Tunnel and Reservoir Plan (TARP)

The 7.9 billion gallon Thornton Reservoir, part of the Calumet TARP system.

The Tunnel and Reservoir Plan (TARP), also known as "Deep Tunnel," is a system of deep, large diameter tunnels and vast reservoirs designed to reduce flooding, improve water quality in Chicago area waterways and protect Lake Michigan from pollution caused by sewer overflows. TARP captures and stores combined stormwater and sewage that would otherwise overflow from sewers into waterways in rainy weather. This stored water is pumped from TARP to water reclamation plants (WRPs) to be cleaned before being released to waterways. The four TARP tunnel systems are designed to flow to three huge reservoirs, and the system will have a capacity of 20.55 billion gallons when complete. That is 5,480 gallons for each person in its service area. One of the largest civil engineering projects on earth, TARP has been extremely effective and widely emulated since the initial tunnels went online in 1981.

The Challenge: Combined Sewer Overflows

Like many older cities, Chicago has a combined sewer system in which sanitary sewage from homes, offices and industries drain into the same pipes as stormwater. Most of these combined sewers were built before wastewater treatment existed and were designed to drain directly into rivers. In the early 20th century, the Metropolitan Water Reclamation District of Greater Chicago (MWRD) built large intercepting sewers to redirect sewers to newly built WRPs to clean the water. This system works well in dry weather, but in heavy rains the intercepting sewers and WRPs can reach capacity and result in combined sewer overflows (CSOs) to the river, impairing water quality and contributing to flooding.

Planning TARP

As development spread through the Chicago area in the early 20th century, paved surfaces directed increasing amounts of stormwater runoff into the combined sewer system. By the 1960s, Chicago area sewers were overflowing to the river more than 100 days a year and flooding had become a persistent issue. In 1967, officials of the MWRD, the state of Illinois, Cook County and the city of Chicago formed the Flood Control Coordinating Committee to find a solution to the region's flooding and water pollution problems caused by combined sewer overflows. The committee considered 50 alternatives and selected TARP as the most cost-effective approach to providing maximum benefits with minimal negative impacts. The most obvious solution, replacing combined sewers with separate storm and sanitary pipes, was determined to be too costly, disruptive to communities, and unable to provide flood relief. The MWRD officially adopted TARP as the area's plan to comply with federal and state water quality standards in 1972.

Construction and Status

TARP tunnel construction began in 1975. Construction was planned so that completed portions of the system could be put into operation as work continued elsewhere. The scale and depth of the project was unlike anything previously undertaken and required innovative approaches to tunneling. Newly-developed tunnel boring machines were used instead of traditional blasting to minimize vibrations, expedite progress, reduce damage to surrounding rock and lower costs for long sections of tunnels. To protect groundwater from leakage and protect the tunnels from water infiltration, cracks in the limestone

TARP Overall

- 20.55 billion gallons (BG) total capacity
- 109 miles of tunnels, 2.3 BG capacity
- Three reservoirs, 18.25 BG capacity
- 352 square mile service area
- 3.75 million people within service area
- Over $180 million annual flood damage savings
- 1.5 million structures protected from flooding
- Phase 1 (Tunnels) completed 2006
- Phase 2 (Reservoirs) to be completed 2029

Upper Des Plaines Tunnel System and Majewski Reservoir

- **Service area:** 11 square miles
- **Tunnels:** 0.07 BG capacity, 6.6 miles
- **Gloria Alitto Majewski Reservoir:** 0.35 BG capacity

Benefiting Communities:

Arlington Heights
Des Plaines
Mount Prospect

Des Plaines Tunnel System

- **Service Area:** 32 square miles
- **Tunnels:** 0.4 BG capacity, 25.6 miles
- **Reservoir:** McCook Reservoir

Mainstream Tunnel System

- **Service Area:** 220 square miles
- **Tunnels:** 1.2 BG capacity, 40.5 miles
- **Reservoir:** McCook Reservoir

McCook Reservoir

- **Capacity:** 10 BG
- **Service Area:** 254.7 square miles
- **Tunnel Systems:** Mainstream and Des Plaines
- **Completion Schedule:** Stage 1, 2017 (3.5 BG); Stage 2, 2029 (6.5 BG)

Benefiting Communities:

Bedford Park
Berwyn
Broadview
Brookfield
Chicago
Cicero
Des Plaines
Elmwood Park
Evanston
Forest Park
Forest View
FranklinPark
Golf
Harwood Heights
Hometown
Kenilworth
La Grange
La Grange Park
Lincolnwood
Lyons
Maywood
Melrose Park
Morton Grove
Niles
Norridge
North Riverside
Oak Park
Park Ridge
River Forest
River Grove
Riverside
Schiller Park
Skokie
Stickney
Summit
Western Springs
Wilmette

Thornton Reservoir and Calumet Tunnel System

- **Service area:** 91 square miles
- **Tunnels:** 0.63 BG capacity, 36.7 miles
- **Thornton Reservoir:** 7.9 BG capacity

Benefiting Communities:

Blue Island
Burnham
Calumet City
Calumet Park
Chicago
Dixmoor
Dolton
Harvey
Lansing
Markham
Phoenix
Posen
Riverdale
South Holland

were sealed with grout and the tunnels were lined with concrete. The Upper Des Plaines Tunnel System, located near O'Hare Airport, went online in 1981 and the entire tunnel system was operational in 2006.

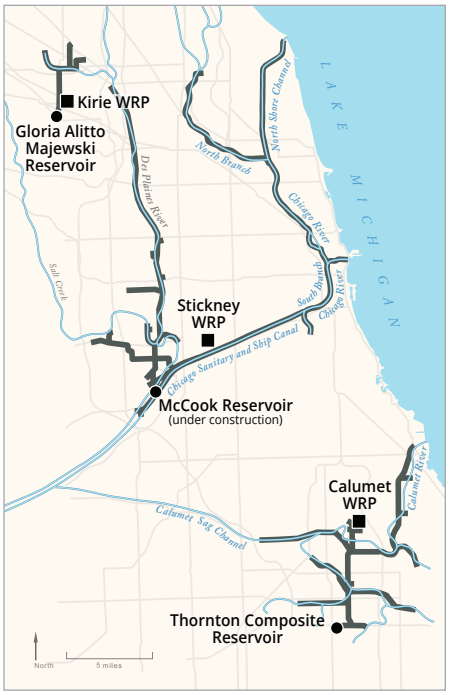
The smallest of the TARP reservoirs, Gloria Alitto Majewski Reservoir was completed in 1998. Thornton Reservoir was completed in 2015 and yielded nearly instant benefits. The first stage of McCook Reservoir went online in 2017. Partnering with commercial quarries has allowed these huge reservoirs to be completed economically and efficiently.

Construction at the confluence of the McCook Reservoir Connecting Tunnel (left) and Mainstream Tunnel (right)

Benefits

TARP has been extremely successful in preventing flooding and pollution caused by combined sewer overflows and will be more effective when the larger reservoirs are online. Since the tunnels became operational, CSOs have been reduced from an average of 100 days per year to 50. Since Thornton Reservoir came online in 2015, CSOs have been nearly eliminated. As water quality has improved, our waterways have become home to increasingly healthy and diverse fish populations and popular destinations for recreation. Other cities around the world have taken note of TARP's success and are now undertaking similar deep tunnel projects.

TARP Tunnels and Reservoirs



How TARP Works