operational Plan by GCC*	(i) Increase in number of UPHCs providing at least 7 out of 12 services in the CPHC package (ii) Increase in % public and selected private health facilities contributing to disease surveillance (iii) Increase in number of UPHCs/UCHCs with NQAS certification				GCC & TN DoHFW	IVA
	Allocated amount: US\$20 million		TBC	(i) US\$1,875,000	(i) US\$125,000 per net additional UPHC providing the CPHC package each year with total disbursement of US\$8,750,000 (ii) US\$75,000 per annual percentage point increase with maximum total disbursement of US\$4,125,000 (iii) US\$75,000 per UPHC/UCHC achieving NQAS certification with maximum total disbursement of US\$5,250,000					

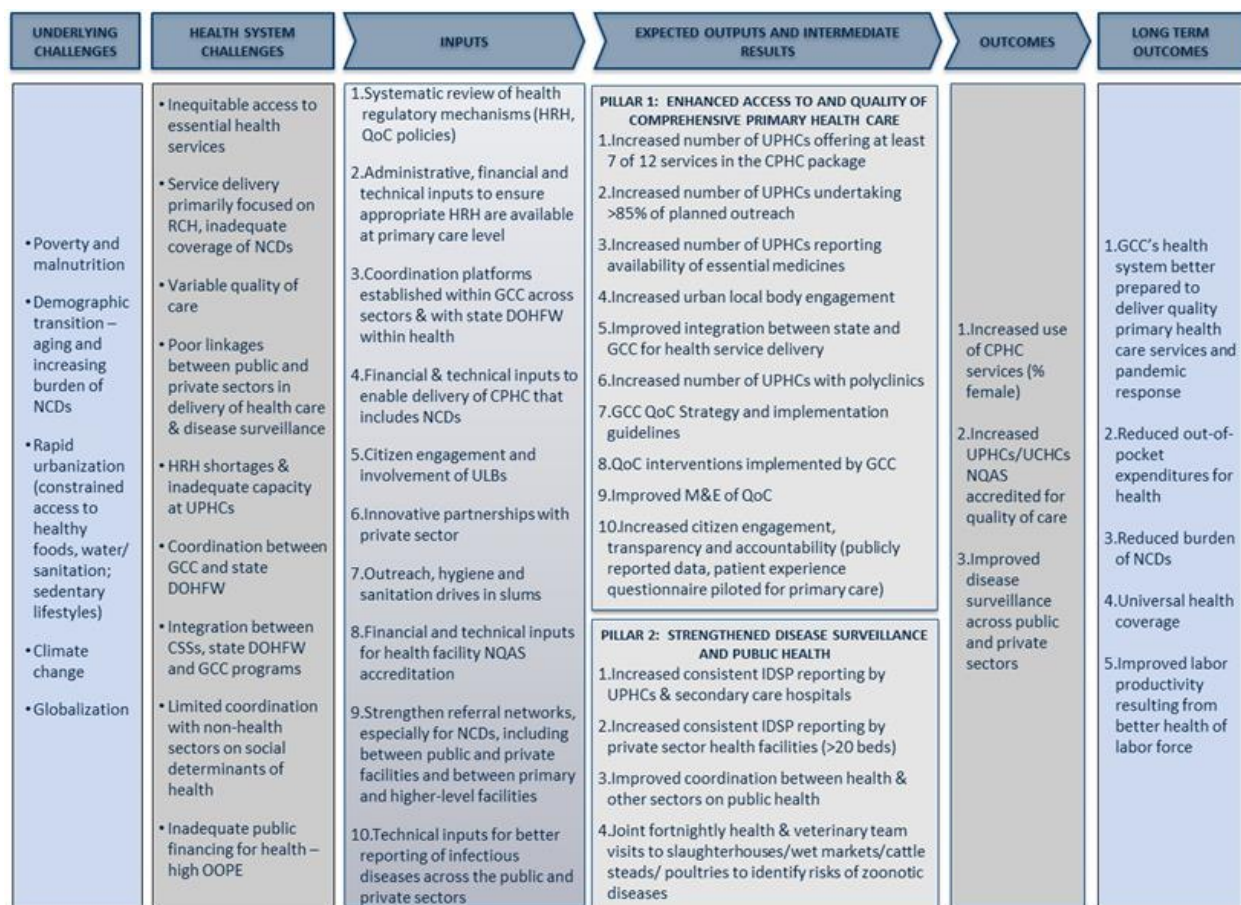
Note: The amount allocated in this table is only for IBRD financing. AIIB will provide an equivalent amount of co-financing for the DLRs, which will double the total amounts.



4.2.5 Sector Specific Results Chain

Theory of Change: The health Program's theory of change is presented in Figure 16.

Figure 16. Health Program Theory of Change



4.2.6 Sector Specific Program Expenditure Framework

The PforR-supported Program for the five-year period is estimated at US\$187 million, with an underlying government program estimated at US\$308 million. The Program cost includes costs of the ongoing reforms, some new initiatives, and operational costs attributable to the operation. The expenditure program is based on work plans designed to achieve the DLI and the overall results. The expenditures proposed for individual activities is commensurate with their scale and complexity and facilitates efficient execution. The Program Expenditure Framework strikes a balance between reform actions such as capacity building, recurring expenditure, and asset creation. The majority (83 percent of PforR and 80 percent of Government Program) of Program costs are recurrent salary expenditures. Other program costs include operating and maintenance and capacity building/policy development. Table 16 shows the overall Program composition by budget head (expenditure category) and Program financing by source of financing. Funding predictability is high, and risks to the Program Expenditure Framework arising out of budget constraints are considered moderate because the Program expenditure is well-aligned with the government priorities.



Table 18. GCC Health Program Expenditure Framework

Strengthening Public Health Services							
Capex/ Opex	Budget Head	Government program “p” Budget (USD million)			PforR-Supported Operation (FY 21-26) (USD million)		
		State Budget + GCC Own Revenue (USD million)	Centre Budget (USD million)	Total “p” (USD million)	GoTN (USD million)	External (USD million)	Total “P” (USD million)
O	Staffing costs (Health services)	255		255	128	22	150
O	O&M costs	29		29	15	13	28
O	Digital health system + QoC interventions + capacity building + strategy development	10		10	5	4	9
O	National Urban Health Mission (NUHM)		8	8			
C	Investments in public health infrastructure	6		6			
Total		300	8	308	148	39	187

It is important to note that in the latest budget announcement, the Fifteenth Finance Commission (15th FC) introduced local grants to local bodies, include urban local bodies, which will be complementary to the PforR-supported Program. The 15th FC recommended a total grant of Rs. 436,361 Crore (\$60,212 million) to local bodies during 5-year period extending from 2021-22 to 2025-26. This includes direct health grants for Urban and Rural Local Bodies amounting to Rs. 70,051 Crore (About \$9,666 million) to strengthen and plug critical gaps in health care system at primary level. Specifically, for the urban areas, these grants will support 11,024 Urban Health & Wellness Centers (UHCs) and strengthen diagnostic infrastructure of UPHCs catering to both disease surveillance and clinical case management. While similar grants proposed by the 15th FC to local bodies for incubation of new cities were linked to improvements in water & sanitation services and ambient air quality, such conditions were not imposed for release of grants for the health sector in the light of the COVID-19 pandemic. The State Governments are to release these grants in 2 tranches each year. These recommendations for direct grants to local bodies were accepted in principle by Government of India.

The implementation arrangements are presented in Figure 17 while Table 18 presents specific allocations for Tamil Nadu. While the exact number of UHCs identified for upgradation and diagnostic infrastructure to be strengthened in Chennai City is still being finalized, GCC as the overall coordinating agency is well placed to ensure coherent planning and coordination of these direct developmental grants to local bodies with the proposed PforR program to achieve the vision envisaged by the 15 FC to strengthen partnerships, convergence, and community based cadres (ASHAs, Multipurpose Health Workers and SHGs) by enhancing harmonization and minimizing duplication in the delivery and monitoring of high quality urban primary health care services with enhanced disease surveillance.



Figure 17. Implementation Arrangements for Grants for Primary Healthcare Channeled through Local Bodies to be in place by April 2021

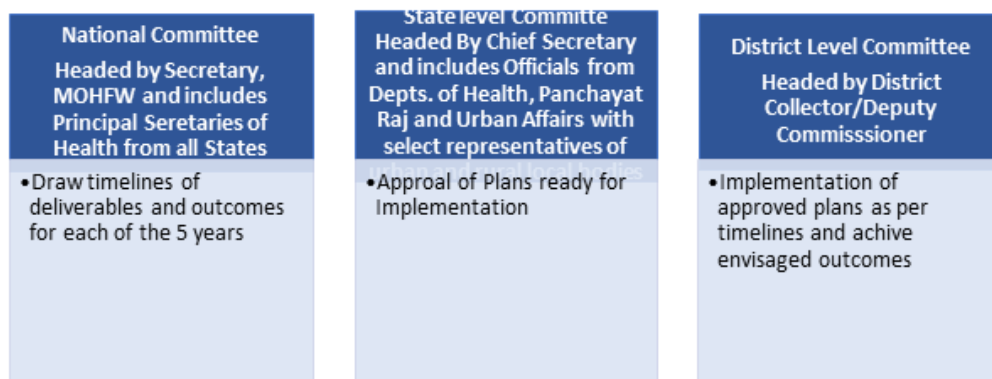


Table 19. 15 FC recommended allocations for Local Bodies in Tamil Nadu State (Rs. Crore)

Total Primary health care grants to local bodies	806	806	846	889	993	4280
Urban Health & Wellness Centers	356.48	356.48	374.30	393.01	412.67	1892.94
Support for diagnostic infrastructure for UPHCs	18.75	18.75	19.69	20.67	21.70	99.56

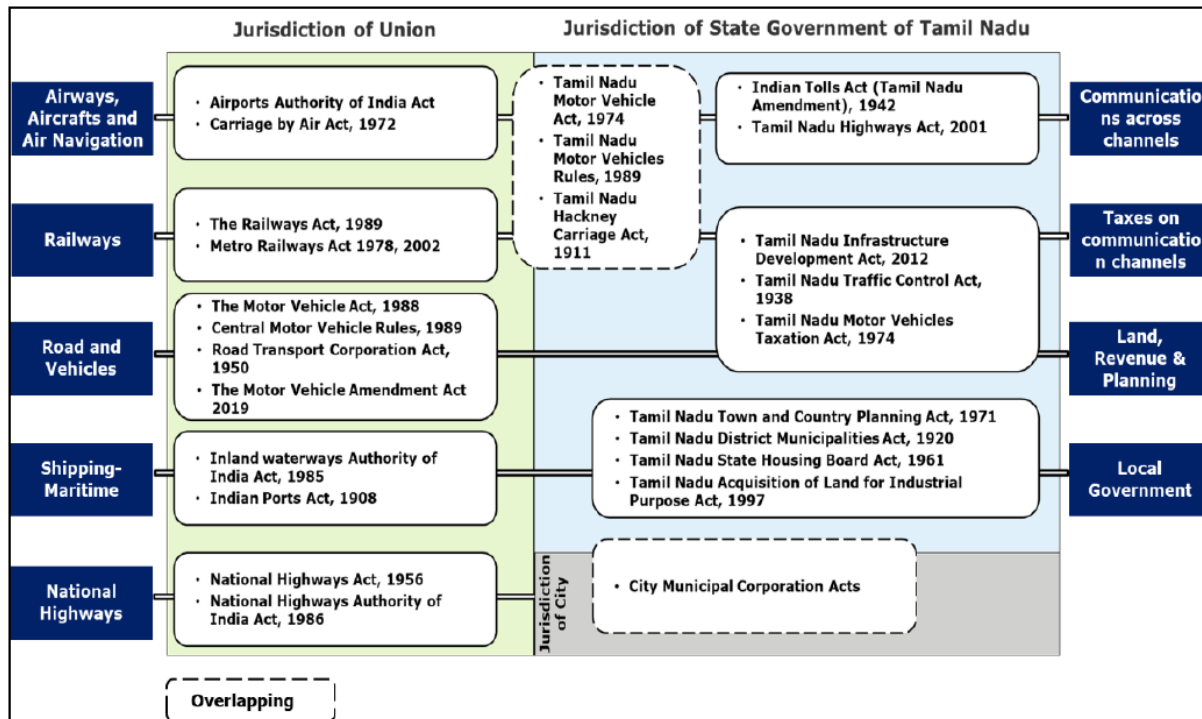
4.3 URBAN MOBILITY and TRANSPORT

4.3.1 Sector Context and Key Constraints

The urban mobility system in CMA is governed by a wide range of laws (Exhibit 1) and corresponding agencies at central, state and city levels with overlap and omission in functions, and insufficient coordination, as outlined in the “Diagnostic Review and Report on Strengthening of CUMTA Act” (Deloitte 2020). A coordinating framework, mechanism, plan, and institutional structure are currently missing to effectively pursue comprehensive urban mobility objectives in the CMA. The Chennai Unified Metropolitan Transport Authority (CUMTA) was set up in 2010 (Act 44 of 2010) with an objective to have proper co-ordination and streamline activities of agencies involved in planning, operation, and management of the transportation system in CMA. In early 2019, the rules for its working were approved and published, but these rules did not provide for financial powers, or powers to impose remedial measures on any agency that violates or fails to implement the urban mobility solutions. CUMTA has no permanent staffing and resources to implement the mandate conferred by the Act and until recently lacked the governance structure to effectively lead the mobility agenda. In September 2020, the governance of CUMTA was enhanced through an amendment to CUMTA that placed the Tamil Nadu as Chairman of CUMTA, and the Housing and Urban Development Minister a vice-Chairman.



Figure 18. Applicability of Multiple Legislations in Urban Centers (Deloitte 2020)



Government expenditures on urban mobility in CMA are not allocated in a manner that reflects sustainable mobility patterns. Cumulative spending for the period FY16 to FY 20 was INR31,640 crore (equivalent to US\$850 m per annum), about evenly distributed between operating expenditures and capital expenditures. They have declined sharply as a percentage of GDP from 2.5% to 1.7% over the period. From FY16 to FY19, capital expenditures were concentrated into metro (62 percent), and road project (25 percent) with the bus sector receiving only 3% of the outlay. Buses received most of the operating expenditure support (61%) followed by railways as the metro was only starting its operation. Combined, the government cost per passenger across travel mode is INR8 for bus transport, INR256 for metro and INR 17 for suburban/MRTS, illustrating an imbalance in allocation compared to the sustainable mobility objectives of CMA (Crisil 2020⁶¹).

Despite a relatively developed public transport system in the form of buses, suburban railway, MRTS and the metro, public transport is continuously losing mode share from 46% in the 1970s to 28% in 2018. The public transport system faces challenges like overlapping routes, lack of integration with other modes of transport, insufficient fleet, lack of last mile connectivity and incomplete feeder system. Fare, service, infrastructure, information, and funding integration across public transport options is insufficient to provide effective door-to-door services. Citizens are left with a system of juxtaposed options, targeting different profiles of customers instead of providing a combined offering, with suburban rail and buses targeting lower income passengers, and metro targeting higher income passengers. This pattern, reflective of the current institutional fragmentation, has led citizens, with rapidly changing expectations, to gradually shift towards private vehicles, particularly two wheelers.

