

Technical Tour 1 – Upper Elahera Tunelling Project

One-day Technical Tour Scheduled for Dec. 6, 2023; Registration fee: US\$ 75

Minimum Number of Participants Needed for the Technical Tour: 4

Longest Irrigation Tunnel in South Asia: Upper Elahera Water Conveyance Tunnel in Sri Lanka

The longest Irrigation tunnel in South Asia is currently being constructed in Sri Lanka. The Upper Elahera Canal project is about 66 km long. It consists of 27.7 km long TBM tunnels, 4.2 km long NATM tunnels, and about 34 km of open ground canals.

The Upper Elahera Canal project is a part of the Mahaweli Water Security Investment Program (MWSIP) which is the largest and giant infrastructure development project in the history of Sri Lanka. The giant project is implemented by the Government of Sri Lanka to improve the irrigation and water needs of the water-lacking North Central and North Western provinces. The MWSIP program comprises mainly the following three projects.

1. Minipe Left Bank Canal Rehabilitation Project (MLBCRP) – The contract amounts to US \$ 122 million, including a 77.8 km long open canal conveying Mahaweli water diverted from Minipe to Moragahakanda reservoir. This project will be completed by the end of 2023.
2. North Western Province Canal Project (NWPCP) – The contract amounts to US \$ 56 million. The project diverts water from the Bowathanna reservoir to the dry zone in the North Western province of Sri Lanka. This project will be completed by the end of 2023. The total length is about 22.7 km long including short rock tunnels and open canals.
3. North Central Province Canal Project (NCPCP) – The contract amounts to US \$ 377 million.
 - 1st component - Construction of Kalu Ganga-Moragahakanda Transfer Canal (including 7.9 km of tunnels and open canals) that will transfer water between the Kalu Ganga and Moragahakanda reservoirs.
 - 2nd component - Upper Elahera Canal Project (UECP): Construction of the Canal connecting the Moragahakanda tank to ancient Huruluwawa, Manankattiya, Eruwewa, and Mahakanadarawa tanks. These reservoirs feed existing irrigation and water supply schemes.

The Upper Elahera Canal Project

The Upper Elahera Canal Project is constructed to transfer 806 MCM (millions of cubic meters) of water annually from the Moragahakanda reservoir to the Huruluwawa tank in the North Central province of Sri

Lanka. The total canal length is about 66 Km. The total canal length consists of about 34 Km in an open canal or aqueduct and 32 km in an underground rock tunnel. The TBM tunnel section of 27.7 km long is excavated using two mechanized tunnel boring machines and another 4.2 km is excavated using the NATM tunneling method.

At the initial stage, in the year 2021, only one TBM was deployed and excavation of the tunnel section was commenced from the Northern portal towards the Southern portal. At that stage, the project was expected to be completed in the year 2027. However, in the year 2022, the Government of Sri Lanka decided to accelerate the project progress and proposed an additional identical TBM to the Southern portal and commenced subsequent TBM excavation towards the Northern portal. Accordingly, the project is now scheduled to be completed in the year 2025.

It is recorded as the longest underground irrigation tunnel in South Asia. The project contractor is China State Construction Engineering Corporation Ltd. The tunnel route has been designed as the shortest pathway avoiding lengthy concrete open canal sections which required construction through highly environmentally sensitive forest reservations in Sri Lanka.

Main features of the Upper Elahara Canal Project (One of the projects of the MWSIP)

Excavation diameter of the tunnel	8.6 m
The total length of the tunnel at UECP	About 32 km (27.7 km – by TBM, 4.2 km by NATM)
Dominant rock type	Biotite gneiss rock
Funding source	Asian Development Bank (85 %) Government of Sri Lanka (15 %)
Total water conveyance	806 MCM / annually

Details of TBM 01

Excavation Diameter	8.6 m
The total length of the TBM	176 m
Cutter geometry	Outer disc cutters: 46, Face disc cutters: 42, Center disc cutters: 8



Figure 1: A Team of the project in front of the TBM machine before the commencement of excavation



Figure 2: Northern portal TBM (TBM 01) sinking shaft



Figure 3: Southern portal TBM (TBM 02) ready to excavate