



**Conversion of Abandoned Quarries as
Water Reservoirs & Tertiary Treatment of
Waste Water for Industrial use in Chennai City**

With no perennial water source in the vicinity of the city, Chennai is primarily dependent on rainfall for its water supply. Water shortages and droughts have always been a part of its history. Ensuring uninterrupted water supply is vital for the viability of the dense industrial cluster of Chennai. The total industrial demand is around 100 MLD which is presently met from surface water and desalination. While the water sources remain constant, the demand has been steadily rising. The demand supply gap is 300 to 400 MLD (millions of litre/day).

Chennai faced its historically worst drought in 2019 as there was deficient rainfall during north-east monsoon of 2018 characterised by a 193 days long dry spell. Considering the constraints in creating new large water storage reservoirs for augmenting



the city water supply and meeting the ever-growing demand, Chennai Metropolitan Water Supply & Sewerage Board (CMWSSB), opted for unconventional and climate resilient sources of water supply.

In its effort to decentralize and identify additional sources for City water supply, CMWSSB found an opportunity to convert the abandoned mining quarries in the vicinity of Chennai into water storage reservoirs. As new storage reservoirs, abandoned stone quarries offer promise for expanding the available reservoirs for drinking water supply systems. This project is first of its kind and does not have any previous engineering references to rely upon.

Possibilities of using the stored water left stagnant in the abandoned quarries at Sikkarayapuram, Erumaiyur, Malayambakkam, Pammal, Thiruneermalai, Pallavaram and Nanmangalam were explored. 25 quarries at Sikkarayapuram & 10 quarries at Erumaiyur were taken up, due to their proximity to the existing Water

Treatment Plant at Chembarambakkam. Quality of water was studied for 54 parameters in compliance with IS-10500-1991 standards including radioactivity and was found suitable for consumption after conventional treatment. Detailed bathymetric and topographic studies were undertaken for quantity and designing the engineering system. The water evacuation operation both for inter basin transfer and transmission to water treatment plant had to be carried out in a treacherous terrain. Entire activity was done in 45 days, in the midst of the drought.

Augmentation of storage capacity of the city by at least 1000 mcft. and around 5000 Million litres of

water could easily be tapped in a year for city water supply. During 2019, around 30 MLD was drawn for more than 6 months from Sikkarayapuram quarries which was around 6% of the total water supplied and 10MLD was drawn from Erumaiyur quarries. Conversion of abandoned quarries into water storage reservoirs is cost effective compared to other options.

Unlike conventional reservoirs, quarries are very deep and store large quantity of water over a smaller surface area. Rocky nature of the reservoirs allow minimal losses due to seepage and offer storage of excess water during floods thereby acting as a flood mitigator.



Quarrying sites are free of habitations and not easy to be encroached upon, due to which rainwater in their catchment areas can be harnessed efficiently with minimal surface runoff. The concept is easily replicable across the country. Use of quarries as a storage reservoir has been a game changer in Chennai's water supply, given that it is among the most cost-effective intervention with no negative environmental impact.

Chennai city has 12 Sewage Treatment plants at 4 locations with a total installed capacity of 727 MLD. Around 550 MLD of secondary treated effluent is discharged into waterways. In order to supply water to various Industries, CMWSS Board have constructed two tertiary treatment reverse osmosis (TTRO) plants of 45 MLD capacity each expandable to 60 MLD at Koyambedu and Kodungaiyur, and laid conveying pipeline to supply product water to industries.

540 industries from two industrial corridors are the beneficiaries of this technological intervention. The plants were established with funding from Atal Mission for Rejuvenation and Urban Transformation (AMRUT) scheme and World Bank. Chennai is the first Indian city to recycle and reuse 20% of its sewage.

It has resulted in improvement in the availability of water for domestic supply by 90 MLD due to swapping of present fresh water source for industries with reuse water. The dependence of industries on Ground water is completely reduced. With reduced discharge of waste water into water ways, their contamination has been considerably controlled. The treated water is devoid of any physical, chemical or biological contaminants. The TDS level is less than 70 mg/l which is much less than that of conventional tap water which is around 250 mg/L.