⁶¹Crisil. 2020. "Overview of expenditure, financing and funding for Urban Transport in Chennai." Report prepared for the World Bank



Bus services dominate among public transport options in terms of motorized mode share at 22% but are experiencing a steady erosion. Low level of investment and unsustainable approach in the bus transport system has led to a constant fleet level between 3,500-3,700 buses for the past decade or so despite the growing population and geographic city's areas. This limits coverage to 65% of the city's area. Even the available fleet is witnessing significant decline in ridership due to overall quality of services i.e. low service reliability, overcrowding of buses, and discomfort in using the service due to inadequate bus stops and access infrastructure. All these have resulted in a drop in ridership from 5 million to 3.1 million per day over the past five years (Crisil 2020). The number of available buses (3614 or 330 per million people) are equivalent to a low level of service "3" based on the national benchmarks (a LOS of 1 by Indian standard would be equivalent to 6,600 buses), substantially below the level in cities with effective bus supply like Singapore or London (over 1000 per million people) or Bangalore (6690 or 544 per million people). The draft Comprehensive Mobility Plan (CMP) has recommended an additional fleet of nearly 2,000 buses to cater to the growing travel need and offer comfortable journey.

The impact of metro development has been limited to date, highlighting the need for more integration. The initial two metro lines of 45 km cater to a low 0.1 million passengers per day. Pricing, poor accessibility and limited integration of metro line in the land use planning have not yet allowed the metro to play its transformational role in CMA. With an objective to reverse the trend and regain the lost share of public transport, the city has initiated implementation of additional 120 km of metro lines by 2025, that would take the overall metro network in the city to 165 km. This is attracting major capital investment that is supported through financing assistance from various MDBs and IFIs. This rapid expansion of the metro system provides an opportunity for the city to holistically and comprehensively integrate transport and land use along with planning complementary services to develop citizen-centric services that meet the future travel demand in CMA, through the next iteration of its masterplan.

Over the years, the share of walk trips in Chennai has remained firm at about 25 percent, while bicycle trips have reduced significantly (from 13 percent in 1984 to 3 percent in 2018) but the urban environment is unsafe for non-motorized transport (NMT). Lack of NMT infrastructure across CMA continues to remain an impediment to the movement of pedestrians and cyclists in the city, along with public transport users, which depend on walking as the first and last legs of their journey. The draft CMP assessed non-motorized facilities as a three out of four in terms of level of services (1 being the best), based on national service level benchmarks established by the Ministry of Housing and Urban Affairs. The lack of facilities directly impacts safety with nearly 30% of traffic related fatalities in Chennai being pedestrians, contributing to making Chennai the city with the second most road fatalities in India.

Women's safety in public spaces and urban transport is a major concern. A survey in 2017 by Aware had revealed that nearly 75 percent women respondents experienced sexual harassment while traveling in Chennai. Under the Safe City project and utilizing the Nirbhaya Funds⁶², a new initiative has been launched to enhance women's safety in public transport system in Chennai including improved infrastructure (cameras, lighting, better design of stations), training of staff, and awareness campaigns. These activities, once coordinated effectively, could serve as a demonstration approach to enhance women's safety in public space and public transport. Since limited experience has been accumulated to date on this topic, a strong focus on monitoring and evaluation would be required to strengthen the emergence of replicable lessons.

Beyond infrastructure and service, Chennai has made limited use of digital solutions or travel demand management to optimize urban mobility. For a metropolitan area of this size, Chennai systems are still at an early

⁶²The Nirbhaya Fund was created in year 2013, by the Government of India, to be utilized for projects specifically designed to improve the empowerment, safety and security of women and girl children in public places. Chennai was one of the eight cities approved under the Union Ministry of Home Affairs to implement the program.



stage of development, as reflected by a score of 4 out of 4 on level of service, based on national service level benchmarks in the draft CMP. Urban mobility expectations of citizens are rapidly evolving and demand continuous quantitative analysis to optimize the planning, operation, and interface with users. While GCC launched several programs, such as an integrated command control center or an intelligent traffic and junction management system through its Smart City program, those are still in their initial phases of rollout and will need further enhancement to integrate with other agencies and achieve effective accessibility and mobility. Moving beyond the supply side of urban mobility, the city is also exploring solutions to manage demand, including through the finalization of a parking policy to regulate, enforce and efficiently manage the on/off street parking in Chennai. The range of travel demand management will increase in relevance as public transport quality improves.

4.3.2 Sector Specific Government Program ('p')

Strategic vision

Mobility in Chennai is at a turning point. A draft Comprehensive Mobility Plan (CMP) has been developed for CMDA by Chennai Rail Metro Limited (CMRL), using a consultancy, UMTC; the Chennai Urban Metropolitan Transit Authority (CUMTA) has been established and will have oversight over the finalization and implementation of the CMP and gradually over sector funding; the transport system includes a wide range of options such as metro, suburban rail, city bus and Intermediate Public Transport (three wheelers); large investments in highways and metro lines are underway; the suburban rail provides for a low-cost travel option; a number of pilots focusing on development of complete streets have demonstrated genuine opportunities for upgrading walkability and quality of urban space; buses operated by Metropolitan Transport Company (MTC) are achieving high passenger loads relative to Indian and international benchmarks; an electric vehicle policy and a draft parking strategy have been developed; and the number of cars is still limited. Together, these elements constitute a strong foundation to make mobility in Chennai far more effective.

The Government program aims to deliver a vision focused on desirable accessibility, sustainable mobility, equity in access, efficiency in service delivery, and safety, leading to reduced pollution and congestion (CMP 2019). Such goals align well with international good practices as captured in the Global Roadmap for Action (2019) of the Sustainable Mobility for All coalition of which the World Bank is party to.

The Government program builds effectively on the pressing issues identified under the draft CMP diagnostic (2019) and addresses the most central features to enhance mobility, namely integrated transportation services, leveraging of the bus network and walking (the two highest-used modes). The program emphasizes the need to: (i) develop the city with access in mind by linking the update of the CMP to the preparation of the Third Masterplan for CMA, concentrating complementary activities (job/housing) around mass transit corridors and stations⁶³; (ii) create neighborhoods with proper walkable space⁶⁴ and enhance safe walking across the city; (iii) enhance public transport infrastructure and services with a focus on diverse user needs including new innovative types of transport; (iv) enhance bus capacity and service quality, to invert the erosion in mode share in recent years, caused in part by insufficient bus services; (v) enhance metro line ridership through multimodal integration and further line expansion; (vi) adapt arterial urban streets, to improve the safe flow of people and decongest the city; (viii) leverage digital solutions to optimize planning and citizen-centric service delivery; (ix) enhance the safety of women in public space and public transport; (x) systematically address road safety; (xi) manage travel demand

⁶³ World Bank 2017. *Transforming the Urban Space through Transit-Oriented Development* World Bank: Washington DC

⁶⁴ World Bank 2021. *TOD Implementation Resources and Tools*, 2nd Edition, World Bank: Washington DC; World Bank 2020; *The Hidden Wealth of Cities: Creating, Financing and Managing Public Spaces* World Bank: Washington DC



with an initial focus on travel demand; and (xii) accelerate the uptake of e-mobility. The program would seek to ensure a more efficient use of scarce urban space and fiscal resources by taking a comprehensive approach to those dimensions and by engaging with citizens in the finalization of the CMP and the development of the masterplan.

The GOTN program recognizes the need to strengthen governance, institutions, and funding for integrated and resilient service delivery across all urban services, including mobility, as foundation to deliver such program.

Multiple agencies are currently responsible for urban transport functions, operation, and management of services in Chennai, and the same results in agencies working at cross purpose thereby creating confusion, inefficiency, and delay. Governance over urban transport activities has led to structural overlaps that hamper unified planning and integrated management of services in CMA. Reviving the decade old CUMTA and strengthening it to function as the key agency for coordination and delivery of urban mobility services and infrastructure is the need of the hour. In this direction, the Tamil Nadu Assembly amended the CUMTA Act in September 2020 to incorporate the Chief Minister as the Chairman of the authority. With the Chief Minister as Chairman, CUMTA will be able to address more effectively political economy issues across agencies and reach balanced decisions. CUMTA is now expected to play a major role in the overall transformation process and the way urban mobility and service delivery will evolve in the short and long term in CMA. Learning from the best international and domestic practice, the development of CUMTA will be undertaken in phases, gradually increasing its role in planning an integrated urban mobility system and aligning resource allocations according to the Operational Manual recently developed (Deloitte 2021). A staffing plan for CUMTA has been developed for each phase of development to provide the necessary day-to-day implementation, through its Secretariat.

The revised CMP is expected to serve as the core document for CUMTA when approving urban transport investments and services in Chennai. The draft CMP 2019 provides valuable analysis and recommendations but requires further calibration to align actions with objectives. In this regard, CUMTA will undertake wider in-depth consultations with the stakeholders to finalize and establish a plan that is collectively owned as a single vision for all urban transport interventions in Chennai. The process for engaging a consultant is in final stages with a final CMP expected by end 2021. The CMP revision would: (i) address the most pressing issues in the city with an established link between the proposed investments and issues to be addressed; (ii) leverage on underutilized assets - existing suburban (service type and availability) and metro rail (pricing), and ensure improved use of roadways (priority allocation to buses with bus priority lanes, junction treatment, roadside friction, role of streets in urban space); (iii) foster true integration across all modes of transport in terms of connectivity, service, ticketing and payments; (iv) contain a precise implementation plan; (v) allocate resources in line with mobility targets and targeted mode share to establish a causal link between the two; (vi) include adaptation measures to address climate and disaster risks; and (vii) integrate the mobility needs of women and the less mobile. The CMP will be updated regularly and CUMTA shall monitor and evaluate its implementation and outcome on a regular basis to provide suitable accountability, based on which the CMP shall be revised or updated in the future.

CUMTA will gradually be responsible for interagency coordination for all aspects of urban transport and mobility in Chennai. This will cover, to different degree, policy formulation, strategic planning and programming, regulatory aspects, oversight on project preparation and approval, oversight on project implementation, oversight on operations and management, and approach to finance, research and awareness raising. This will be a departure from the current fragmented approach (Table 19) characterized by a lack of coordination, the lack of formal mechanism to bring all agencies on a level platform, limited role of regulatory agencies in improving urban transport, overlaps and gaps in jurisdiction of agencies, and funding related challenges (Deloitte 2020). The new role of CUMTA will include the review of proposed expenditures for the sector, starting with new capital investments and operational expenditures in line with the CMP vision. It is also envisaged that the annual fund



allocation for urban transport would be gradually approved by CUMTA prior to being routed to the city agencies, equipping CUMTA with an effective instrument to steer sector transformation holistically.

Table 20. Functions of Different Agencies (Deloitte 2020)

Functions	Private Transport		NMT		Public Bus		Paratransit		Urban Rail	
	Central Agency	State/ City Agency	Central Agency	State/ City Agency	Central Agency	State/ City Agency	Central Agency	State/ City Agency	Central Agency	State/ City Agency
Policy Formulation	• MoRTH • MoHUA • NITI Aayog • DHI	• H(T)D/ MAWS/ HMPD	• MoHUA • MoRTH	• MAWS (GCC) • HUDD	• MoHUA • MoRTH • ASRTU • DHI	• TD • H(T)D/ MAWS/ HMPD	• MoHUA • MoRTH • DHI	• HUDD • H(T)D	• MOHUA • MOR	• TD • HUDD
Strategic Planning & Programming	• MoHUA • NIUA • MoRTH • DHI	• HUDD • MAWS (CMA) • HMPD	• MoHUA • IUT	• HUDD • MAWS • HMPD	• MoHUA • IUT • MoRTH • DHI	• TD (MTC) • HUDD	• IUT • DHI	• TD	• MOHUA • MOR	• SPV (CMRL)
Regulatory	• MoRTH	• TNP (CTP)	• IUT • MoRTH	• H (T)D (TC) • TNP (CTP)	• MoRTH • DHI	• H(T)D (TC)	• MoRTH	• H(T)D (TC)	• MOR	• SPV (CMRL)
Project Preparation & Approval		• HUDD (DTCP) • MAWS (CMA) • HMPD	• MoHUA • IUT	• MAWS (CMA) • HMPD	• MoHUA • IUT	• TD (MTC) • TD (IRT) • MAWS (CMA) • HMPD	• IUT		• MOHUA • MOR	• HUDD • PDSI
Project Implementation		• MAWS (CMA) • HMPD • TNPWD		• MAWS (CMA) • HMPD • TN-PWD		• TD (MTC) • TD (IRT) • MAWS (CMA) • HMPD			• MOR	• SPV (CMRL) • PDSI • MAWS (CMA) • HMPD
Operations and Management		• MAWS (CMA) • HMPD • TNP (CTP)		• MAWS (CMA) • HMPD • TNP (CTP)	• IUT	• TD (MTC) • TD (IRT)			• MOR	• SPV (CMRL) • PDSI • MAWS (CMA) • HMPD

4.3.3 Sector Specific PforR Program ('P')

The proposed PforR Program for urban mobility has been carved out of the overall government program by including four of the most urgent and critical elements to the transformation: (i) institutional reforms providing the foundation for integrated planning and management of urban mobility, combined with a finalized comprehensive mobility plan and holistic funding and financing approach to the sector; (ii) expansion in the quality and coverage of bus services based on a new five year business plan and performance-based contracting; (iii) demonstration program to enhance walkability through a pilot complete street program; and (iv) result-focused approach for the program on Women Safety in Public Space.

The four elements were selected based on strategic relevance, impacts on the most used mobility options, impact on women (whose travel patterns have been deeply impacted by changes occurring as a result of COVID-19), potential for replicability, and areas of value addition by the Bank. The Program excludes large investments financed through other sources. The first activity would establish the vision, governance and supporting funding approach that underpin the overall sector transformation, as a required first step in the overall government program. The second would put the main public transport option, bus services, back on solid footing after the COVID-19 impact. The third would deliver a proof of concept to the larger program to enhance safe walkability in Chennai. The last would enhance the safety of women in public space and public transport and establish a result-focus in the implementation of the Nirbhaya fund program, with replicability potential for other cities. Expansion of pilots could then be supported under downstream projects under the Chennai City Partnership. Extensive studies have been completed over the past two years on those topics providing a sound foundation to the program (Exhibit 4). Those studies drew on international and domestic examples and methodologies developed by the Bank on topics like urban finance or sector governance.



4.3.4 Technical Assessment of Key Pillars and Activities

The government's program on urban mobility seeks to strengthen the integrated policy, institutional, service delivery and financial framework for sustainable urban mobility and spatial development in CMA. The program would reflect feedback from citizens, collected as part of the development of the masterplan and finalization of the CMP, supplemented by State of Transport Surveys over a five-year period. The program would foster quality neighborhoods, stimulating walking and cycling, and effective integrated multimodal solutions for access and mobility across the metropolitan area. The transformation would engage all relevant agencies and foster digital governance and a data analytics system for mobility and spatial development. The proposed program **around the following three pillars** would focus on foundational urban mobility aspects related to institutions, performance-based contracting, and sector funding.

