# **Building a Resilient Chicago**

# Metropolitan Water Reclamation District of Greater Chicago

W-SMART 2017 Workshop November 3-4, 2017 Edward W. Podczerwinski, PE Director of Monitoring and Research



Metropolitan Water Reclamation District of Greater Chicago (District)

- History of Chicago and the District
- Overview of collection systems in Chicago
- How we manage stormwater
- What the future holds







#### CHICAGO IN 1820.





Population:

Chicago 1832

1831: 60 1832: 150 1834: 1,800 1837: 4,170 (Chicago is incorporated ) 1846: 14,169



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### Chicago 1857

Population 1856: 84,113 1860: 112,172 1880: 503,185 1890: 1,099,850 1894: 1,567,657









Chicago Drinking` Water Intake - 1867









Attend immediately to all disorders of the Bowels.

TAKE NO MEDICINE WITHOUT ADVICE.

Medicine and Medical Advice can be had by the poor, at all hours of the day and night, by applying at the Station House in each Ward.

CALEB & WOODHULL, Mayor JAMES KELLY, Chairman of Sanatory Committee.





- The District was created in 1889
- Mission: Protect the quality of the water supply source
- Decided to reverse the flow of the Chicago River entirely













#### **Local Sewers and Lateral Connections**



#### **Intercepting Sewers**

#### **MWRD Intercepting Sewer** Flows to MWRD water reclamation plants

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#### **Combined Sewer Overflows**





#### **TARP Reservoirs**



# Metropolitan Water Reclamation District of Greater Chicago

- Tunnel and Reservoir Plan (TARP or Deep Tunnel)
  - Phase I Tunnels
    - 109 Miles of CSO Tunnels (175 km)
    - 2.7 Billion Gallons of storage (10.2 millions cubic meter)
    - 8-ft to 30-ft in Diameter (2.4 m to 9.2 m)
    - 150-ft to 300-ft deep (45 m to 91 m)
  - Phase II Reservoirs
    - Majewski Reservoir 350 Millions Gal. (1.3 millions cubic meter)
    - Thornton Reservoir 7.9 Billion Gal. (29.9 millions cubic meter)
    - McCook Reservoir-10 Billion Gal. (37.9 millions cubic meter)

-Stage 1 (2017) - 3.5 Billion Gallons (13.3 millions cubic meter)

-Stage 2 (2029) - 6.5 Billion Gallons(24.6 millions cubic meter)

## Metropolitan Water Reclamation District of Greater Chicago

- 7 Wastewater Treatment Plants
  - Over 2 Billion Gallons per Day of treatment capacity (7.6 millions cubic meter/day)
  - The District treats an average of 1.4 Billion Gallons per Day (5.3 millions cubic meter/day)
- 560 miles of intercepting sewers and force mains: 6 inches to 27 feet in diameter (0.15 m to 8.23 m)
- 22 Pumping Stations

# TARP: Majewski Reservoir



#### **TARP: Thornton Composite Reservoir**





### TARP: McCook Reservoir, Phase 1



#### Building a Resilient Chicago







#### Stormwater Management 2004 – Authority



In 2004, District decided we wanted to do more. We went to Springfield and asked to take over stormwater authority for entire Cook County.



### **Stormwater Program Summary**

Program Component	Current Number of Projects	Structures Protected / Removed	Construction / Acquisition Cost (\$Million)
Phase I	27	4,423	\$369
Phase II Shovel Ready	21	3,146	\$81
Green Infrastructure	25	717	\$48
Flood Prone Property Acquisition	9	201	\$61
Totals	82	8,487	\$559



Virgil Grissom Elementary School Before

MANAZANAZANAZANAZANA

ŠPACE TO GROW Virgil Grissom Elementary School After

CREENING CHICACO

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SCHOOLYARDS

ALXING

# **Property Buyout Program**

#### Flood Prone Property Acquisitions



Municipality	# of Structures to be Removed	Total Cost	Completion Date
Des Plaines (1)	13	\$3,999,810	2017
Riverside Lawn	39	\$12,000,000	2017
Flossmoor	2	\$688,538	2017
Northlake	7	\$1,184,018	2018
Wheeling Twp.	6	\$1,415,906	2018
Stone Park	35	\$2,700,000	2019
Franklin Park	32	\$5,200,000	2019
Des Plaines (2)	29	\$15,730,281	2019

#### Small Streams Maintenance Program

- The Small Streams Maintenance Program established in 2006 follows MWRD's stormwater management mission to relieve flooding in urbanized areas through immediate and relatively simple remedies.
- The objective of the program is to remove obstructions and debris in the waterways that impede the natural drainage of small streams and rivers.