Pillar 1: Strengthening Governance and Institutions:

This pillar would support the introduction and application of metro-level transportation and planning authority reforms. Critical institutional transformation would include: (i) strengthening the capacity of CMDA to plan and oversee the development and implementation of the Third Masterplan and neighborhood plans; (ii) turning the concept of Unified Metropolitan Transport Authority (CUMTA) into reality, with capacity, staffing and oversight over urban mobility resources and service delivery and a mandate to facilitate multimodality; (iii) transforming the bus company into a world class organization; (iv) strengthening the capacity of GCC to plan, implement and scale up mobility initiatives requiring close integration like complete streets or parking management; (v) strengthening the effectiveness of road safety program to reduce fatalities and serious injuries caused by road crashes; (vi) strengthening the digital governance, capacity, platforms and solutions to support interagency cooperation; (vii) enhancing the effectiveness of the Nirbhaya program for women's safety in public space through a gender lab; (viii) supporting an integrated approach to electric mobility; and (ix) enhancing citizen engagement. The program would support a move to efficiency, transparency, and accountability by building the institutional capacity to use performance-based contracting backed by sustainable funding and monitored by information systems.

Pillar 2: Enhancing Service Delivery:

To support the mainstreaming and effectiveness of the reforms in Pillar 1, activities under this pillar would: (i) move MTC to performance-based bus service delivery aligned with the CMP, with COVID 19 green label compliance, quality standards and minimum occupancy targets; (ii) expand bus service delivery through performance-based gross cost contracting for additional bus services; (iii) develop mass rapid transit systems and in particular continue the expansion of the metro network; (iv) develop urban mobility corridors and enhance road safety; (v) consider contracting of other urban mobility services; (vi) support the development of complete streets fostering multimodality, including safe streets and urban spaces and utilities, from guidelines to design and implementation; (vii) support a comprehensive approach to decongestion on critical corridors; (viii) support adoption of the policy, standards and process for open data sharing for public transport (static and real time) and common payment systems; (ix) implement a parking management policy with private sector participation; and (x) develop public transport hub and electric mobility program through public private partnerships.

Pillar 3: Improving Financial Sustainability:



Performance-based contracting for transport services introduced in the second pillar will enhance efficiency but will only be effective if use of resources is transparent, funding of services is sufficient for long term sustainability and timely contract payments take place. In order to support this, the program will transform the way funding and financing of urban mobility projects takes place across the sector. New projects and a new urban transport fund will be placed under the approval authority of CUMTA, and by 2024, CUMTA will become responsible to approve the overall sector funding annually, providing an alignment between resources and targeted urban mobility and access objectives, building on citizen feedback. The approach will ensure that the combination between regularly adjusted fares, non-fare revenues and viability gap funding, covers the cost of efficient delivery, while leveraging on non-fare revenues. Fares will be reviewed from a multimodal system perspective to foster social, economic, and environmental progress. Multilateral financial institutions (JICA, ADB, AIIB, NDB, KfW) will continue to extend their support to metro development, ITS improvement, street improvement, resilience, and bus modernization.

This program would last until 2031 and cover all aspects of transport in CMA. At a sector level the projected revenues and expenditures for the sector would be as follows for the period FY21-31.

Table 21. Projected revenue and expenditures for Urban Mobility (Crisil 2020)

Summary (All values in Rs crore)		FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
I	Passenger revenue	537	1,237	1,635	1,795	1,982	2,197	2,397	2,744	3,033	3,600	4,154
II	Other mobility income	78	109	127	142	160	178	198	240	270	331	393
III	Grants/ Subsidy towards mobility*	981	1,119	1,271	1,370	1,403	1,491	1,612	1,740	1,846	1,993	2,144
	Revenue income	1,595	2,466	3,033	3,307	3,545	3,866	4,207	4,724	5,149	5,924	6,692
IV	O&M expense	1,324	1,797	2,014	2,190	2,423	2,604	2,969	3,348	3,698	4,335	4,785
V	Establishment exp.	1,633	1,821	2,118	2,302	2,542	2,746	3,022	3,258	3,511	3,834	4,019
VI	Interest expenditure	374	351	364	374	385	396	409	421	463	506	499
	Revenue expenditure	3,331	3,968	4,496	4,866	5,350	5,747	6,400	7,028	7,672	8,675	9,304
	Rev. surplus/ (deficit)	(1,736)	(1,502)	(1,463)	(1,559)	(1,805)	(1,881)	(2,193)	(2,303)	(2,523)	(2,751)	(2,611)
VI	Loan repayment	698	698	698	868	868	868	827	827	526	526	573
VII	Capital expenditure	2,472	2,577	7,291	7,378	7,478	7,651	7,727	7,719	7,830	7,972	2,049
	Agg. surplus/(deficit)	(4,906)	(4,777)	(9,451)	(9,805)	(10,152)	(10,400)	(10,747)	(10,849)	(10,879)	(11,249)	(5,233)



Table 22. Key Underlining Studies

Topic	Relevant Studies ⁶⁵	Comment
Institutional reform/CUMTA	Diagnostic Review and Report on Strengthening of CUMTA Act (Deloitte for WB 2020) CUMTA Operational Manual (Deloitte for WB 2021) Institutional Labyrinth: Designing a Way Out for Improving Urban Transport Services (2013) Unified Metropolitan Transport Authority – Operations Document (MOHUA 2016)	Systematic analysis of urban transport functions against domestic and international good practice and sequenced program of implementation. A global framework for urban mobility governance (strategic, tactical, operational). National guidelines on UMTA.
Urban Transport Funding	Overview of expenditure, financing, and funding for Urban Transport in Chennai (Crisil for WB 2020) Sustainable Urban Transport Financing from the Sidewalk to the Subway (World Bank 2016).	Systematic analysis of funding and financing across all modes and projection of requirements drawing on domestic and international good practice.
Urban Transport Planning	Final Draft Comprehensive Mobility Plan (UMTA for CMRL/CMDA 2019)	Analysis and recommendations for the overall transport program
Urban Bus Transport Improvement	Reimbursable Advisory Services for Improvement of Public Transport: Approach to a State Urban Bus Transport Strategy (World Bank/Transport for London 2020) Report on Review of Regulatory, Institutional, and Fiscal Policies (Efficient and Sustainable City Bus Service Project (India)) (MOHUA 2020)	Systemic approach to enhance sustainable urban bus transport services applied in the context of MTC in terms of approach and benchmarking. A detailed review of constraints to urban bus service delivery and recommendations to address those.
Chennai Complete Street Program	Planning Manual (GCC, ITDP 2020) Design Manual (GCC, ITDP 2020) Implementation Manual (GCC, ITDP 2020) Evaluation Metrics (GCC, ITDP 2020) Concept Reports for package 1-6 (GCC 2020) TOD Implementation and Resources (WB 2021)	Complete set of guidelines and detailed proposals for six packages of street development projects, including first phase pilots. Guidelines to implement safe design for complete street.
Women Safety in Public Space	Women and Mobility (Safetipin) Women and Transport in Indian Cities (ITDP) Why Does she Move? A Study of Women's Mobility in Latin American Cities (WB 2020) How to design projects to end violence against women and girls (UN Women 2015)	Analysis of challenges and solutions impacting women's mobility in cities in India and internationally and of program to address issues of harassment or access to opportunities stemming from public space and public transport service delivery.

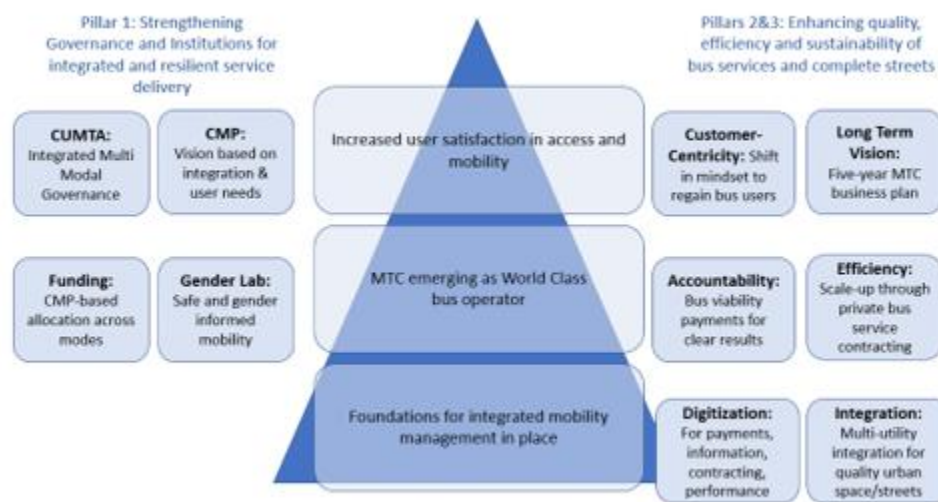
⁶⁵Those studies greatly benefited from the Government of Japan as the grant which financed those studies was received under the Japan-Bank Program for Mainstreaming DRM in Developing Countries which is financed by the Government of Japan, as part of the Global Facility for Disaster Reduction and Recovery



4.3.5 Sector Specific Results Chain

The Program is structured around the same three pillars as the overall Government program and builds on government decisions to strengthen urban mobility and its system of governance, leveraging on a strengthened CUMTA. The transformation is expected to be phased and embed lessons learned from one phase to another, in line with lessons learned internationally. The program includes incentives to institutions to transform, such as provision of transparent viability gap funding to MTC against achieving performance targets embedded in a multi-year business plan framework. Several studies launched during preparation, such as the CMP update, or the business plan for MTC, will also support engagement of stakeholders in the formulation of final solutions. The main beneficiaries will be citizens of CMA who will experience services better tailored to their needs. The focus will be particularly felt by income groups using public transport, walking, and cycling extensively.

Figure 19. PforR-supported Program for Urban Mobility



Pillar 1: Strengthening governance and institutions for integrated and resilient service delivery

The PforR activity under this pillar proposes to support the **strengthening of urban mobility governance and institutional mechanisms through CUMTA** to achieve greater user-centric impact and broad-based achievement of sustainable and resilience goals for the metropolitan area. Its design is based on a review of the existing urban transport system in Chennai, or national approaches to urban transport governance (17 UMTAs in place), and of international cases (in particular Transport for London, Singapore Land Transport Authority, Ile-de-France Mobilites). It builds on an international framework developed by the Bank (Institution Labyrinth 2013) and guidelines developed for the Ministry of Housing and Urban Affairs supported under the Sustainable Urban Transport Program (2016). It would empower CUMTA as a unified coordination and regulatory agency for urban mobility, with human and budgetary resources, as well as technical and financial capacity, with oversight on a growing share of urban mobility resources and support its leading role in finalizing the new Comprehensive Mobility Plan for the city through consultation. The budget elements for which CUMTA would have gradual oversight would be defined based on the sector analysis completed in 2020 as part of the PforR preparation.

The proposed approach to CUMTA development would be phased, reflecting a gradual increase in responsibilities over the sector and lessons learned in other Unified Metropolitan Transport Authorities (Deloitte 2020).



Preparation included the development of a detailed operation document for CUMTA covering geographical coverage, governing board composition, functions, organizational structure and staffing, and funding. CUMTA is expected to evolve through different maturity levels over the next five years and gradually broaden its role pertaining to policy formulation, strategic planning and programming, project preparation and approval, oversight on project implementation, operations and management, as well as regulatory, financing, research and awareness functions. CUMTA staffing would grow to 20 by year 2 and 40 by year 4 to fulfil its new responsibilities. The respective staff profiles have been outlined in the operational manual. GoTN has already taken critical decisions for phase 1 of CUMTA. Through the appointment of the Chief Minister as CUMTA Chairman, the Tamil Nadu Assembly elevated the decision-making capacity of CUMTA and enabled it to reach agreements across stakeholders in urban mobility more effectively. On December 30, 2020, the GoTN also issued a Government order to staff CUMTA with 13 staff, to launch the first phase of CUMTA activities. Both of those resolute decisions enable CUMTA to launch its activity effectively in 2021.

The PforR would also strengthen the **result-focus of the ongoing Women Safety in Public Space** program, through effective planning and coordination, leveraging on a new Gender Lab and active impact monitoring for results. The GoTN is keen to provide a safe environment for women and children and prides itself of being amongst the safest states in India. GoTN established a multi-agency Apex Committee and Steering Committee in 2019 to steer the use of resources from the Nirbhaya fund. Chennai was selected by the Government of India as one of the 8 mega-cities to implement such program. The Apex Committee chaired by the Chief Secretary includes Secretaries for Transport, Municipal Administration and Water Supply, Home, Social Welfare, as well as the Commissioners for GCC and for the Greater Chennai Police. Such high-level representation and the substantial budget resources allocated to program ensure its high visibility.

As part of the program, the Apex Committee will seek to develop the projects it oversees not as discrete interventions but rather as holistic and data-driven approaches, reflecting what has proven successful elsewhere. To that end, capacity will be built in a new Gender Lab to strengthen the integrated delivery of activities under the Women's Safety in Public Space program supported by the Nirbhaya Fund. Out of the total 13 projects already approved, eight are under various stages of implementation by GCC and MTC. Additional projects identified during preparation will be within the aegis of GCC, MTC and Transport Department. The program design will incorporate elements of design and implementation of effective interventions that have emerged internationally and in India.⁶⁶ The approach is structured along five pillars reflecting such lessons⁶⁷: (i) assess the ground situation; (ii) strengthen policy; (iii) build capacity and awareness; (iv) improve infrastructure; and (v) monitor and evaluate. Such approach recognizes that decreasing violence against women and girls requires a community-based, multi-pronged approach, sustained engagement with multiple stakeholders and a strong monitoring and evaluation framework.⁶⁸ The main risk factor is partial integration among the various sub-projects leading to more limited

⁶⁶ [https://www.whatworks.co.za/resources/presentations/item/699-what-works-to-prevent-violence-against-women-and-girls-presentation-3-march-2020 - Slide 10](https://www.whatworks.co.za/resources/presentations/item/699-what-works-to-prevent-violence-against-women-and-girls-presentation-3-march-2020-Slide-10)

<https://asiapacific.unwomen.org/en/digital-library/publications/2015/07/how-to-design-projects-to-end-violence-against-women-and-girls>

⁶⁷ <https://openknowledge.worldbank.org/handle/10986/33466>

<https://www.adb.org/documents/gender-tool-kit-transport-maximizing-benefits-improved-mobility-all>

<https://safetipin.com/report/women-and-mobility-report-english/>

<https://www.itdp.org/publication/women-transport-indian-cities/>

http://www.jagori.org/wp-content/uploads/2006/01/Strategic_Framework.pdf

⁶⁸ <http://documents1.worldbank.org/curated/en/820851467992505410/pdf/102114-REVISED-PUBLIC-WBG-Gender-Strategy.pdf> - Lessons learnt - page 28

<https://blogs.worldbank.org/transport/no-one-helps-nadie-me-hace-el-paro-preventing-violence-against-women-public-transport#:~:text=The%20name%20of%20this%20pilot,.%E2%80%9D%20Poster%20of%20the%20Campaign.>



impacts than what could be achieved otherwise. The December 2020 decision by the APEX committee to formally create a Gender Lab to support the program is expected to address this challenge.

Pillar 2: Enhancing the quality, efficiency, and sustainability of urban services.

The PforR activity under this pillar would support the GoTN's vision **of transforming MTC into a world class organization that meets the evolving mobility needs of Chennai and regains its lost mode share**. The proposed approach is aligned with two detailed technical analyses of urban bus service delivery (World Bank 2020, MOHUA 2020) that analyzed bus service provision in India and internationally through detailed case studies and outlined roadmaps for enhancing service sustainability. The vision will be anchored in a five-year business plan with progress and performance targets. The Program will entail an upgrade in the quality of services delivered, with universal access in new buses, improved coverage (with additional buses) and reliability, COVID-19 safe measures, use of digital ticketing, multi-modal passenger information system based on open data, renewed focus on non-fare revenues and improved funding mechanism to ensure long term sustainability. The program would allow bus transport, the public transport option for most, to recover from the COVID-19 period, restore service benefitting a large part of the population, and reduce on-board overcrowding.

MTC is the State Transport Undertaking (STU) in-charge of city bus services in Chennai and has a ridership of 3.1 million trips per day. With a fleet of 3,476 buses it is currently the second largest urban bus fleet operator in India after the Bengaluru Metropolitan Transport Corporation (BMTCL). MTC is also among the most efficient urban bus systems in India with a pre-COVID vehicle utilization of 280 km per bus per day, schedule adherence of about 91% trips performing as planned and a ridership of about 870 passengers per bus per day. However, MTC's share of total trips in the Chennai Metropolitan Area (CMA) has dropped from 39% to 22% over the past three decades due to a combination of reduced performance efficiency with an aging fleet and increased user preference for private cars and two-wheelers, compared to usage of overcrowded buses. Retaining the current mode share of buses and improving it further will require a transformation of the services offered by MTC to make them attractive enough for users.

MTC financial position is precarious as a going concern. Based on its 2020 Audit, MTC has a weak balance sheet, with a negative net worth of US\$1.4 billion to the state as shareholder as of 31.03.2020. The total liabilities of MTC exceeded assets by US\$1.09 billion. MTC also faced a shortfall of US\$520 million in pension contributions. Accumulated deficits and government loans to MTC with partial default (US\$75 million) are a form of implicit contribution of the GoTN as a sole shareholder of MTC, but this does not allow MTC to effectively plan its service delivery.

The PforR will enable this transformation by supporting MTC to improve their availability, accessibility and overall attractiveness compared to other private mobility alternatives. This will involve shifting MTC's focus from fleet procurement and operations to service delivery, based on a business plan that provides a transparent roadmap to reach their long-term goals in-line with the Comprehensive Mobility Plan (CMP) of Chennai.

Towards reaching the intended transformation, MTC will improve the internal efficiency of their operations to be tracked based on quantitative and qualitative indicators. The fleet utilization, i.e., percentage of total fleet operated per day is targeted to increase from 79% to 92% in two years. The staff hired per bus will be reduced from 6.2 currently to 5.7 over five years accelerating convergence towards other benchmarks in India (e.g. Bengaluru).

The relationship between GoTN and MTC will be formalized through public transport service contract (PTSC) including multi-year performance targets, with emphasis on staff performance, supported by multi-year budget plans and government funding. The use of PTSC would be novel in an Indian context but is now a standard practice



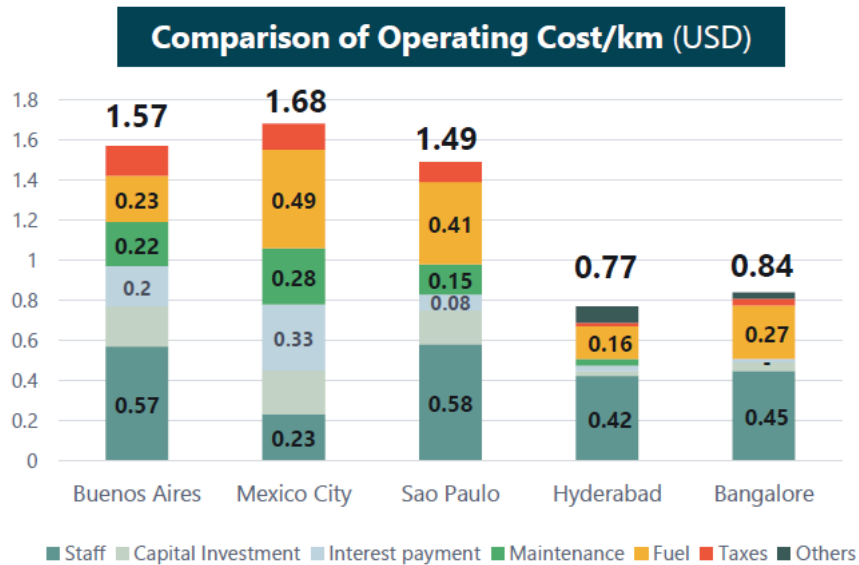
in other regions like the European Union, for services that are not privately outsourced. Those plans will emphasize norm-based performance for MTC and viability gap funding for contracted services. Viability gap funding covers the difference between the cost of efficiently delivered services and collected passenger revenue. MTC will procure services through quality-based gross contracts⁶⁹ equivalent to 1000 buses and put in place the mechanism for effective contract management (effective procurement, fair contract, mechanism for timely payment, penalties and incentive system), backed by a robust intelligent transport system. Those contracts are likely to be issued in smaller batches on a regular basis to stimulate competition. Such an approach has demonstrated cost effectiveness both in India and abroad but requires careful route planning to enhance effectiveness and minimize the need for viability gap funding, that the PforR would be supporting in the case of buses under gross cost contracts. The rollout of both types of contracts is expected to take place from 2022, once the business plan for MTC has been finalized and the supporting contracting environment has been put in place.

This new approach to service delivery represents a significant shift in the financial flows for MTC and provides a strong performance incentive by focusing resource allocation on the viability gap funding. At this stage, MTC generates its own revenues from service delivery and does not get direct budgetary support from the government on a regular basis, aside from regular contributions to part of the diesel cost and concessional fares and from occasional support for capital investments. Projections of costs and revenues with efficiency gains based on better performing peers have been used to estimate the viability gap funding associated with existing and additional services. Those will be further refined based on the five-year business plan being elaborated. The viability gap funding is expected to be lowered substantially with the PTSC (INR 37 per bus-km) compared to the expected evolution in the business-as-usual scenario (INR 61 per bus-km), through enhanced fleet utilization, increasing daily vehicle productivity and reducing staff cost per km, combined with enhanced ridership, although it would remain higher than the 2019 value (INR 28 per bus-km), as fares are rising slower than cost of delivery. The operating cost of US\$1.1 per bus-kilometer is relatively low compared to comparators from Latin America but rather high compared to high performers in India as shown on the graph below. The business plan is expected to combine a focus on improved quality of service and efficiency gains in delivering on this new mandate.

⁶⁹A Government Order amending the Tamil Nadu Motor Vehicles Rules, 1989 for hiring of stage carriage to enable the STU to run any private vehicle taken on hire on payment of fixed hire charges by obtaining a permit for such vehicle has recently been issued (Refer G.O(Ms). No. 261, dated July 29, 2020).



Figure 20. Comparison of operating cost per km



Source: Urban Mobility RAS (World Bank 2020)

The introduction of new contracting modalities will be accompanied by active engagement with stakeholders, during the preparation phase of such contracts (2021). The Program design maintains existing services under the aegis of MTC, to address potential concerns over job security for existing staff. The enhanced approach to service delivery and multi-year approach to budgeting would improve the financial standing of MTC and create new opportunities for staff that will be communicated during the development of the business plan.

The PforR would support the bus service transformation and capture it through indicators of share of MTC bus services delivered under contracts and of increased service availability (payment for additional contracted quality bus services).

The budget approach and DLIs under the PforR have been designed to gradually address the current financial weakness. At MTC level, the proposed contracting would shift the currently implicit support from GOTN to MTC to a formalized viability gap funding against service delivery with key performance indicators. For service extension, it would provide funding in ways that directly contribute to service delivery and ensure the viability gap of those services is backed by explicit government support to back those contracts. Both types of contracting will incentivize performance-based service delivery.

The PforR activity under this pillar would also support the **pilot phase of the Chennai Mega-street program (Quick Wins)**, which aims at standardizing the approach to develop Complete Streets through the transformation of about 11.6 kms of streets in Chennai. The Mega-streets program aims to facilitate seamless mobility for safe walking and cycling by upgrading public spaces and pedestrian environment in line with the 2014 Non-Motorized Transport Policy adopted by GCC. It builds on the success of 170 kms of bus route road transformation with safe and continuous footpath, provision for cycle lanes where possible, and a public cycle sharing system, as well as the integrated institutional approach for the Pondy Bazaar-Pedestrian Plaza. Chennai won several national and international awards for those past achievements, with strong ownership by the GCC commissioner, the GCC team of engineers and respective political leaders.



The Mega-street program focuses on redesigning and developing streets to be resilient, future ready and NMT friendly. It will incorporate key aspects of safe and green mobility, all key utilities (electricity, telecom, internet, water supply, sewage...), to enhance liveability, streetscape organization (vending and on-street parking) and resilience to floods and drought, in line with principles promoted by the National Smart City Mission. To this end, in February 2020, the GCC established and adopted a complete set of guidelines on planning, design, implementation and evaluation of complete streets in Chennai. Through integrated planning, all utilities and the streetscape will be implemented in a one-time project, with a full life cycle of 30 years, leading to efficiency gains and greater resilience to floods. Urban space, walking and cycling will be able to regain the space reflecting their share in overall urban mobility, and create safe space for women and universal access.

The PforR would support the implementation of the quick win projects as part of Phase 1 under the Mega-street program. The Phase 1 of the Mega-street program targets the central core areas of Chennai, the oldest neighborhoods, with a rich mix of uses, and leverage on transit accessibility. Phase 1 connects with school and parks and establishes a well-integrated walking and cycling network. GCC will engage deeply with the stakeholders to create space that would provide safe streetscape for all, underground utility functions and unique projects in each neighborhood. The PforR would enable the optimization of the institutional and design mechanism for the program implementation and focus on effective on-the-ground implementation in preparation for the Phase 1 scaling up. Detailed concept designs have already been developed by high quality design consultancy and been reviewed. The detailed design is in final stage of elaboration and used to validate the cost of activities based on quantities and established unit rates. The cost is similar to projects of the same nature undertaken in Tianjin, China. The balance implementation of Phase 1 program would be considered under the subsequent Urban Mobility and Spatial Development project under the Chennai City Partnership. The program main risk would stem from the careful need for interagency coordination and active engagement with citizens to successfully shape the interventions.

Pillar 3: Improving financial sustainability of urban services.

Overall, MTC is financially strained. Over the past five years, its operating revenues from passengers represented 73 percent of its operating expenses, including GoTN support for subsidized passengers and diesel (16 percent), while other non-operating revenues represented 2.6 percent. Farebox declined slightly over five years by 1 percent to US\$144 million in FY 20, under the pressure of competition from other modes, while operating expenditures grew at 4 percent over the period, reaching US\$ 274 million in 2020, leading to a rapid growth in annual losses, with an estimated deficit of US\$102 million including depreciation in FY20 (Crisil 2020). MTC losses accrue to GoTN as sole shareholder. The company has been incurring cash losses for the past five year and its accumulated losses exceeded paid up share capital and share advance by US\$1.41 billion, and the total liabilities of MTC exceeded its assets by US\$1.1 billion, leading its auditors to question the going concern nature of the corporation (MTC Audit report 2020). Over the past five years, the average implicit support in the form of accumulated loss translating in declining equity or new debt was estimated at US\$82 million annually. The financial position of MTC further deteriorated this fiscal year due to effects of COVID on bus service closure.

The Program supports MTC in moving up a ladder of capability and, simultaneously, improving service delivery. The current financial situation of MTC reflects a system in need of evolution. Bus fares in Chennai, like in most metropolitan areas, are set below the true cost of delivery for social, environmental, and political reasons and evolve irregularly. MTC makes limited use of non-tariff revenues. The GoTN implicit support as shareholder does not translate into the resources needed to continuously upgrade services and remain competitive, nor provide incentives to MTC to transform service delivery. This has led to decline in ridership impacting revenues. From a



broader policy perspective, MTC receives limited government support compared to other public transport modes considering the number of passengers it carries. The 2019 combined cost to GoTN per passenger remained very low at US\$0.011; about 32 times lower than the cost per metro passenger (CRISIL 2020). Regular GoTN direct support is primarily in the form of contribution to diesel cost and contributions to offset the discounted fares to some of the riders like students, based on state policy. GoTN supports occasionally capital expenditures in the form of fleet replacement.

Performance based contracting for the MTC introduced in the second pillar will enhance efficiency by introducing transparent use of resources, providing funding of services is sufficient for long term sustainability and timely contract payments take place. As part of the MTC modernization program under Pillar 2, the overall approach to funding of bus services would be adjusted. Contracting service delivery will bring efficiencies but requires full, timely and assured payments to be effective. The program would require annual audits to track the use of resources by MTC, underpinned by its upgraded intelligent transport system and sharing per annual performance reports. It would target an improved revenue recovery ratio. It would introduce regular increase in tariffs tracking the cost of service delivery, and consider options to introduce targeted subsidy, as required, for lower income groups. It would establish a predictable level of viability gap funding to ensure full coverage based on an approved five-year business plan. The approach will be gradual to allow a transition in resource formally committed by the state to MTC. The PforR would support the transformation to a transparent, accountable, and funded system of bus service delivery to be monitored through indicators.

The level of explicit GOTTN fiscal support extended to MTC will increase from around US\$56million on average for the past 5 years to US\$159 million, when considering the continued support to subsidized passengers and diesel (US\$44 million), the rollout of PTSC contracts with MTC, and the service expansion through gross cost contracting. This approach will make the implicit deficit of earlier period explicit (US\$82 million), but also translate in a large quantitative and qualitative enhancement of MTC services (50 million additional bus-kilometers per annum), with performance-based contracts incentivizing performance and payment for the viability gap incentivizing better planning of services for impacts.

While the Program aligns closely with the Government program, the changes it implies raise several political issues:

- a. The establishment of CUMTA will require a more holistic approach to funding and financing with impact on allocation for the different subsector. The use of a standardized approach developed as part of project preparation will allow for clarity of purpose in such allocation, with CUMTA, chaired by the Chief Minister, with representatives from all key ministries directing the allocations.
- b. Contracting of services for MTC will change the framework of interaction between MTC and GOTTN into a performance-based multi-year approach. It will also open up private sector provision of bus services under an MTC banner for service expansion. The approach will preserve the overall level of jobs associated with existing services, while unlocking efficiencies for additional services. As this will be a departure from the traditional approach, consultation with unions will be warranted by GoTN and MTC during the preparation of the contractual arrangements in 2021.
- c. Development of the mega street program and its pilot will transform the urban environment in those streets. Active consultation will take place to embed solutions for informal activities in those locations.

The Program also entails several risks that will be addressed through the Program Action Plan for Urban Mobility. The risks are substantial and:



- d. Without staffing CUMTA will not be able to lead the transformation envisaged under the Program. GOTN has taken a decision to staff the Secretariat with 13 staff, and a draft Operational Manual has been developed and is being consulted upon. By July 30, 2021, staffing of at least 5 technical staff and the operational manual should be in place.
- e. The transformation of MTC cannot work if a one-year forward look remains the norm. MTC shall complete its five-year business plan development (about to be contracted), and the transport department will define service obligations and secure viability gap funding for MTC through a Government Order by December 30, 2021.
- f. Contracting out of service under MTC will not be successful if proper system for contracting and monitoring supported by an IT solution are not in place. MTC will develop such system by December 1, 2021.
- g. Coordination across the Safe Women in Public Space Program may not materialize. The APEX Committee decision to establish a Gender Lab will allow such evidence-based team to facilitate the flow of exchange. The Core Gender Lab would be established by July 30, 2021 and complete the evaluation of at least three projects by December 1, 2022.
- h. Implementation of the mega-street pilot may be slowed by coordination challenges. A detailed operating procedure manual will be developed by July 30, 2021 of project to ensure effective coordination.