#### **Small Streams Maintenance Program**

Year	Little Calumet Watershed	Cal-Sag Watershed	Lower Des Plaines River Watershed	North Branch of the Chicago River Watershed	Upper Salt Creek Watershed	Poplar Creek Watershed	Total
2007	7,640	5,260	3,160	1,730	0	0	17,790
2008	10,310	7,910	5,290	2,170	3,300	2,320	31,300
2009	9,330	9,890	11,065	11,460	370	2,650	44,765
2010	6,472	9,482	10,832	4,692	1,585	1,651	34,714
2011	9,526	3,195	12,874	4,338	645	184	30,762
2012	7,414	5,564	5,310	4,313	590	201	23,392
2013	7,405	8,115	10,038	4,532	480	250	30,820
2014	3,615	5,200	9,939	1,896	1,095	150	21,895
2015	6,545	5,860	8,691	1,606	491	380	23,573
2016	5,650	7,985	5,265	3,769	629	140	23,438
Total	73,907	68,461	82,464	40,506	9,185	7,926	282,449

#### Watershed Management Ordinance

The WMO requires developers to account for stormwater when developing.

If developers plan to remove greenspace that naturally absorbs water, they are required to implement a plan for replacing that water detention. Green Infrastructure

Appendix Law

Bioswales provide stormwater relief and add curb appeal along Cermak Ave. in Chicago's Pilsen neighborhood.

# **Permeable Pavement**

# Rain Gardens

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## Rain Barrels

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#### HOW TO PLANT AND CARE FOR YOUR TREE

Here are a few hints to help you plant and care for your tree.

- Keep your tree in a cool place and do not take it out of its container until you are able to plant it. Restore the Canopy saplings are distributed in MWRD composted biosolids, a sustainable alternative to chemical fertilizers produced by co-composting products of the wastewater treatment process with locally available woodchips.
- If you received a bare-root sapling (not in a container), plant your sapling within two days for best results.
- Plant your tree where it will receive full to partial sunlight and in a location where it has room to grow; full grown oak trees range from 50 to 80 feet tall. Do not plant under a power line or too close to any structures.
- Dig a hole wide enough to let the roots spread out completely and deep enough to cover the roots. The topmost roots should be at ground level.
- Fill the hole with soil, making sure the tree is straight by pressing around the stem. Water the tree after filling the planting hole until water accumulates on the surface.
- If you use mulch, keep it away from the trunk.
- Keeping your tree watered is important during its first year. Keep the soil moist but not soggy. In dry weather, you should water every 7–10 days. Avoid watering so much that you see standing water. No need to water once the ground freezes.
- Remember to use good gardening hygiene.





#### **Board of Commissioners**

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Restore the Canopy is made possible through a partnership with



CHICAGO REGION TREES INITIATIVE Our Trees. Our Communities. Our Future.



Metropolitan Water Reclamation District of Greater Chicago





#### Planting and Caring for Your Free MWRD Tree

### Work in Robbins

MWRD performed study of the flooding impacting >140 acres (~20% of total land in Robbins or 0.22 sq. miles)
Identified cause and extent of the problem

Developed traditional solutions







### Challenges of the Previous Work

> Engineered solutions focused only on stormwater management

- Effective, but high cost (\$6M)
- Provided 25-year level of protection
- Solution impacted at least some homes
- Plans for future development incomplete and not integrated with stormwater alternatives
- No added benefits beyond flood control

# **Opportunities**

"Let's design a flood control solution that will maximize local assets and spur economic development."



### Village of Robbins

MWRD's goal is to redefine the meaning of infrastructure investment by implementing solutions that not only promote resiliency, but also promote the economic growth, health, and "well being" of a community.

#### **Technical Experts:**

**Cook County Department of** Transportation and Highways **Regional Transit Authority Illinois Department of Natural Resources** Chicago Botanic Garden The Nature Conservancy South Suburban Mayors & Managers Association

Stewards/Workforce: **U.S.** Department of **Defense / Innovative Readiness Training** Program Morton Arboretum **Chicago Botanic Garden** OAI, Inc. **Illinois Department of** Natural Resources -Millennium Reserve

#### **Funders/Influencers** Cook County

U.S. Department of Housing and Urban Development **Illinois Housing Development Authority**  Illinois Department of Natural Resources The Nature Conservancy South Suburban Mayors & Managers Association **Metropolitan Planning** 

#### Council

**Other Interested Partners: Illinois Environmental Protection Agency Forest Preserve District** of Cook County **Chicagoland Metropolitan** Argonne National Lab Illinois Association of Park Districts

**Potential Private Partners: UIC's Voorhees Center Impact Engine MacArthur Foundation Grand Victoria** Ebimetaticommunity Trust **Rural Studio** Corvias **Owner of Robbins Power** Center Miller Canfield

Land Holders: South Suburban Land Bank and Development Authority

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**Cook County Land Bank** Authority Housing Authority of Cook County **OpenLands** 

Core Group for Infrastructure and Pre-Development Leadership: Village of Robbins Metropolitan Water **Reclamation District Cook County** South Suburban Land Bank and Development Authority Metra

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# Thank you!