Table 23. Program Action Plan for Urban Transport

Action Description	Source	DLI / Results Indicator	Responsibility	Due Date	Completion Measurement
Transport					
CUMTA Board shall establish a Secretariat for Phase 1 and approve the CUMTA Operational Manual	Technical	DLI 2	CUMTA	30-Jul-2021	Establishment of Secretariat with appointment of at least 5 technical staff and formal approval of Operational Manual by CUMTA Board.
MTC shall complete its Business Plan development. Transport Department to define service obligations and secure viability gap funding.	Technical	DLI 6	MTC, DoT	30-Dec-2021	Business plan approved by MTC Board and Transport Department. Adopted Government Order establishing the process to define service obligations and viability gap funding methodology.
MTC to develop contract, procurement and ITS approach for gross cost contracts.	Technical	DLI 6	MTC	01-Dec-2021	Procurement of gross cost contracts ready to proceed with systems in place for procurement and contract monitoring.
Nirbhaya Apex Committee to establish Gender Lab	Technical	Improved SWM efficiency and safer streets	GCC	30-Jul-2021	Establishment of Gender Lab with core staff recruited.
GCC has established the detailed operating procedures to coordinate the rollout of the Mega-	Technical	Improved SWM efficiency and safer streets	GCC	30-Jul-2021	Operational procedure manual adopted by GCC covering all aspects of coordination across



street Program across agencies					agencies for the Mega-street program.
Completion and evaluation of three pilot projects for women's safety improvements in buses and public spaces	Technical	Improved SWM efficiency and safer streets	GCC	01-Dec-2022	Gender Lab pilots, completes and evaluates three projects for women's safety improvement in buses and public spaces

4.3.6 Sector Specific Program Expenditure Framework

Sector budget structure

Urban transport expenditure at about 1.8% of GDP in FY 20 experienced a sharp decline (in GDP terms) between FY 16 to FY 20. Capital expenditure remained at about 1% of GDP with metro investments dominating the share. Capex fell from Rs. 3651 crores (1.4% of GDP) in FY 16 to Rs. 3539 crores (0.9% of GDP) in FY 20 and averaged 1.0% of GDP during FY 16-20. As shown in table 2 and 3, metro-rail garnered a 64% share of cumulative capex for FY 16-20, and roads had a 27% share. Capex on MRTS and Suburban rail was 5%. Opex grew at a compounded annual growth rate (CAGR) of 6% from Rs. 2615 crore in FY 16 to Rs. 3270 crores in FY 20. MTC dominated opex with 60% share, followed by railways with 26% share.

Table 24. CAPEX for Urban Mobility by agency (CMA) (INR Cr)

	Consolidated Capital Expenditure - Rs. Crore	FY 16	FY 17	FY 18	FY 19
I	Capex by Agency	3,651	3,017	3,050	2,632
	GCC	1,153	254	228	378
	Smart city mission	-	0	0	27
	MTC	48	63	1	27
	CMRL	1,847	2075	2248	1730
	Highways	280	334	246	220
	CMA / Others	107	115	124	135
	Railways	216	175	202	115
II	Capex by type	3,651	3,017	3,050	2,632
	Interior roads	629	272	318	441
	Bus route roads	564	97	14	26
	Major roads - Highways	186	184.49	138.93	130.81
	Footpath / NMT	67	0	20	74
	FoB / Bridges / Grade separators - Highways	94	150	107	89
	Bus - MTC	43	60	0	26
	Bus related infra - MTC	5	3	1	2
	Metro rail	1847	2075	2248	1730
	MRTS	17	13	48	35



	Suburban	199	163	154	80
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Table 25. OPEX for Urban Mobility by agency (CMA) (INR Cr)

Consolidated O&M expenditure Rs. Crore	FY 16	FY 17	FY 18	FY 19
O&M by agency	1,319	1,571	1,538	1,646
GCC	53	201	84	21
CMDA	15	17	17	18
MTC	476	493	502	556
CMRL	21	36	58	109
Highways	29	30	33	37
CMA / Others	38	42	46	52
Railways	686	751	798	853
Salary, establishment, and admin expenses	1,296	1,362	1,581	1,628
GCC	55	58	64	73
CMDA	17	19	21	35
MTC	1168	1207	1403	1406
CMRL	40	60	74	92
Highways	8	9	9	10
CMA / Others	8	9	10	12

Revenue income of city agencies grew moderately at a CAGR of 4% from Rs. 2108 crore in FY 16 to Rs. 2459 crore in FY 20. Fare box revenue and grants from GoTN accounted for 54% and 41% share of revenue income respectively and between them contributed to 96% of all revenue income. Other mobility income had a 4% share. Steep fall in public transport ridership reflected inadequate focus on service quality improvement in the core public transport mode, bus transport. Fares in certain segments continued to be price sensitive with a 33% drop in traffic after a moderate fare increase by MTC.

The total financial support by GoTN towards supporting urban transport in the Chennai Metropolitan Area is made of two components: explicit support in the form of direct revenue grant support, capital grant and debt servicing; and implicit support. Direct revenue grant support represents the direct grants by GoTN towards urban transportation agencies. It includes diesel grants and student subsidy grants for MTC, attributable component of devolution grants (for GCC, and other local bodies), and budgetary grants towards meeting the plan and non-plan expenditure of railways and highways. Capital grant and debt servicing covers two categories: (i) direct capital grants and (ii) grants and funds to support principal repayment of the urban transportation agencies. In case of bilateral and multilateral loan financed projects, the direct capital grants estimate includes only the non-loan proportion of capex. Implicit revenue grant support includes the operating losses made by the agencies that are or will also be directly or indirectly supported by the Government through different mechanisms. This is specifically relevant of public transport agencies (MTC, CMRL, Railways). The implications for the Government may be in the form of lump-sum equity or grant support for current or future years. The



implicit revenue grant support is calculated by adding the revenue deficit of MTC and CMRL. It also includes the losses due to exchange rate impact of CMRL loans that are also borne by the State Government.

The sector received about INR3,143 crores of Government support in FY20 (or US\$430 m) in the form of revenue grant support, capital grant and loan guarantee support and implicit revenue grant support. The latter includes operating deficit in the case of MTC and CMRL, and interest or debt paid by MTC and CMRL which is funded by government grants and short-term loans. By comparison GOTN collected taxes on petroleum, vehicles and passenger and goods transport amounting to INR 6,333 crore in FY20 (US\$870 m), leaving the state with a substantial and growing sector level surplus (Figure 21) and indicate that the size of the program, while substantial, remains modest compared to overall sector funding and financing.

Figure 21. GOTN – Attributable Revenue and Expenditures (Crisil 2020) (INR Cr)

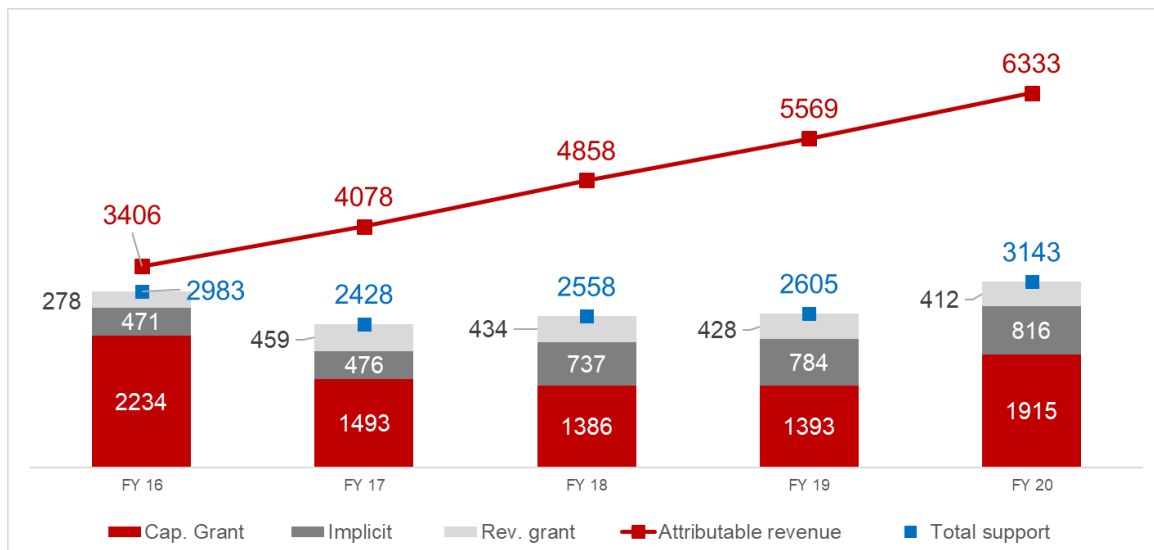
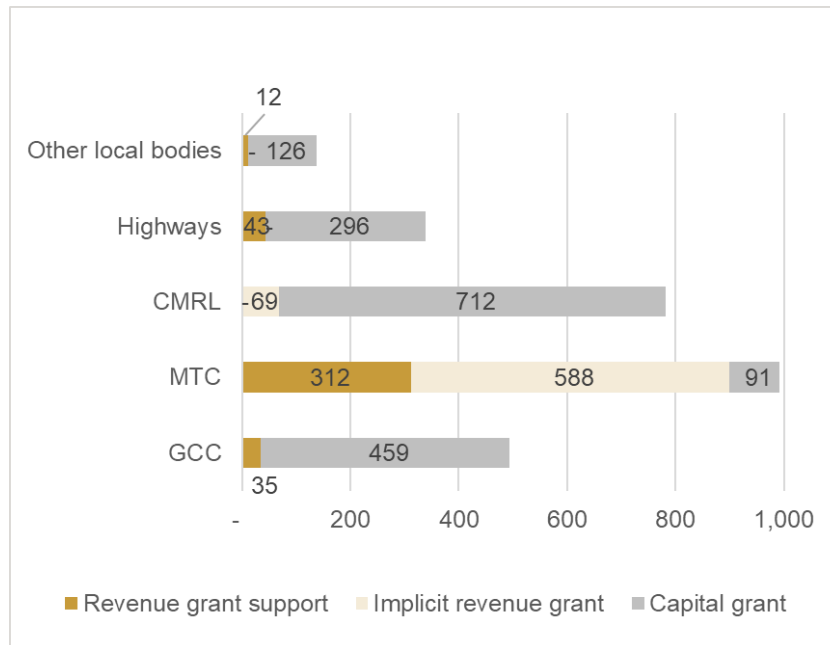


Figure 22 outlines the average annual GoTN contribution to capital and operational expenditures. When considering implicit and explicit support, MTC received the highest level of GoTN support in line with its dominant role in public transport in the metropolitan area, but a large part of this support was implicit, and did not translate in resources that could be invested in upgrading the quality of services and ensuring the competitiveness of its services. Comparatively, CMRL, which is still in its formative stages, received more explicit support, while carrying 30 times fewer passengers.



Figure 22. Average Annual GOTN Support– FY16-20 (Crisil 2020) (INR Cr)



The PforR- support program for the five-year period is estimated at US\$225.9 million with an underlying government program of US\$639 million. The Program cost includes the cost of establishment and operation, consultancies and capacity building for establishing CUMTA and the Gender Lab, capacity building, technical assistance and viability gap funding to MTC to transform service delivery and scale up bus services under performance-based contracts, infrastructure investments to develop pedestrian friendly streets. The proposed allocations under the Government program and the PforR are based on work plans designed to achieve the DLI and the overall results. The expenditures proposed for individual activities are commensurate with their scale and complexity and facilitates efficient execution. The Program Expenditure Framework strikes a balance between reform actions such as capacity building, recurring expenditure, and asset creation. Funding predictability is high, and risks to the Program Expenditure Framework arising out of budget constraints are considered moderate because the Program expenditure is well-aligned with the government priorities.

Table 26. Urban Mobility and Transport Program Expenditure Framework

Sn	Capex/O pex	Budget Head	Governme nt program ('p') - 5 years	PforR Program ('P') - 5 years			Additiona l direct GOTN cont.	Notes/Comments
				Govt. Funds	External Funds	Total		
CUMTA								
1	O	CUMTA Establishme nt and Operations	12.5	5.0	7.5	12.5	5.0	SECRETARIAT – ECONOMIC SERVICES (code 3451) HUDD- New Commitment



Sn	Capex/O pex	Budget Head	Governme nt program ('p') - 5 years	PforR Program ('P') - 5 years			Additiona l direct GOTN cont.	Notes/Comments
				Govt. Funds	External Funds	Total		
MTC								
2		Bus Service Delivery		-	-	-		Subsidy+deficit+cap ital grant 2019- 2020-under 3a and 3b with inflation US\$1088 m compared to proposed total of US\$1636 m in BAU
	O	3a. Service improveme nt from 3,700 buses to 4,700 buses including fleet augmentati on through GCC	145.5	73.5	72.0	145.5	73.5	New-Assumes GCC contracting with a 20 INR deficit (2021 value) per bus km for fleet expansion with 0,500,1000,1000 buses (inflation applied); 50% coverage by PforR)
	O	3b. Service improveme nt with replacemen t of old buses through PTSC	413.0					Reduced allocation compared to today- Assumes MTC contracting with a 37.1 INR deficit per bus km (including bus renewal) inclusive of inflation-BAU INR 61.5 per km over period 2021-2025. In 2019-20 INR28.5 per km on average. Does not account for COVID Impact. Assumes PTSC covers 10% of MTC buses in FY2022, followed by 30, 70 and 100% in subsequent years.
Total - Urban Mobility			571.0	78.5	79.5	158.0	78.5	



4.4 WATER RESOURCES MANAGEMENT and URBAN WATER SERVICES

4.4.1 Sector Context and Key Constraints

Water Security, Sustainability and Resilience Challenges

Chennai, the fourth largest metropolitan city, is one of the most water stressed cities in India. With 7.5 million population, the current water demand is 1,333 MLD and supply is about 800 MLD, which reduced to 525 MLD during the severe drought of 2018. Chennai currently uses diverse sources to supply water, including reservoirs (65%), desalination (16%), recycled wastewater reuse (10%), and ground water (9%). At least 50% of the water supply in Chennai is arranged by households and other customers through borewells /dug wells / tankers that are outside the supply network system of the water utility. The groundwater use is not regulated in Tamil Nadu and is being over-abstracted by industries, undermining the ability of households to meet their demand. The high reliance on surface water makes Chennai particularly vulnerable to the impacts of climate change. About 70% of the estimated sewage in the GCC Area is collected and treated through existing Sewage Treatment Plants (STPs). A large number of private lorries are engaged in disposing the sullage from the unconnected customers, which often gets dumped in lakes and streams. The gap in sewerage treatment capacity is estimated to be 20% when 135 LPCD will be supplied. CMWSSB has started programs for re-use of wastewater for industrial use. Currently, about 10% of the wastewater is being recycled. In 2050, the population in Chennai will reach 10.3 million and the water stress is expected to become much worse.

Paradoxically, Chennai is also affected by frequent flooding. The December 2015 floods were particularly severe. More than 500 lives were lost, over 1.8 million people were displaced, thousands were left homeless and damage to and loss of property was estimated at US\$ 3 billion.

Chennai is served by four river basins, Arani, Cooum, Adyar, and Kosasthalaiyar with a catchment area of 6,618 Sq km, referred as the Chennai basin. About 41 million m³ (MCM) per day of rainwater is received in the Chennai basin, on average during the winter monsoon, which translates into an average runoff in the Chennai basin of ~6.57 MCM/day over a 92 days period, equal to a total of 604 MCM. The Chennai basin supports nearly 4,100 water bodies with a potential storage capacity of 4,747 MCM that provide water to irrigated agriculture. Water supply in Chennai is drawn from four major reservoirs (Poondi, Cholavaram, Redhills and Chembarambakkam) with a total capacity of ~313 MCM.

A recent analysis⁷⁰ provides a better understanding of the root causes of Chennai's recurrent water shortages. Based on the available storage capacity in reservoirs that provide water to Chennai, harnessing and storing only ~42 percent (254 MCM out of 604 MCM) of winter monsoon runoff in the Chennai basin can fulfil about seven months (January–July) of Chennai city's water demand, covering the dry period (January–May) and buffering the impact of delayed monsoon onsets (June and July), while reducing floods at the same time. The paper argues that Chennai's water challenges do not arise from rainwater shortages or excesses, but from the suboptimal harnessing of runoff. The paper does not provide a better understanding of the reasons, but other sources have highlighted

⁷⁰ Nigam, S. Ruiz-Barradas, A. and Agniv Sengupta. 2021: The Chennai Water Crisis: "Insufficient rainwater or suboptimal harnessing of runoff?" *Current Science*, Vol. 120, No. 1, 10 January 2021 43.



unplanned urbanization, poor solid waste management, lack of maintenance and inadequate management of reservoirs as some of the underlying causes. These same reasons also account for Chennai's limited capacity to dispose of excess water and recurrent flooding.

Chennai's approach to addressing its water challenges has historically been based on infrastructure development. Several proposals for infrastructure investments have been developed that require significant financial outlays. The WRD has identified a number of investments, including intra-basin transfer and pumping, capacity enhancement of major tanks, formation of four riverine reservoirs / barrages and conservation of flood water and recharging aquifers. The total amount of the proposed investments is INR 3,956 crores (US\$ 540 million equivalent) and the amount of water that is estimated to be generated is 512 million m³, at a cost that varies between \$0.04 and \$2.86 per m³. Similarly, the Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB) is rapidly developing desalination and wastewater reuse plants to meet Chennai's water demand at a cost that varies between \$0.30 and \$0.60 per m³. Desalination plants of 200 MLD capacity are operational and 550 MLD capacity are proposed. Tertiary treatment-reverse osmosis (TTRO) plants for sewage reuse for non-potable applications are also being developed. Two indirect potable reuse plants each of 10 MLD capacity are under construction and four plants with a combined capacity of 260 MLD are planned. While these projects are expected to address water security issues by diversifying sources, they also increase the subsidy commitments (both capital and operating costs) of the GoTN. While numerous infrastructure solutions have been identified, lower cost options, including improved management of storage, reduction of Chennai's NRW of 50%, incentivizing more efficient use and reallocation of water from inefficient uses to urban water supply have received much less attention and their importance is downplayed, obfuscated by the perceived reality that the Chennai basin is running out of water.

Chennai is at a crucial juncture in addressing its water challenges. It can continue spending significant amounts of money to invest in the development of expensive storage or supply augmentation infrastructure. But development of more storage that will, in turn, be filled for only 56% does not constitute a proper use of public resources, nor does the development of desalination plants. Alternatively, Chennai can look at lower cost options, including demand management, reallocation of the savings that are the results of higher efficiency, reduction of NRW, better integrated management of storage, and evidence-based operations of reservoirs.

Pivoting towards demand management and reallocation of savings requires an effective institutional and legislative framework for water regulation. The State has made several attempts to promote water regulation, including the State Water Resources Management Agency (SWARMA). Yet, despite these efforts, water resources regulation continues to face several challenges to its effectiveness. Siloed decision making and investment planning is continuing, and little integrated cross-sectoral decision making is taking place. The challenges that Chennai's water resources regulation is facing include a combination of (i) insufficient mandate as advisory body without regulatory authority, (ii) membership at a too high level of seniority, as a result of which meetings are held infrequently or not at all, (iii) inadequate technical in-house expertise and reliance on outside knowledge, (iv) inadequate communication between the sectors; and (v) membership limited to a single institution.



Service Delivery and Operational Inefficiencies

Alongside floods and recurrent shortages in the supply of water to Chennai, the quality of WSS services is also declining. Rapid urban agglomeration along with significant multi-fold expansion in the service area of CMWSSB from 176 sq. km to 426 sq. km during the last decade has put a huge strain on WSS services.

Service Delivery

Partial coverage and alternate day supply: The average water supplied is 86 LPCD to about 50% residents against the benchmark of universal coverage and 135 LPCD. The water is generally supplied on alternate days for 2-6 hours duration, often supplemented by water tankers due to shortage in supply and the quality at the customer end is generally unknown. *Untreated sewage pollutes surface water:* Water shortage problems are further exacerbated by environmental degradation since only 70% of estimated sewage generated in GCC area is collected and treated at the city's 13 Sewage Treatment Plants (STPs). Any surplus sewage is drained into the nearby natural water courses of the city viz. Cooum river, Adyar river, Buckingham canal and Otteri Nalla.

Operational Inefficiencies

Absence of metering, flat tariffs, high Non-Revenue Water (NRW) and low O&M cost recovery: Less than 5% of the service connections are metered and most consumers are paying a monthly flat rate of Rs 80. Although a volumetric tariff system exists, there is no rationale for the multiple slabs, making the tariff system complex. The tariff is not revised on a regular basis with no indexation. Further, the cross subsidization has led to overtly high charges for commercial customers, who drop out of the system, resulting in loss of revenue generating customers. High NRW and inequitable distribution continue to affect the distribution network in the core-city. *O&M cost recovery through user charges is about 50% and zone-level information is not available.* There is inadequate asset planning and maintenance although pipe network is old, requiring massive rehabilitation works.

Lack of Energy Efficiency and Water Audit Measures: There is absence of energy or water audits to assess the present water and energy efficiency of the system. *Service delivery contracts:* There is absence of performance-based contracting and business models for outsourcing of O&M to private contractors. The CMWSSB does not have an e-procurement policy and follows the traditional procurement processes. The CMWSSB has a master plan but the plan does not address integrated actions, identification of the resources required, or clear targets for the staff.

Adequate incentives to improve the quality of services are missing. Performance-based financing mechanism that would reward good and penalize poor performance is not in place. Service delivery targets and regular reports on key service performance indicators are not being prepared. There is a basic monitoring and evaluation system with limited use of digital technologies. Although established protocols for customer grievance handling are in place, the record on addressing customer grievances is mixed, and transparency in addressing grievances is limited with no systematic public disclosure. Citizen report cards are not published. Tamil Nadu's potable water service delivery is locked into a vicious cycle of poor service delivery, a public perception that water is a "free social good" that the government needs to provide, and inadequate cost recovery. Transparent information on the amount of subsidy and capital grants that are being provided to keep WSS service delivery afloat— may not clearly be perceived and appreciated by the customers.

Outdated Water Policy, Fragmented Institutional Responsibilities, Lack of Customer Accountability



Despite the significant surface and groundwater challenges, Tamil Nadu has not yet adopted a comprehensive water legislation. Groundwater regulation (based on a Government Order) is in place in Chennai district, but groundwater in other parts of Tamil Nadu, including Chennai's suburbs, is withdrawn without adequate regulation. Similarly, Tamil Nadu's State Water Policy has not been updated since 1994, despite the important changes that have happened since, including the sharp increase in groundwater use, climate change and declining water quality. The key gaps in the existing policy are clarity in institutional responsibilities, coverage and service delivery targets, key performance indicators, enforcement mechanisms, investment plans, etc. Various policies and guidelines are independent and fragmented, issued as individual advisories and Government Orders, and on an ad-hoc basis. In general, there is a gap between the policy intent and its implementation.

Water programs are spread across multiple agencies with fragmented responsibilities. CMWSSB owns, operates, and maintains the WSS services of the GCC area. The WRD is responsible for the development, operation, and management of surface water sources outside the city of Chennai, and releases water to the CMWSSB to treat and supply to the consumers. WRD also develops storage capacity to store water coming from other basins like water supply from Krishna river in AP etc. SWARMA is serving as a state-level advisory body to the Government and provides recommendations for any policy decisions regarding water resources, water tariffs, and sectoral allocation for bulk users. The Institute of water Studies (IWS) is responsible for conducting water budget studies. The Groundwater Department (GWD) is responsible for monitoring groundwater data across the state. Reservoirs located within Chennai city are the responsibility of CMWSSB. Other critical city level agencies are (i) the GCC, responsible for civic services in the city, including management of storm water drainage. It has ceded the water and wastewater responsibility to CMWSSB. However, GCC still collects property tax which includes a share for water services; (ii) the Public Works Department (PWD) that also houses the WRD, (iii) the Tamil Nadu Pollution Control Board (TNPCB) and (iv) the Chennai Rivers Restoration Trust (CRRT). Water sources are owned by WRD and GCC, and CMWSSB has no responsibility for modalities for access, protection, and source augmentation of these sources. These institutions are also facing capacity constraints in carrying out their mandates. CMWSSB is lacking in institutional development and business plans, service delivery and performance indicators. The climate-related responsibilities are dispersed but not coordinated between urban planning and water handling bodies, resulting in inadequate attention to declining ground water tables, sea water ingress, erratic rain patterns, etc.

CMWSSB Governance Arrangements

The CMWSSB was set up by an Act of the Tamil Nadu state legislature with the mandate for providing WSS services within CMA. The CMWSSB is currently responsible for developing, managing, and operating WSS assets and for provision of WSS services within the areas under GCC limits. *Governance:* The CMWSSB is governed by a Board of Directors with the Minister for Municipal Administration, Rural Development, and Implementation of Special Programs as the Chairman of the Board. *Organization:* The CMWSSB organization is led by a full-time Managing Director and is managed under three departmental heads, the Technical Director responsible for projects, Executive Director responsible for operations and maintenance, and the Finance Director who handles finance, accounts, and administration. CMWSSB functions as a parastatal agency managed under the MAWS department of GOTN. The Board of Directors overseeing the functioning of CMWSSB comprise only of representatives of GoTN and/or government functionaries/heads of other Chennai agencies including GCC and CMDA. The CMWSSB Act 1978 does not have a requirement for Independent Directors on the Board.



CMWSSB faces a number of limitations with respect to its organization, with the following major gaps: (i) limited HR capability including a staffing norm-based organization rather than capabilities / centers of excellence driven set-up, (ii) lack of a strong Information Technology capability and organization, (iii) need for a strong central project management team along with revamped procurement (including e-procurement) and strengthened contracting documentation capabilities, (iv) ineffective O&M function organization without adequate IT tools, (v) low customer centricity and (vi) inadequate focus on revenue mobilization and enhancement. Areas of strengthening from a governance and institutional perspective are as follows:

A service delivery charter articulating threshold service level benchmarks and targeted improvements.

A clear tariff and subsidy policy that spells out cost recovery, and subsidy principles and enables financially sustainable service provision.

Independent governance through greater delegation of powers for investment approvals and tariff regulation through induction of Independent Directors on the Board.

A revamped organization, with commensurate up-dation of service rules, staffing norms, sanctioned positions, and performance management processes; and

Migrating to information technology and digitalized processes and a SCADA based acquisition, and monitoring of information on assets and service delivery.

Financial Sustainability Issues

The operational costs are met through a combination of user charges and water and sewerage taxes. The GoTN grants and subsidies cover the O&M cost of desalination. Although tariffs were increased in 2018 after a gap of over 20 years, the user charges recover less than 50% of the operating costs. A detailed financial analysis has been carried out for the 'business as usual' vs. increases in 'metering' and 'tariff' scenarios. The analysis shows that GoTN financed subsidies will be required for the business as usual scenario, increasing from USD 39 million in FY 20 to USD 158 million by FY 26. In addition, revenue through user charges needs to increase by at least 50% over the next five years to meet 100% O&M cost recovery, even after factoring the GoTN grants for the desalination O&M costs. Options for various combination of revenue grant and increase in user charges are possible based on how much revenue grants are affordable by the GoTN and how much increase in tariffs is politically acceptable.

4.4.2 Sector Specific Government Program ('p')

The Vision Tamil Nadu 2023, formulated by GoTN in 2012, outlines the strategic development priorities and provides the overarching framework for transforming Chennai as a world class city. Chennai is poised to emerge as a mega polis with its population expected to cross 10 million during the next decade. This scale of urban growth coupled with expectations of a vastly improved quality of life of aspirational residents is creating additional demand for services. Ushering in water security through a comprehensive, holistic planning and development of water resources (including surface, ground water, reclaimed water and desalinated water) and provision of universal WSS services including metered continuous supply and sewerage services in an ecologically and financial sustainable manner is a critical pre-requisite to realize this ambition. Vision Tamil Nadu 2023 identifies investment to improve water and sewerage services in Chennai with the following goals: (i) Provision of 135 LPCD piped water



supply across all parts of Chennai and achievement of service level benchmark (SLB) norms as outlined by Ministry of Housing and Urban Affairs (MoHUA) by 2022, and (ii) Provision of sewerage access across Chennai and achievement of MoHUA's SLB norms for sewerage in Chennai by 2022.

The Vision 2023 also emphasizes the importance of an effective framework for water resources regulation to preserve the State's rich environmental resources, including groundwater, rivers, reservoirs and other water bodies. In response to the increasing competition over a scarce and more volatile resource as a result of climate change, and as part of its efforts to reduce flooding and mitigate droughts, the State wishes to strengthen capacities, promote stakeholder involvement in planning and decision making in water resources, improve information and ensure that investments in water security are based on sound evidence.

Water Resources Management - Government program (p)

The WRD aims to reduce flooding and droughts, strengthen climate resilience, and address the growing competition over water through the implementation of comprehensive flood mitigation and water conservation measures, adoption of effective policies and implementation of institutional reforms. Specifically, the Department aims to address the combined challenges of a critical short fall in water supply, urban flooding, and groundwater depletion by improving the integrated management and development of water resources. The WRD intends to achieve its objectives in a cross-sectoral manner. To that end, the Department wishes to play a lead role in bringing stakeholders together, identifying priority policy measures and defining effective institutional arrangements. The Department also recognizes that the proper management of the State's reservoirs requires an integrated approach that is based on high quality data, irrespective of the vocation or ownership of the reservoirs, in order to make the most out of the hydraulic hardware.

The Department has a historic mandate for maintaining and developing structural and non-structural components of irrigation and drainage facilities, and for effectively managing, efficiently utilizing, and equitably distributing irrigation water. However, with close to 95% of the area potentially irrigable developed for irrigation, with competition over water resources and the impact of climate change increasing, and in view of the Tamil Nadu Vision 20203, the Department's priorities have been broadened and include:

- a) *Efficient management, utilization, and distribution of scarce water resources among water users:* The Department aims to promote efficient water use and allocate water resources among all water users in a participatory manner. It intends to introduce water accounting and water auditing to monitor actual withdrawals and use. As part of these efforts, the Department is strengthening its network for water data collection.
- b) *Promoting and coordinating the integrated management of water resources:* The Department recognizes that an integrated multi-sectoral approach to the management of water resources is required. The Department intends to play a convening role that is in accordance with its mandate.
- c) *Identifying and prioritizing investment opportunities in water resources:* The Department will identify investment opportunities to improve the water security in Chennai. It has reorganized itself along river basin boundaries and has adopted a river basin approach to identify and prioritize investments. The Department also wishes to ensure that investment opportunities are prioritized according to clear and transparent indicators and intends to undertake an options assessment to identify and prioritize water security options.
- d) *Adoption of appropriate policy measures and institutional arrangements:* The Department recognizes the importance of effective institutions and policies to help identify and implement options to improve water



security in Chennai. The Department prepared a groundwater act in 2003 but it was repealed in 2013. Since then the GoTN has adopted a Groundwater Government Order in the three districts that are most affected by declining groundwater tables. The Department wishes to prepare more comprehensive surface and groundwater regulation.

- e) *Operation and Maintenance of Irrigation Systems:* The Department has a mandate for the operation and maintenance (O&M) of large-scale irrigation systems across the State and in the Chennai basin. It has introduced participatory irrigation management (PIM) to strengthen stakeholder involvement in O&M and recover some of the O&M costs.

Water Supply and Sanitation – Government program (p)

The CMWSSB has a strategic plan to develop water resources for the next 30 years through a combination of surface, desalination, wastewater reuse, and ground water sources, to address the depleting capacity in the existing reservoirs. The CMWSSB plans to increase water supply from the present capacity of 1,333 MLD to 1,640 MLD by 2025 and 2,178 MLD by 2050 to meet the requirements of the GCC Area. It also plans to expand capacity to 3,746 MLD by 2050 to meet the requirements for the CMA, as per the Master Plan. Following are the key programs and activities being taken up by the GoTN / CMWSSB over the next five years:

- a) *Program for NRW reduction, metering, and water supply service improvement in the core city area* (\$ 220.9 m over 10 years): The GoTN is supporting service delivery improvement program in the core city area through NRW reduction, providing metered connections, and creation of District Metered Areas (DMAs) for better supply management. This program will help in water auditing, pressure management and improved services for meeting the Service Level Benchmarks (SLBs) as defined by the GoI. The CMWSSB also plans a gradual phased approach for rehabilitating the old infrastructure for improved services. The CMWSSB plans to implement performance-based contracts in place of the conventional time and material-based contracts.
- b) *Program for NRW monitoring in bulk water transmission and wastewater systems* (\$ 10m over 5 years). The CMWSSB is planning to improve NRW management in bulk water transmission and wastewater systems for addressing the water availability issues. The CMWSSB is planning to install bulk water meters to monitor flow of water supply from sources to the treatment facilities, pumping stations and the distribution reservoirs. Coupled with SCADA system, the entire bulk water system will be monitored for physical losses of water in the system, energy efficiency of pumps, measurement of flow, pressure, and quality parameters. This will help in better distribution management and decisions on investments to reduce the NRW. The CMWSSB is also keen to measure wastewater flows at various critical points for quantity and quality parameters. This system will provide a decision support system to improve services and guide future investments. This will also help in integrating reservoir management with the demand for water supply and increasing resilience to climate change related impacts.
- c) *Program for metering high volume customers* (\$ 1.3m over 5 years). While water meters are being planned for all customers in the core city area, there is an urgent need to discourage wasteful use of water by commercial and large domestic complexes that use high volume of water. This will help in increasing revenues from the high-water using customers and also savings for distribution to other customers. This work is expected to be completed by end of 2021.
- d) *Program for increasing water and sewer house connections in added areas* (\$ 61 M over next 5 years). The 42 added areas need to be provided with the same levels of WSS service as in the core city. The CMWSSB is taking up programs to provide access to improved WSS services in the added areas which are already covered with water supply and sewer networks. The house service connections are lower in these areas than the desired levels mainly due to requirements of the customer obtaining permissions from GCC / State Highways/



NHAI, etc. There is potential for providing 253,000 water supply connections and 203,000 sewer connections over the next five years. The CMWSSB is preparing a program to fast track the last mile connections with reduced documentation, flexible payments options, and easy processing of documents for the connections.

- e) *Program for expanding water and sewerage network coverage in added areas* (\$ 398 M over 10 years). The CMWSSB is investing in all the 42 zones to provide water and wastewater services. In several areas, water and sewer networks have been commissioned while work is in progress in other areas. The CMWSSB is preparing a program to cover 15 added areas for achieving near universal sewerage coverage in Chennai city. The program includes extension of sewer connections up to the boundary of the customer property and extending sewer networks to existing Sewerage Treatment Plants.

4.4.3 Sector Specific PforR Program ('P')

Water Resource Management – PforR Program (P)

The PforR emphasizes three priority areas: (i) knowledge base, capacities, and tools to identify and prioritize investments in water security, (ii) water regulator for effective cross-sectoral coordination between stakeholders in the water sector, and (iii) investments in resilient watersheds.

Pillar 1: Strengthening governance and institutions for integrated and resilient service delivery

Under the *first priority area*, the Program will undertake a water security options analysis that would identify and prioritize measures and investments to strengthen the water security of Chennai. The options would include investments but also reallocation and improvements in the management of water resources. The assessment will, for each of the proposed measures, validate the amount of water that can be unlocked and determine the associated costs and the reliability of supply. The assessment will then prioritize the proposed (suites of) investments according to the reliability of the supply and the costs per m3 of water mobilized. The water security options analysis would leverage several studies that have identified investment opportunities and provide the inputs for the preparation of a follow-on investment operation in water security in Chennai.

The more than 4,000 water bodies that the Chennai basin boasts could contribute in a more effective manner to flood reduction and drought mitigation when managed and operated in an integrated manner. The Program will develop and implement a Decision Support System (DSS) for the management of cascades of reservoirs in the Chennai basin. The Program will support WRD's efforts to improve the extent, quality and accessibility of water resources data, as well as facilitating to collect, process and share of hydrological data among stakeholders in the water sector. The Program will also strengthen capacities of staff in the management and development of water resources, and in the use of modern technologies, including water accounting and auditing and the use of remote sensing for water resources planning.

Under the *second priority area*, it is recognized that the implementation of demand management and reallocation measures requires an effective institutional, policy and legal framework. The results include the preparation of a Surface and Groundwater Act and the establishment of a Surface and Groundwater Regulatory Authority for coordination between water sector institutions in the area of water resources planning and decision making. The Authority would have the following responsibilities:

- Undertake strategic studies on WR management and development in the Chennai basin
- Oversee development of decision support tools for the management of cascades of reservoirs
- Identify options and priority investments to strengthen water security in Chennai



- Determine criteria for water allocation and for bulk water tariffs for various users
- Review and clear water resources investments
- Serve as an appellate authority for water disputes
- Promote and preserve water quality
- Promote water conservation

Under the *third priority area*, the Program will invest in resilient watersheds so they can play a more effective role in flood reduction and drought mitigation. The proposed investments are priority low-cost options, including increasing the conveyance capacity of feeder canals, in-stream water storage and desilting of reservoirs. These investments have little to no negative environmental or social impacts will help reduce the gap between potential and actual available storage and capture a larger proportion of runoff flows during the winter months.

Water Supply and Sanitation - PforR Program (P)

The GoTN is committed towards building capacity of CMWSSB for providing WSS services that are cost efficient and accountable. The PforR Program supports the shift in orientation from infrastructure creation to service delivery and building resilience for efficient and accountable services.

Pillar 1: Strengthening governance and institutions for integrated and resilient service delivery

This Result Area is achieved through two DLIs on enhancing water security and transitioning to e-procurement. The DLI on enhanced water security would support CMWSSB and WRD to plan and prepare for meeting the future water demand of the population. This DLI would support the WRD and CMWSSB to adopt a mechanism for water resource development, management, long-term planning, along with prioritization of the 'use' of water sources, including surface water reservoirs, desalination, tertiary treated water, ground water sources, etc., building climate resilience and disaster management. The preparation of the water security and optimization plan will promote water conservation (including metered billing, groundwater recharge through rainwater harvesting, and awareness creation), reduction in NRW, and recycling / reuse actions. The focus of this policy is on water security including waste-water reuse, demand management (bulk/ customer metering, digitalization, service delivery, disclosure, and improvement). The CMWSSB will establish a dedicated team to coordinate with WRD in preparation, roll-out and monitoring of the plan, including establishing a water security cell.

The DLI on transitioning to e-procurement will enhance efficiency and transparency of public procurement, facilitating a shift from conventional procurement of works to procurement of all works and services (above a certain threshold value) on an e-procurement platform for e-tendering. The CMWSSB will prepare an e-procurement policy and shift in a phased manner to 100% conformance of its e-procurement targets, as per its e-Procurement policy.

Pillar 2: Enhancing the quality, efficiency, and sustainability of urban services.

This Results Area would be achieved through a phased improvement in service levels over the program period and is achieved through actions across two DLIs: (i) improved operational efficiency and (ii) improved service delivery indicators. The DLI on improved operational efficiency supports CMWSSB in improving the operational efficiency of water supply service delivery and overall service standards. The CMWSSB will establish a framework for performance-based contracting as well as adopt a phased program for metering to reduce NRW. The key activities include: (a) *Performance-based contracting of a private sector partner with agreed service delivery parameters for improving service delivery.* The contract is expected to be awarded by year 2 of the program period. (b) *Adoption of universal metering*, starting with the bulk supply points, commercial and high-rise residential, followed by individual house service connections in a phased manner during the program period.



Apart from the comprehensive system improvements envisaged through the metering and digitalization initiatives, the CMWSSB will also initiate reforms to strengthen the quality and accountability of service delivery improvements. The key activities include *tripartite agreement on service delivery performance between GoTN, CMWSSB and GCC* to improve accountability in service delivery. Key areas of commitment under the agreement will include *targets for phased improvement of services* in duration, volume and quality of supply at the customer end as well as tangible reduction in NRW in select zones and areas of the city; *establishment of two independent directors on CMWSSB Board* for ensuring greater transparency and improved service outcomes; *annual publication and disclosure of customer report card* to enhance the quality of customer feedback, effective grievance redress and strengthening the feedback loop in improving performance; and *establishment of working arrangements between GCC and CMWSSB* to ensure greater coordination between the agencies.

This Results Area also supports a *phased increase in the number of water supply connections* for assured water supply. The CMWSSB will ensure at least 5% additional households gain access to assured water supply every year. The standard of water supply is defined by the hours of supply. The CMWSSB will be incentivized for improvements over and above the 5% additional targets envisaged every year.

Pillar 3: Improving financial sustainability of urban services

This result area focuses on supporting financial sustainability of CMWSSB through improved phased improvement in cost recovery from user charges. In FY 20, user charge collection accounted for a mere 39% of net O&M costs after adjusting the subsidies provided by GoTN. A phased increase in user charge revenue to 100% of net O&M cost by year 5 of the program period is envisaged. This is planned to be achieved through (a) expanded coverage and improvement in services (b) a phased shift to volumetric billing, (c) improvement in collection efficiency, and (d) timely and periodic tariff rationalization.

4.4.4 Technical Assessment of Key Pillars and Activities

Water Resources Management

The PforR Program supported by the Bank complements the Government's program by focusing on the knowledge base, capacities and tools for water security, and investments in resilient watersheds, planned for the next five years and comprises the following key activities:

- (i) *Investments in hydrological data monitoring and management* (US\$ 2.1 million): support to the collection and management of water resources data, that will bring all hydrological together and make it accessible to stakeholders in the water sector.
- (ii) *Water accounting/auditing in the Greater Chennai Area* (US\$ 0.41 million): introduction of water accounting and water audits to monitor water use and water withdrawal in the Chennai basin
- (iii) *Establish a cascade operation system* (US\$ 2.1 million): development and operationalization of a decision support system (DSS) for the management and operations of cascades of reservoirs in the Chennai basin.
- (iv) *Investments in resilient watersheds* (US\$36.6): investments in resilient watersheds to increase the capture of runoff into storage, including increasing the conveyance capacity of feeder canals, in-stream water storage and desilting of reservoirs.
- (v) *Strengthen capacity of WRD staff and other stakeholders* (US\$ 0.68 million): strengthen capacities of staff in the management and development of water resources, and in the use of modern technologies, including water accounting and auditing and the use of remote sensing for water resources planning.

Water Supply and Sanitation



The PforR Program (P) supports the Government's program by focusing on service delivery improvements in identified areas of the core city and the added areas for the next five years, and comprises the following key activities:

Water Supply service delivery improvements

- (i) *Water supply service delivery improvement in Zone X and XIII.* An operator will be engaged on performance-based contract in two zones, to enhance supply levels through NRW reduction, metering, distribution network improvements, creation of District Metered Areas (DMA), and demand management. The Program will benefit 1,89,360 connections, including 4,233 new connections in these two zones. All connections will be metered with volumetric tariff and services will be improved by zone level service operators. This will reduce NRW to a desired level at the distribution level.
- (ii) *Monitoring of NRW:* The Program will contribute to monitoring of NRW in the entire city, with improved monitoring of flow and losses, by installing meters for bulk water transmission lines and wastewater system, supported with SCADA use IOT based systems to measure quality and energy efficiency of pumps.

Water and Sewer Improvements in added areas

- (iii) *Extending sewer network in unserved added areas:* 17 added areas need sewer networks to achieve near universal sewer coverage in Chennai city. The Program will cover five areas and the investment will include household connections to the sewer network and transmission to the existing Sewage Treatment Plants. This will benefit about 250,000 population.

Technical Support and Consultancy

- (iv) The Program will also support hiring consultants and agencies for technical support and capacity building for activities like reducing NRW, reuse of wastewater, improving demand management programs, adopting performance-based contracts, improving M&E systems, innovative financing models, improving energy efficiency, etc.



4.4.5 Sector Specific Program Expenditure Framework

Table 27. WRM and WSS Program Expenditure Framework

SN	Budget Head	Governme nt program ('p') - 5 years	PforR Program ('P') - 5 years			Additional direct GOTN contributi on
			Govt. Funds	External Funds	Total	
Urban Water Resource Management and Resilience						
Water Supply and Sanitation						
CMWSSB						
3	Service improvement, NRW reduction and metering in core city (including strengthening of distribution network - capex cost + operator fee only)	82.0	41.0	41.0	82.0	41.0
4	Water Supply Network Improvement in core city area	71.4				
5	NRW monitoring in bulk water transmission and Wastewater system, including establishing SCADA, and some HH metering.	10.0	2.0	8.0	10.0	2.0
6	Providing Water Meters to commercial properties	1.3				
7	Increase water and sewerage network coverage in added areas	61.0	20.5	40.5	61.0	20.5
	Sub-total – WSS	225.7	63.5	89.5	153.0	63.5
Water Resource Management						
WRD						
8	Investments in hydrological data monitoring and management, including hydromet stations, SCADA, satellite-based performance monitoring, etc.	2.1	0.6	1.5	2.1	0.6
9	Undertake water accounting/auditing in CMA	0.4		0.4	0.4	
10	Establish a reservoir operation system including software system and adequate institutional arrangements	2.1		2.1	2.1	
11	Investments in resilient watersheds including reprofiling of drainage channels, groundwater recharge, rejuvenation of reservoirs, lake restoration, and water quality improvements	36.6	12.4	24.2	36.6	12.4
12	Comprehensive water resources assessment and investment options analysis for urban floods and droughts risk mitigation in Chennai	0.7		0.7	0.7	
13	Strengthen capacities of WRD staff, farmers, and other stakeholders	0.7		0.7	0.7	
	Sub-total – WRM	42.5	13	29.5	42.5	13
	Total – UWRM	268.2	76.5	119	195.5	76.5



5 Annexes

5.1 Indicative List of Water Security Investments

Table 28. Sample Investments for Water Security

Sl. No	Name of Work	Estimate Amount (in Crore)	Sub Basin	Yield [MCft]	Yield [MCM]	Cost of Capital Investment [Million Rs]	O&M Cost and Interest for Capital [Million Rs]	Total Investment [Million Rs]	Total Supply Quantity [MCM]	Rs/ KLts	\$/ KLts
1	Manimangalam Tank	15.00	Adayar Sub Basin	250	7.08	150.00	675.00	825.00	318.56	2.59	0.03
2	Sriperumbudur Tank	7.50	Adayar Sub Basin	364	10.31	75.00	337.50	412.50	463.83	0.89	0.01
3	Pillaipakkam Tank	7.50	Adayar Sub Basin	350	9.91	75.00	337.50	412.50	445.99	0.92	0.01
4	Rehabilitation of Minor/Urban Tanks	60.00	Adayar Sub Basin	1600	45.31	600.00	2700.00	3300.00	2038.79	1.62	0.02
5	Thiruneermalai Barrage across River Adayar (with Pumping)	105.00	Adayar Sub Basin	2250	63.71	1050.00	4725.00	5775.00	2867.05	2.01	0.03
6	Somangalam Check Dam in Adayar	4.68	Adayar Sub Basin	500	14.16	46.80	210.60	257.40	637.12	0.40	0.01
7	Orathur Reservoir with transfer link	55.84	Adayar Sub Basin	450	12.74	558.40	2512.80	3071.20	573.41	5.36	0.07
8	Kondangi Tank	10.00	Kovalam Sub Basin	250	7.08	100.00	450.00	550.00	318.56	1.73	0.02
9	Manamathy tank	10.00	Kovalam Sub Basin	200	5.66	100.00	450.00	550.00	254.85	2.16	0.03
10	Padalam Barrage across River Palar (with Pumping)	815.00	Lower Palar Sub Basin	2500	70.79	8150.00	36675.00	44825.00	3185.62	14.07	0.19
11	Kazhuveli Reservoir (with Pumping)	900.00	Nallavur Basin	4500	127.42	9000.00	40500.00	49500.00	5734.11	8.63	0.12
12	Chettipunniyam Abundant Quarry (with Pumping)	150.00	Lower Palar	1000	28.32	1500.00	6750.00	8250.00	1274.25	6.47	0.09



Sl. No	Name of Work	Estimate Amount (in Crore)	Sub Basin	Yield [MCft]	Yield [MCM]	Cost of Capital Investment [Million Rs]	O&M Cost and Interest for Capital [Million Rs]	Total Investment [Million Rs]	Total Supply Quantity [MCM]	Rs/ KLts	\$/ KLts
			Sub Basin								
13	Voyalur Reservoir (with Pumping)	1125.0	Lower Palar Sub Basin	4550	128.84	11250.00	50625.00	61875.00	5797.82	10.67	0.14
14	Thenneri Tank (with Pumping)	55.00	Lower Palar Sub Basin	550	15.57	550.00	2475.00	3025.00	700.84	4.32	0.06
15	Maduranthakam Tank	20.00	Kiliyar Sub Basin	500	14.16	200.00	900.00	1100.00	637.12	1.73	0.02
16	Chengalpattu Kolavoy tank	20.00	Lower Palar Sub Basin	800	22.65	200.00	900.00	1100.00	1019.40	1.08	0.01
17	Check Dams and Tanks in Kosasthalaiyar River Basin	150.00	Kosastha laiyar Basin	1500	42.47	1500.00	6750.00	8250.00	1911.37	4.32	0.06



5.2 Financial Analysis for CMWSSB

A review of the income and expenditure performance of CMWSSB and its cost recovery levels during 2014-15 and 2019-20 reveals that CMWSSB achieves about 40%-46% cost recovery through user charges and about 20%-33% through property tax revenues. The rest is recovered through grants from the GoTN. As Chennai increases its reliance on expensive desalination, the expectation under current plants is that the cost recovery through user charges will decline from current levels.

Under a Business-As-Usual Scenario, the *Figure 23* below provides the projected increase in O&M costs of CMWSSB by FY 26 and FY 31. As can be seen, the O&M costs are expected to go up from USD 132 million in FY 20 to USD 327 million by FY 26 and USD 518 million by FY 31. The GoTN grants required to meet the O&M costs for desalination are expected to increase from USD 39 million in FY 20 to USD 158 million in FY 26 and USD 190 million by FY 31. Taking into consideration the scenario in which the GoTN fully subsidizes the desalination costs, the remaining O&M costs of CMWSSB are projected to increase from USD 93 million in FY 20 to USD 169 million by FY 26 and USD 328 million by FY 31. User charge led cost recovery will achieve between 51% and 56% cost recovery till FY 26 and could fall to 46% by FY 31.

Figure 23. Business as Usual Scenario - Increase in O&M Costs (FY 20-31)

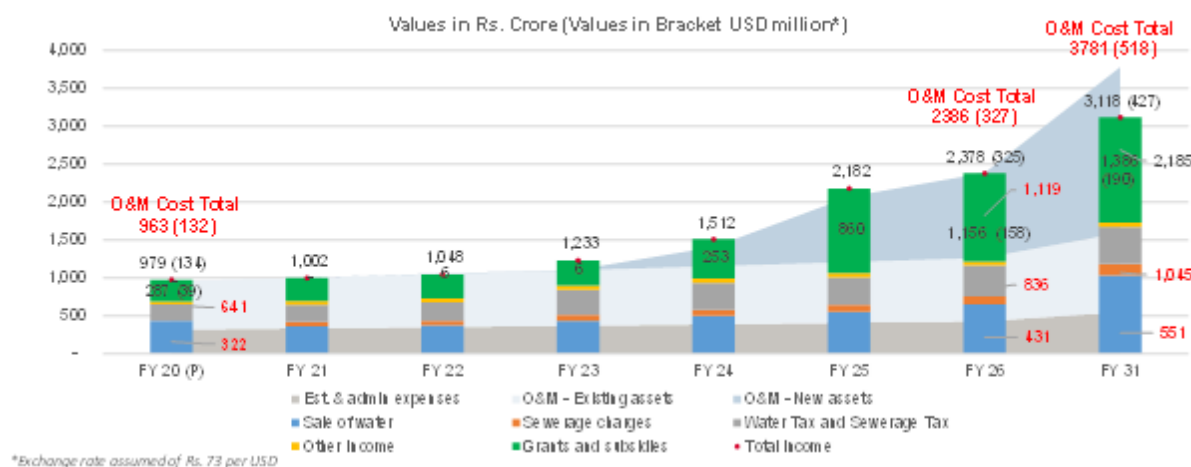
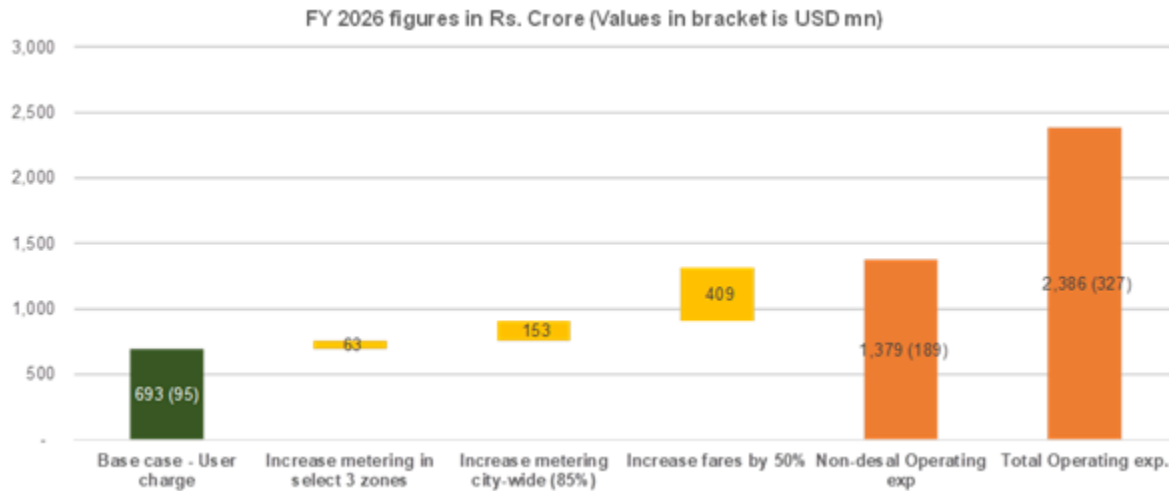


Figure 24 specifically analyzes the need for increasing user charges for meeting O&M costs by FY 26. This would require a shift to universal metering and volumetric basis of tariffs and billing. While Chennai has designed volumetric tariffs, these are not implemented due to very low levels of metering. The tariff design can also be rationalized to increase revenue through user charges, especially at the lower slabs. At present the volumetric metering charge at the lowest slab (0-10 kl) is only Rs 4 per KL and is much lower than peer cities like Bengaluru (Rs 7 per KL for 0-8 KL) and Hyderabad (Rs 10 per kl for 0-15 KL). Various scenarios have been considered to get a broad assessment of the implications of increasing metering and tariffs, including (a) base-case user charges, (b) increased metering in select three zones, (c) increased metering city-wide (85%), and (d) tariffs increased by 50%. The analysis shows that an increase in user charge realization by nearly 50% from the current levels would be required to achieve O&M cost recovery even without taking into consideration the desalination costs. An increase of more than 100% in user charge realization would be required to achieve full O&M cost recovery including desalination costs.



Figure 24. Increase in User Charges for O&M Cost Recovery



Following are the key points emerging from the financial analysis.

1. For the business as usual scenario, a commitment for GoTN subsidies will be required in the form of (a) revenue grant for desalination O&M costs which will increase from USD 39 million in FY 20 to USD 158 million by FY 26, and (b) capital grants support of USD 1.4 billion till FY 26.
2. In addition, revenue through user charges needs to increase by 50% during the next five years to meet 100% O&M cost recovery, after factoring the GoTN revenue grants for the desalination O&M costs.
3. Options for various combination of revenue grant and increase in user charges are possible based on how much revenue grants are affordable by the GoTN.



5.3 Interventions on Diet and Physical Activity: Summary Results from a Systematic Review

Settings	Impacts	Examples
Policy and environment	Effective interventions	<ul style="list-style-type: none"> Government regulatory policies to support a healthier composition of staple foods (e.g. replacing palm with soya oil reduces the saturated fatty acid content of the oil). Environmental interventions targeting the built environment, policies that reduce barriers to physical activity, transport policies, and policies to increase space for recreational activity. Point-of-decision prompts to encourage using the stairs (e.g. information on the benefits of physical activity beside elevators and stairs)
	Moderately effective interventions	<ul style="list-style-type: none"> Pricing strategies (fiscal policies) and point-of-purchase prompts in grocery stores, vending machines, cafeterias, and restaurants to support healthier choices Multi-targeted approaches to encourage walking and cycling to school, healthier commuting, and leisure activities
	Effective interventions	<ul style="list-style-type: none"> Mass media campaigns promoting physical activity: with community-based, supportive activities such as programs in schools and local communities; or associated with policies to address local environmental barriers to participation
	Moderately effective interventions	<ul style="list-style-type: none"> Intensive mass media campaigns using one simple message, e.g. increasing consumption of low-fat milk, or fruit and vegetables National 'health brand' or logos to assist consumers to make healthy food choices Long-term, intensive mass media campaigns promoting healthy diets
School settings	Effective interventions	<ul style="list-style-type: none"> High-intensity school-based interventions that focus on diet and/or physical activity, are comprehensive, multi-component and include: <ul style="list-style-type: none"> Curriculum on diet and/or physical activity taught by trained teachers Supportive school environment/policies A physical activity program A parental/family component Healthy food options available through school food services: cafeteria, vending machines, etc.
	Moderately effective interventions	<ul style="list-style-type: none"> A focused approach, for example programs aimed at reducing sedentary behavior and increasing participation in physical activity, accompanied by supportive activities within the curriculum A formative assessment that addresses the needs of the school and cultural contexts
Workplace	Effective interventions	<ul style="list-style-type: none"> Multi-component programs promoting healthy dietary habits and/or physical activity, that <ul style="list-style-type: none"> Provide healthy food and beverages at the workplace facilities, e.g. in the cafeteria or vending machines. Provide space for fitness or signs to encourage the use of stairs. Involve workers in program planning and implementation. Involve the family in interventions through self-learn programs, newsletters, festivals, etc. or



Settings	Impacts	Examples
		<ul style="list-style-type: none"> ○ Provide individual behavior change strategies and self-monitoring
Community	Effective interventions	<ul style="list-style-type: none"> • Diet education programs that: target high-risk groups (e.g. menopausal, pre-diabetic women); and are multi-component • Community development campaigns with inter sectoral cooperation and/or focused on a common goal (e.g. reduction in cardiovascular disease risk) • Group-based physical activity programs or classes for a homogenous group of individuals
	Moderately effective interventions	<ul style="list-style-type: none"> • Interventions that use an existing phone-in service to provide dietary advice • Community-wide interventions conducted as part of a national or global campaign (e.g. healthy lifestyles strategy or 'Healthy Village') in a homogenous community • Programs that target low-income/low-literacy populations and include diet education in the standard program • Computer/web-based interventions with interactive personalized feedback, targeting high-risk groups • Supermarket tours and on-site educational programs to support the purchase of healthier foods • Walking school bus
Primary care	Effective interventions	<ul style="list-style-type: none"> • Interventions targeting chronic NCD risk groups that <ul style="list-style-type: none"> ○ Include persons who are inactive, consume less than five servings of fruits and vegetables daily, consume a lot of dietary fat, are overweight, or have a family history of obesity, heart disease, cancer, and/or type 2 diabetes and ○ Include at least one session (health risk appraisal) with a health-care professional, with a brief negotiation or discussion to decide on reasonable, attainable goals, and a follow-up consultation with trained personnel who are supported by targeted information and are linked and/or coordinated with other stakeholders such as community sports organizations or ongoing mass media physical activity campaigns
	Moderately effective interventions	<ul style="list-style-type: none"> • Cholesterol screening programs that provide clients with their results and follow-up education, ideally in person • Weight loss programs using health professionals with <ul style="list-style-type: none"> ○ Personal or telephone/Internet consultations over a period of at least four weeks, and ○ A self-help program that includes self-monitoring.

Source: World Bank (2017) based on WHO (2009).